



Co-funded by the
Erasmus+ Programme
of the European Union

Learn2Analyze (L2A)

An Academia-Industry Knowledge Alliance for enhancing Online Training Professionals' (Instructional Designers and e-Trainers) Competences in Educational Data Analytics



Learn2Analyze

Erasmus+ Program

Knowledge Alliances (Key Action 2)

AGREEMENT NUMBER: 2017 - 2733 / 001 – 001

PROJECT NUMBER: 588067-EPP-1-2017-1-EL-EPPKA2-KA

R6a. Learn2Analyze MOOC Learning Materials (Phase A)

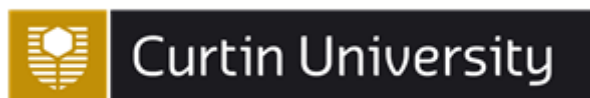
Document Control Page

WP	WP3
Result	R5
Title	Learn2Analyse MOOC Learning Materials (Phase A)
Result type	Report
Lead Partner	P1 (UPRC)
Planned Due Date	M16
Completion Date	M14, 16, 18
Lead Author(s)	Demetrios Sampson, Editor (UPRC)
Contributors	Dimitra Vinatsela, Sofia Mougiakou, Demetrios Sampson (UPRC): Module 1, 2, 8 Zacharoula Papamitsiou, Michael Giannakos (NTNU): Module 3 Dirk Ifenthaler, Marc Egloffstein (UMA): Module 4 Deborah Couëdelo, Mary Jones (eN): Module 5 Elisabetta Parodi, Laura Brambilla, Maria La Porta (LL): Module 6 Uta Schwertel, Samandar Atoev [IMC]: Module 7, 1 Lina Pelliccione(CU): Modules 1, 2, 8
Reviewer(s)	Demetrios Sampson (UPRC): Modules 3, 4, 5, 6, 7 Zacharoula Papamitsiou, Michael Giannakos (NTNU): Module 1, 2, 4, 8 Dirk Ifenthaler (UMA): Module 1, 3, 4, 8 Deborah Couëdelo, Mary Jones (eN): Module 1, 6, 7, 8 Elisabetta Parodi (LL): Module 1, 5, 7, 8 Uta Schwertel, [IMC]: Module 5, 6, 8
Dissemination level	PU- Public

Disclaimer:

*The **Learn2Analyze project results** are developed with co-funding by the European Commission through the **Erasmus+ Program** of the European Union (Cooperation for innovation and the exchange of good practices - **Knowledge Alliances**, Agreement n. 2017-2733 / 001-001, Project No 588067-EPP-1-2017-1-EL-EPPKA2-KA). The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflects the views only of the authors, and the Commission will not be held responsible for any use which may be made of the information contained therein.*

Learn2Analyse Consortium



Contact

Professor Demetrios Sampson, Learn2Analyse Project Co-ordinator

Department of Digital Systems, University of Piraeus,
80, Karaoli and Dimitriou Street, Piraeus, 18534 / Greece

Phone: +30-210-4142766

E-mail: sampson@unipi.gr

Module 1	Orientation
Module 2	Educational Data
Module 3	Learning Analytics
Module 4	Teaching Analytics
Module 5	Educational Data Analytics with Moodle
Module 6	Educational Data Analytics with eXact Suite
Module 7	Educational Data Analytics with IMC Learning Suite
Module 8	Concluding the MOOC

Learn2Analyze

Knowledge Alliances (Key Action 2)

AGREEMENT NUMBER: 2017 - 2733 / 001 – 001

PROJECT NUMBER: 588067-EPP-1-2017-1-EL-EPPKA2-KA

WP3. Learn2Analyse MOOC Design and Development

Result 6a Learn2Analyze MOOC version 1 Learning Materials

Module 1: Orientation

Module 1

Orientation

Welcome!



Learn2Analyze

Hello and welcome to the **Learn to Analyze Educational Data and Improve your Blended and Online Teaching** Massive Open Online Course (MOOC).

This MOOC aims to support the development of the basic competences for Educational Data Analytics of Online and Blended teaching and learning.

It targets:

- **instructional designers** and **e-tutors** of online and blended courses, as well as,
- **school teachers** of blended learning courses (using the flipped classroom model).

It combines

- **theoretical knowledge** on core issues related to collecting, analysing, interpreting and using educational data, including ethics and privacy, with

- **practical experience** of applying educational data analytics in three different e-learning platforms, namely, Moodle, the eXact Suite and the IMC Learning Suite.

The MOOC has been developed by an international Academia-Industry consortium within the action **Learn2Analyze** — *An Academia-Industry Knowledge Alliance for enhancing Online Training Professionals' (Instructional Designers and e-Trainers) Competences in Educational Data Analytics* which is co-funded by the European Commission through the **Erasmus+ Program** of the European Union (Cooperation for innovation and the exchange of good practices - **Knowledge Alliances**, Agreement n. 2017-2733 / 001-001, Project No 588067-EPP-1-2017-1-EL-EPPKA2-KA). The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflects the views only of the authors, and the Commission will not be held responsible for any use which may be made of the information contained therein.

More information about the project is available at www.learn2analyze.eu.

We're excited to offer this new course and we do hope you will enjoy learning about *analyzing Educational Data to improve your Blended and Online Teaching!*

VIDEO:

[Learn2Analyze - Learn to Analyze Educational Data and Improve your Online Teaching](https://www.youtube.com/watch?v=hWm533GpMKg)

<https://www.youtube.com/watch?v=hWm533GpMKg>

This is the course for you!

No previous knowledge related to Educational Data Analytics is needed. Join us *and* a large community of innovative instructional designers and educators from around the globe to become the pioneers of Educational Data Analytics in your workplace.

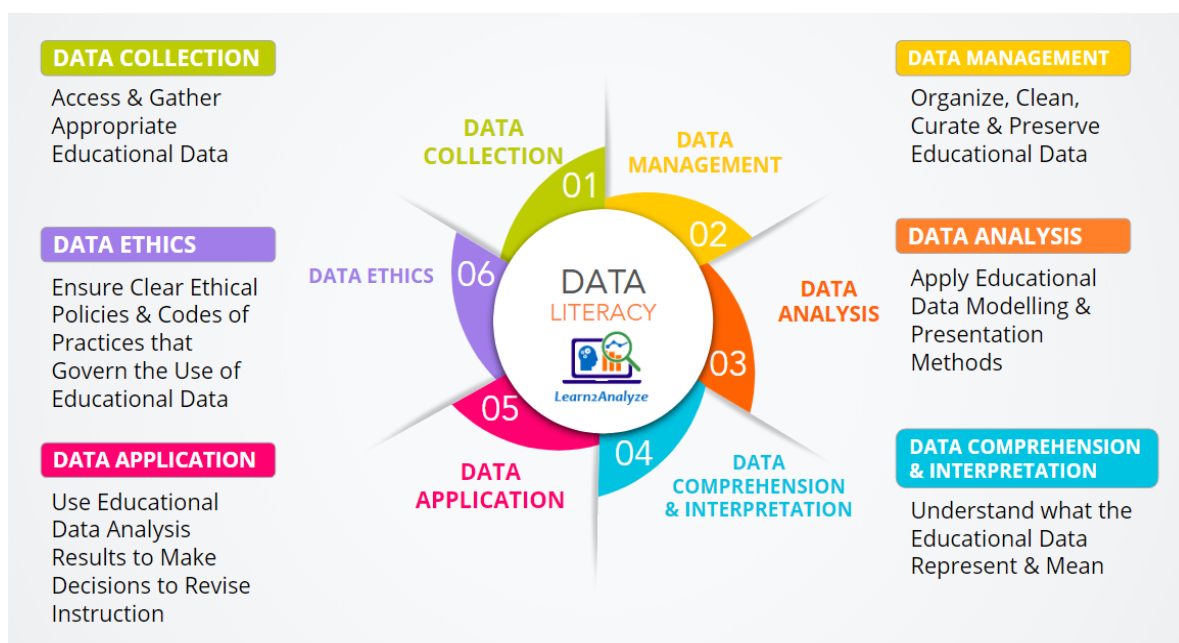
[END OF PAGE]

What you will learn

By completing this course you will:

- *know* where to locate useful educational data in different data sources and *understand* their limitations;
- *know* the basics for managing educational data to make them useful, *understand* relevant methods and *be able* to use relevant tools;
- *know* the basics for organising, analysing, interpreting and presenting learner-generated data within their learning context, *understand* relevant learning analytics methods and *be able* to use relevant learning analytics tools;
- *know* the basics for analysing and interpreting educational data to facilitate educational decision making, including course and curricula design, *understand* relevant teaching analytics methods and *be able* to use relevant teaching analytics tools;
- *understand* issues related with educational data ethics and privacy.

The learning outcomes of this course cover the set of competences anticipated by the **Learn2Analyse Educational Data Literacy competence framework**.



[END OF PAGE]

Course Length

Start Date: **October 21th, 2019**

End Date: **December 14th, 2019**

This course is open for **eight (8) weeks** and consists of **eight (8) modules** including six (6) core modules, one orientation and one concluding module.

The expected effort from your side to complete the basic requirements for the **Certificate of Achievement** is approximately **sixty-eight (68)** hours in total.

Let's take a look at what each module will cover on the next page.

[END OF PAGE]

Course Overview

Module 1: Orientation

This module offers the opportunity to become familiar with the MOOC platform, the course structure and the course policies.

Estimated Effort to complete: **4** hours

Assessment Multiple Choice Questions: -

Module 2: Educational Data

This module will introduce the concept of educational data as a key success factor for online and blended teaching and learning, present the Learn2Analyze framework for educational data literacy competences and discuss the fundamentals of educational data collection and management, including issues related with ethics and privacy.

Estimated Effort to complete: **12** hours

Assessment Multiple Choice Questions: **25**

Module 2 Learning Objectives	Learn2Analyze Educational Data Literacy Competence Profile
Learn how educational data can support successful online and blended courses	1.1
Understand the importance of data-driven decision making to continuously improve the online and blended teaching and learning	5.1
Recognise the value of Educational Data Literacy to make data-informed reflections on the design and delivery of instruction	5.2
Know the different types of Educational Data in Online and Blended courses	1.1
Know the different Educational Data Sources related to core elements of e-learning environments	1.1
Know and Understand the most common quality issues of raw educational data	1.2
Understand data cleaning methods for educational datasets	2.1
Understand the advantages of enhancing educational data through data description	2.2

Understand the need for data curation in educational data management	2.3
Be able to identify storage issues for preserving educational data	2.4
Understand the importance of informed consent as a key Ethical Principle of Educational Data	6.1
Understand the significance of educational data protection policies	6.2

Module 3 - Learning Analytics

This module will introduce the basics of methods and tools for analysing and interpreting online learners' data to facilitate their personalised support. It will focus on organising, analysing, presenting and interpreting learner-generated data within their learning context, as well as on ethical concerns and policies for protecting learner-generated data from mistreatment and misuse.

Estimated Effort to complete: 8 hours

Assessment Multiple Choice Questions: 15

Module 3 Learning Objectives	Learn2Analyse Educational Data Literacy Competence Profile
Know what the common measurements of learner data and their contexts are, and understand the processes needed to collect both learner and context data in online and/or blended learning settings	1.1
Be able to identify and describe the limitations and quality measures on collecting learners' data in online and/or blended learning settings	1.2
Know methods for learners' data analysis and modelling as part of learning analytics methods	3.1
Know and understand learner-generated data presentation methods	3.2
Know and understand learners' data properties in learning analytics	4.1
Be able to identify and discriminate statistics commonly used for the interpretation of educational data in learning analytics	4.2
Be able to elaborate on the insights from learners' data	4.3

analysis	
Know and understand the methods that can be used to protect individuals' data privacy, confidentiality, integrity and security in learning analytics	6.2

Module 4 - Teaching Analytics

This module will introduce the basics of methods and tools for analysing and interpreting educational data for facilitating educational decision making, including course and curricula design.

Estimated Effort to complete: **8** hours

Assessment Multiple Choice Questions: **15**

Module 4 Learning Objectives	Learn2Analyse Educational Data Literacy Competence Profile
Know how to identify data sources within the educational design process	1.1
Be able to explain key concepts of data quality for data collected in the educational design process	1.2
Be able to design automated and semi-automated interventions based on educational data	4.4
Know and understand how to revise course tasks and contents based on educational data	5.1
Be able to construct adequate criteria and indicators for evaluating the impact of a data-driven intervention in educational design of online and blended courses	5.2
Be able demonstrate awareness of data privacy and distinguish between different levels of data protection in educational design of online and blended courses	6.2
Be able to explain the differences between the concepts of authorship, ownership, data access, renegotiation, and data-sharing in education design	6.3

Module 5 - Educational Data Analytics with Moodle

This module will present tools for educational data analytics in Moodle and focus on the use of these tools to support school teachers in the design and delivery of their online and blended learning courses.

Estimated Effort to complete: **12** hours

Assessment Multiple Choice Questions: **25**

Module 5 Learning Objectives	Learn2Analyse Educational Data Literacy Competence Profile
Know how to obtain, access and gather the appropriate educational data in Moodle	1.1
Be able to apply informed consent within Moodle	6.1
Be able to apply educational data privacy and distinguish between different levels of data protection within Moodle	6.2
Demonstrate an understanding of key data analysis and modelling methods and how they are applied to teaching and learning in Moodle	3.1
Understand how to communicate your interpretation of the educational data in an intuitive accessible way within Moodle	3.2
Be able to interpret insights from educational data analysis within Moodle	4.3
Be able to elicit potential implications of the educational data insights from data analysis to instruction within Moodle	4.4
Be able to use educational data analysis results to make decisions to revise instruction within Moodle	5.1

Module 6 - Educational Data Analytics with eXact Suite

This module will present tools for educational data analytics in the eXact Suite and focus on the use of these tools to help instructional designers and e-tutors of online courses in supporting online learners.

Estimated Effort to complete: **10** hours

Assessment Multiple Choice Questions: **10**

Module 6 Learning Objectives	Learn2Analyse Educational Data Literacy Competence Profile
Know how to obtain, access, and gather the appropriate educational data in eXact Suite	1.1
Demonstrate an understanding of key educational data	3.1

analysis and modelling methods and how they are applied to teaching and learning in eXact Suite	
Understand how to communicate your interpretation of the educational data in an intuitive and accessible way within eXact Suite	3.2
Be able to interpret insights from educational data analysis within eXact Suite	4.3
Be able to elicit potential implications of the educational data insights from data analysis to instruction within eXact Suite	4.4
Be able to use educational data analysis results to make decisions to revise instruction within eXact Suite	5.1

Module 7 - Educational Data Analytics with IMC Learning Suite

This module will present tools for educational data analytics in the IMC Learning Suite and focus on the use of these tools to help instructional designers of online course in reflecting on their educational design and re-design them.

Estimated Effort to complete: 8 hours

Assessment Multiple Choice Questions: 10

Module 7 Learning Objectives	Learn2Analyse Educational Data Literacy Competence Profile
Know how to obtain, access and gather the appropriate educational data in the IMC Learning Suite	1.1
Understand how to apply data processing and handling methods (i.e., configuring and filtering reports, choosing the relevant data) in the IMC Learning Suite	2.1
Be able to use data presentation tools of the IMC Learning Suite	3.2
Be able to interpret insights from educational data analysis within the IMC Learning Suite	4.3
Be able to elicit potential implications of the educational data insights from data analysis to instruction within the IMC Learning Suite	4.4
Be able to use educational data analysis results to make decisions to revise instruction within the IMC Learning Suite	5.1
Be able to apply educational data privacy and distinguish	6.2

between different levels of data protection within the IMC Learning Suite	
---	--

Module 8 - Concluding the MOOC

This concluding module will allow participants to finalise their assignments, discuss their overall MOOC learning experience with their peers, and reflect on their learning experience by submitting the course feedback survey.

Estimated Effort to complete: **6** hours

Assessment Multiple Choice Questions: -

[END OF PAGE]

Assessment Method, Grading Policy and Certification

This course is graded as *Pass or Fail*, meaning you will either be given a passing score or a failing score.

In order to successfully complete this course and gain your **Certificate of Achievement** you must gain a mark of **60% or greater** overall to all 100 quizzes.

Your grade in the course is calculated based on your replies to **100 multiple choice questions** distributed to the 6 core modules. The Multiple Choice Questions are included at the end of Module #2 to Module #7 and aim to assess your understanding of the core concepts presented.

You may complete the Multiple Choice Questions Assessment **at any time** as there are no 'due dates'. Nevertheless, we recommend that you complete them sequentially, after you have completed the relevant module.

If you successfully complete this course you will receive a **Certificate of Achievement**. Successful completion of the course requires:

- completing the **Multiple Choice Questions Assessment** with **60% success**
- completing the **Pre-course** and the **Post-course Surveys**



[END OF PAGE]

Your Instructors

<p>Prof Demetrios Sampson</p> <p>Sofia Mougiakou</p> <p>Dimitra Vinatsella</p>		<p>Module 2:</p> <p>Educational Data</p>
<p>Prof Michael Giannakos</p> <p>Dr Zacharoula Papamitsiou</p>		<p>Module 3:</p> <p>Learning Analytics</p>
<p>Prof Dirk Ifenthaler</p> <p>Marc Egloffstein</p>		<p>Module 4:</p> <p>Teaching Analytics</p>
<p>Deborah Couëdelo</p> <p>Mary Jones</p>		<p>Module 5:</p> <p>Educational Data Analytics with Moodle</p>
<p>Elisabetta Parodi</p> <p>Laura Brambilla</p> <p>Maria La Porta</p>		<p>Module 6:</p> <p>Educational Data Analytics with eXact Suite</p>
<p>Dr Uta Schwertel</p> <p>Samandar Atoev</p> <p>Dr Mareike Schmidt</p>		<p>Module 7:</p> <p>Educational Data Analytics with IMC Learning Suite</p>

[END OF PAGE]

Where to go for additional help

If you have any questions or problems while studying this course there are a number of places you can go for help:

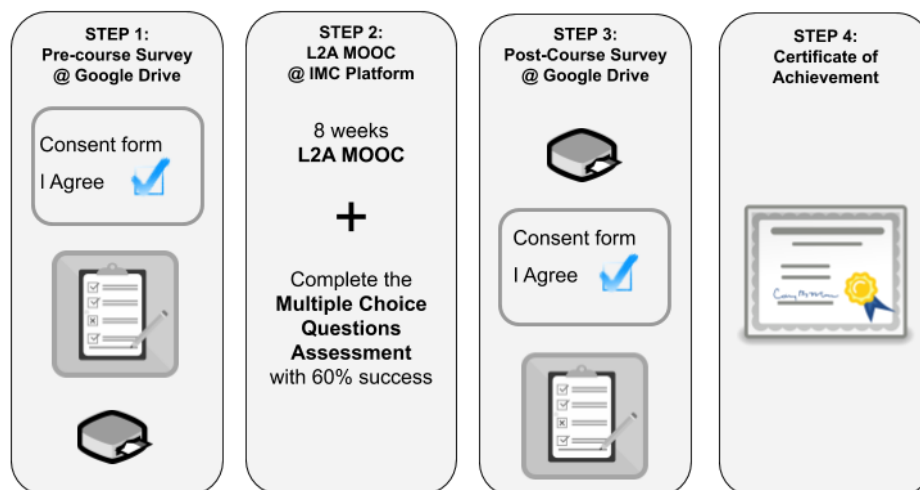
- If you want to contact us directly on issues related with the **MOOC content** , feel free to send a personal email to the Course Team: l2a.mooc@gmail.com
- If you want to contact us directly on issues related with **technical issues of the MOOC platform**, feel free to send a personal email to the Course Team: technik@opencourseworld.de
- If this is your first MOOC experience, it is suggested that you visit the FAQ page on the MOOC platform OpenCourseWorld at <https://www.opencourseworld.de/pages/faq.jsf>.

[END OF PAGE]

Invitation for the Learn2Analyze MOOC Evaluation

You are invited to participate in the **Learn2Analyze MOOC Evaluation** survey as you have registered for the online course administered by the Learn2Analyze Consortium. Your responses to this survey will help us to evaluate the Learn2Analyze MOOC and improve it in future versions. Your participation will involve completing two questionnaires: one at the beginning of the course (Pre-Course Survey) and one at the end (Post-Course Survey).

To obtain your L2A Certificate of Achievement it is necessary to complete both surveys. Each survey is expected to take approximately 20 minutes to complete. Upon completion of the Pre-Course Survey you will receive a **verification code**. You will be asked to fill in this code to start the Post-Course Survey.



We greatly appreciate your willingness to share your time by participating. Your responses to these surveys will help us to improve the quality of the learning experience and to better our course offerings.

On behalf of the Learn2Analyze Consortium, we express our sincere thanks for your participation in our survey acknowledging that your insights on the questions in this survey will prove invaluable.

[END OF PAGE]

Pre-Course Survey

In the **Pre-Course Survey** you will be asked to provide answers to a series of questions related to your demographics and general background, your motives for enrolling in the Learn2Analyze (L2A) MOOC and your existing competence level per “Educational Data Literacy (EDL) Competence Profile (CP) Statement” for each competence dimension of the Learn2Analyze EDL Competence framework.

Although the Pre-course Survey participation will be available to complete throughout the course run, it is highly recommended, for the purposes of the validity of our research, to be completed before the beginning of the course.

Pre-Course Survey link: shorturl.at/bpHI8

(https://docs.google.com/forms/d/e/1FAIpQLSdVRO_CMIRSlr5vk4ECydDe_F3d65HCw7RDz5oKoc2doPV8pg/viewform?usp=sf_link)

The link will be available till **31/12/2019**.

[END OF PAGE]

Discussions

You are encouraged to use the **Discussions area** to connect with other participants enrolled in this course and/or to ask questions of your Instructors.

It is important to be mindful of other participants engaging in different time zones than yours. Your Instructors and the Course Team are based in various countries in **Europe** and work within **UTC/GMT+0 to+2** so please allow a reasonable amount of time for them to respond to any queries.

Instructions for Using the Discussion Forum

<IMC to provide instructions based on their implementation, including screen shots>

As the course is also provided in a self-paced mode, please be aware that instructors and the course team will **monitor the discussion boards on a weekly, rather than daily, basis**. Please be patient, and trust that we will respond to your posts as soon as we can.

ACTIVITY: DISCUSSION FORUM - INTRODUCE YOURSELF

Let's start this course with a few introductions, so you can get to know other learners enrolled in the course.

Please post your introduction on the discussion board below.

In your post, introduce yourself and tell the course team and the community of course participants a few things about yourself. You might like to include information such as:

- your **location** (cities and countries only, no street addresses please!);
- your current **status**: profession / role in school education and/or student (undergraduate, postgraduate);
- **why** you are studying this course and **what** you hope to learn; and
- anything else you believe we'd like to know about you!

[END OF PAGE]

Learn2Analyze

Knowledge Alliances (Key Action 2)

AGREEMENT NUMBER: 2017 - 2733 / 001 – 001

PROJECT NUMBER: 588067-EPP-1-2017-1-EL-EPPKA2-KA

WP3. Learn2Analyse MOOC Design and Development

Result 6a Learn2Analyze MOOC version 1 Learning Materials

Module 2: Educational Data

Module 2

Educational Data

Estimated Effort to complete: 12 hours

Assessment Multiple Choice Questions: 25

2.0 Introduction		
2.0.1 Welcome	LO #2.0.1.1 HTML page: Welcome to Module 2	
2.0.2 Introduction	LO #2.0.2.1 HTML page: Module 2 Introduction	
2.0.3 Learning Objectives	LO #2.0.3.1 HTML page: Module 2 Learning Objectives	
2.0.4 Poll: You and Educational Data	LO #2.0.4.1 ACTIVITY: Poll: You and Educational Data	
2.1 Educational Data as a key success factor for online and blended teaching and learning		
2.1.1 Educational data for data-driven decision making	LO #2.1.1.1 ACTIVITY: Poll LO #2.1.1.2 VIDEO: Big Data LO #2.1.1.3 HTML page: The 4 V's of Big Data LO #2.1.1.4 VIDEO: Educational Data LO #2.1.1.5 HTML page: Educational Data Opportunities LO #2.1.1.6 VIDEO: Data-Driven Decision Making LO #2.1.1.7 HTML page: Competences for effective Data-Driven Decision Making LO #2.1.1.8 VIDEO: Use Case: Canterbury Christ Church University, UK LO #2.1.1.9 ACTIVITY: Poll & Discussion LO #2.1.1.10 HTML page: References and Further Readings	
2.1.2 Why Educational Data is important for online and blended teaching and learning?	LO #2.1.2.1 ACTIVITY: Poll LO #2.1.2.2 HTML page: Personalised Teaching and Learning LO #2.1.2.3 VIDEO: What is Personalised Teaching and Learning LO #2.1.2.4 HTML page: Online Learner Generated Data LO #2.1.2.5 VIDEO: Use Case: Arizona State University, USA LO #2.1.2.6 ACTIVITY: Poll & Discussion LO #2.1.2.7 HTML page: References and Further Readings	
2.1.3 How Educational Data can help Instructional Designers and e-Tutors of Online Courses?	LO #2.1.3.1 ACTIVITY: Poll LO #2.1.3.2 HTML page: Instructional Designers and Trainers LO #2.1.3.3 HTML page: Instructional Designers of online and blended courses LO #2.1.3.4 HTML page: Trainers / Tutors of online and blended courses LO #2.1.3.5 HTML page: How Educational Data Helps Instructional Designers and (e-)Tutors LO #2.1.3.6 VIDEO: Data-Driven Learning Design LO #2.1.3.7 ACTIVITY: Poll & Discussion LO #2.1.3.8 HTML page: References and Further Readings	
2.1.4 How Educational Data can	LO #2.1.4.1 ACTIVITY: Poll & Discussion	

help School Teachers of Blended Courses?	LO #2.1.4.2 HTML page: Educational Data for school self-evaluation and improvement LO #2.1.4.3 VIDEO: How Educational Data Can Help Schools LO #2.1.4.4 VIDEO: How Educational Data Can Help School Teachers LO #2.1.4.5 VIDEO: How Educational Data Can Help Students and Parents LO #2.1.4.6 VIDEO: The Flipped Classroom model LO #2.1.4.7 HTML page: Use-case: Example for the school teacher of blended learning courses in the K-12 education context LO #2.1.4.8 VIDEO: Real-life case: 4 School Districts' Findings on Implementation of Blended Courses. LO #2.1.4.9 ACTIVITY: Poll & Discussion LO #2.1.4.10 HTML page: References and Further Readings	
2.1.5 The Learn2Analyze Educational Data Literacy competence framework	LO #2.1.5.1 ACTIVITY: Poll LO #2.1.5.2 HTML page: Data Literacy LO #2.1.5.3 HTML page: Educational Data Literacy Roadmap LO #2.1.5.4 HTML page: Educational Data Literacy Competences LO #2.1.5.5 HTML page: The Learn2Analyze EDL-CP LO #2.1.5.6 VIDEO: Expert View - Data Culture LO #2.1.5.7 ACTIVITY: Poll & Discussion LO #2.1.5.8 HTML page: References and Further Readings	
2.1.6 Quiz	LO #2.1.6.1 ACTIVITY: Topic 1 Quiz	
2.2 Data is Everywhere (Educational Data Collection)		
2.2.1 Posing questions and identifying appropriate educational data	LO #2.2.1.1 ACTIVITY: Poll: Looking for Answers LO #2.2.1.2 HTML page: Educational Data: Definitions and Categories LO #2.2.1.3 HTML page: Data Collection Strategy LO #2.2.1.4 HTML page: Why is data needed? LO #2.2.1.5 HTML page: What data is needed? LO #2.2.1.6 HTML page: When will the data be collected? LO #2.2.1.7 VIDEO: Animation - Using Data LO #2.2.1.8 ACTIVITY: Poll & Discussion LO #2.2.1.9 HTML page: References	
2.2.2 Matching appropriate educational data with data sources	LO #2.2.2.1 ACTIVITY: Poll LO #2.2.2.2 HTML page: Where to get the data? LO #2.2.2.3 HTML page: Quality measures of data LO #2.2.2.4 HTML page: How to collect data? LO #2.2.2.5 VIDEO: Biases LO #2.2.2.6 HTML page: Barriers to Educational Data LO #2.2.2.7 ACTIVITY: Poll & Discussion LO #2.2.2.8 HTML page: References	
2.2.3 Combining data from different educational data sources	LO #2.2.3.1 ACTIVITY: Poll LO #2.2.3.2 HTML page: What data sources are available? LO #2.2.3.3 HTML page: Data we have- Data we get LO #2.2.3.4 VIDEO: Why to combine different data sources? LO #2.2.3.5 HTML page: How to combine different data	

	sources? LO #2.2.3.6 ACTIVITY: Poll & Discussion LO #2.2.3.7 HTML page: References	
2.2.4 Educational Data Ethics: informed consent	LO #2.2.4.1 ACTIVITY: Poll LO #2.2.4.2 VIDEO: Introduction to Data Ethics LO #2.2.4.3 VIDEO: Defining Informed Consent LO #2.2.4.4 HTML page: How should informed consent be requested? LO #2.2.4.5 HTML page: Informed Consent and Children LO #2.2.4.6 HTML page: Informed Consent and Educational Data LO #2.2.4.7 VIDEO: Expert View - Code of Ethics LO #2.2.4.8 ACTIVITY: Poll & Discussion LO #2.2.4.9 HTML page: References	
2.2.5 Quiz	LO #2.2.5.1 ACTIVITY: Topic 2 Quiz	
2.3 Adding value to educational datasets (Educational Data Management)		
2.3.1 Making data tidy (Data cleaning)	LO #2.3.1.1 ACTIVITY Poll LO #2.3.1.2 VIDEO: Unlock the Potential of Data LO #2.3.1.3 HTML page: Data Cleaning Framework LO #2.3.1.4 HTML page: Missing Data LO #2.3.1.5 HTML page: Outliers LO #2.3.1.6 HTML page: Inconsistent Data LO #2.3.1.7 HTML page: Double Instances LO #2.3.1.8 HTML page: The workload of Data Cleaning LO #2.3.1.9 ACTIVITY Poll & Discussion LO #2.3.1.10 HTML page: References	
2.3.2 Data to describe data (Metadata)	LO #2.3.2.1 ACTIVITY Poll LO #2.3.2.2 HTML page: What is Metadata? LO #2.3.2.3 HTML page: Types of Metadata LO #2.3.2.4 VIDEO: Understanding Metadata LO #2.3.2.5 VIDEO: Data Interoperability LO #2.3.2.6 ACTIVITY Poll & Discussion LO #2.3.2.7 HTML page: References	
2.3.3 The significance of Data Curation	LO #2.3.3.1 ACTIVITY Poll LO #2.3.3.2 HTML page: Maintaining the value of data LO #2.3.3.3 VIDEO: What is Data Curation? LO #2.3.3.4 HTML page: Data Curation Lifecycle Model LO #2.3.3.5 VIDEO: Expert View - Data Curation LO #2.3.3.6 ACTIVITY Short answer & Discussion LO #2.3.3.7 HTML page: References	
2.3.4 Storage issues for preserving educational data	LO #2.3.4.1 ACTIVITY Poll LO #2.3.4.2 VIDEO: Why digital preservation matters LO #2.3.4.3 HTML page: Issues for Effective Educational Data Digital Preservation LO #2.3.4.4 HTML page: Getting Started with Preservation LO #2.3.4.5 HTML page: Storage Methods LO #2.3.4.6 VIDEO: Storing Data on the Cloud LO #2.3.4.7 HTML page: Storage Security LO #2.3.4.8 VIDEO: Real Life Case	

	LO #2.3.4.9 ACTIVITY Poll, Short Answer & Discussion LO #2.3.4.10 HTML page: References	
2.3.5 Educational Data Ethics: Sensitive educational data protection	LO #2.3.5.1 ACTIVITY: Poll LO #2.3.5.2 VIDEO: The Right to Privacy LO #2.3.5.3 VIDEO: Personal Student Information LO #2.3.5.4 HTML page: Categorisation of Data under GDPR LO #2.3.5.5 HTML page: Data Protection by Design & by Default LO #2.3.5.6 HTML page: Privacy by Design Strategies & Technologies LO #2.3.5.7 HTML page: Storage Limitation LO #2.3.5.8 HTML page: What are Individuals' Rights LO #2.3.5.9 HTML page: Data Protection Impact Assessment LO #2.3.5.10 VIDEO: Expert View - Protecting Student Data Privacy LO #2.3.5.11 ACTIVITY Poll & Discussion LO #2.3.5.12 h HTML page: References	
2.3.6 Quiz	LO #2.3.6.1 ACTIVITY: Topic 3 Quiz	
Multiple Choice Quiz		

2.0 Introduction

2.0.1 Welcome

(Learning Object #2.0.1.1 - html page)
Welcome to Module 2



Learn2Analyze

Welcome to Module 2 of the Learn2Analyze MOOC

This module

- introduces the concept of **educational data** as a **key success factor** for **online and blended teaching and learning**,
- presents the **Learn2Analyze framework** for **educational data literacy competences**, and
- discusses the fundamentals of **educational data collection and management**, including issues related to **ethics** and **privacy**.

[END OF PAGE]

2.0.2 Introduction

(Learning Object #2.0.2.1 - html page)
Module 2 Introduction



Source: <https://pixabay.com/illustrations/online-education-tutorial-3412473/>

Data is identified as one of the **key enablers for driving change** in the 21st century.

In the context of online education, **learners are leaving behind a rich data footprint** throughout the course of their study. As a result, the existing **educational data about learners, their learning and the environments in which they learn**, has exponentially increased.

We can grasp the great opportunities offered by educational data and the potential provided by data analytics technologies, to gain powerful insights and develop new ways of achieving excellence in both teaching and learning.

Educational data can reveal insights about our course design and teaching practice we might not recognise otherwise. Moreover, through educational data analysis, we can have a **holistic view of our learners' past, present and likely future**, develop a **deep understanding of our learners' activities, behaviour and preferences**. As a result, we can target accordingly our teaching and learning interventions to provide our learners with a **personalised learning experience** and **better feedback**, and help them meet their educational goals.

Educational Data-Driven Decision Making (DDDM) can be a useful tool for reflecting on our teaching practices and improving our teaching and learning outcomes. For effective DDDM, we need to be able to **identify, collect, combine, analyse, interpret and effectively act upon all types of educational data from diverse sources**.

Data Literacy for Education Professionals (such as instructional designers, teachers and tutors of online and blended courses), is now recognized internationally as a **key set of competences** and a **strong competitive advantage** to get the **best results in online and blended teaching and learning**.

Since educational data comes from a variety of sources in diverse formats, the effective **educational data collection** and **management** are considered as core competences in this continuous process of evaluation, reflection and improvement.

Along with the emerging opportunities offered, education data-driven practice and assessment raise **challenges** such as **ethical issues** and implications especially in terms of **privacy, security of data** and **informed consent** that should be addressed via transparent and well-defined ethical policies and codes of practices.

[END OF PAGE]

2.0.3 Learning Objectives

([Learning Object #2.0.3.1 - html page](#))
Module 2 Learning Objectives

By completing this module you will:

Module 2 Learning Objectives	Learn2Analyse Educational Data Literacy Competence Profile
Learn how educational data can support successful online and blended courses	1.1
Understand the importance of data-driven decision making to continuously improve the online and blended teaching and learning	5.1
Recognise the value of Educational Data Literacy to make data-informed reflections on the design and delivery of instruction	5.2
Know the different types of Educational Data in Online and Blended courses	1.1
Know the different Educational Data Sources related to core elements of e-learning environments	1.1
Know and Understand the most common quality issues of raw educational data	1.2
Understand data cleaning methods for educational datasets	2.1
Understand the advantages of enhancing educational data through data description	2.2
Understand the need for data curation in educational data management	2.3
Be able to identify storage issues for preserving educational data	2.4
Understand the importance of informed consent as a key Ethical Principle of Educational Data	6.1
Understand the significance of educational data protection policies	6.2

[END OF PAGE]

2.0.4 Poll: You and Educational Data

(Learning Object #2.0.4.1 - Activity) Poll: You and Educational Data

Poll: You and Educational Data



Source: <https://pixabay.com/illustrations/analytics-google-data-visits-page-3680198/>

Welcome on board. To start with, let's learn a bit more about your experiences with educational data so far. Please answer the poll questions below.

ACTIVITY/PRACTICE QUESTION (Poll):

1. Have you ever been involved in Data-Driven Decision Making as an Instructional Designer, e-tutor or school teacher, by collecting, analysing, and interpreting diverse types of data from a variety of sources, as an instructional designer, tutor or school teacher?
 - ☐ Yes
 - ☐ No
2. Have you taken any courses in data literacy, as part of your professional development as an instructional designer, tutor or school teacher?
 - ☐ Yes
 - ☐ No

3. Do you consider that educational data can enable you to develop new ways of achieving excellence in online and/or blended teaching and learning?
- Yes
 - No

Thanks for answering these questions. You may wish to check the results again after more people have completed the poll to review the responses of other learners of this course.

[END OF PAGE]

2.1 Educational Data as a key success factor for online and blended teaching and learning

2.1.1 Educational data for data-driven decision making

(Learning Object #2.1.1.1 - Activity)

Poll



Source: <https://pixabay.com/illustrations/learning-hint-school-subject-3245793/>

ACTIVITY/PRACTICE QUESTION (Poll):

1. Do you know what the 4 V's of big data mean?
 - ☐ Yes
 - ☐ No

2. Are you aware of Data-Driven Decision Making (DDDM) for teaching and learning?
 - ☐ Yes
 - ☐ No

[END OF PAGE]

(Learning Object #2.1.1.2 - video)
Big Data



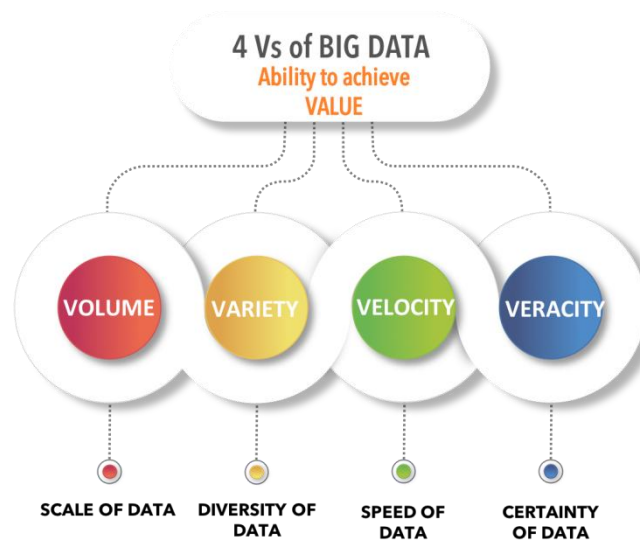
External Video: What is Big Data and how does it work? [1:33]

As described in the video we just watched, data is identified as one of the key factors driving change in the 21st century. Commonly referred to as the ‘*data revolution*’, the ‘*era of big data*’, or more simply ‘*big data*’, the term is used to describe the tremendous increase in the amounts of data we generate in all aspects of our lives. As explained, Big Data can bring big possibilities and thus create big expectations ([Shacklock, 2016](#)).

Next, we will explore further this technological trend and the famous “*four Vs*” concept as proposed by IBM.

[END OF PAGE]

(Learning Object #2.1.1.3 - html page)
The 4V's of Big Data



“Big Data gives you the ability to achieve superior value from analytics on data at higher volumes, velocities, varieties or veracities”. This claim is summarized in the above graphic, based on the infographic [“Extracting business value from the 4 V's of big data”](#) by IBM.

Volume The size of available data has been growing at an exponential rate. “**With higher data volumes**, you can take a more holistic view of your subject’s past, present and likely future”.

Velocity Data streams are created at an unprecedented speed. “**At higher data velocities**, you can ground your decisions in continuously updated, real-time data”.

Variety Data comes in all types of formats. “**With broader varieties of data**, you can have a more nuanced view of the matter at hand”.

Veracity Data veracity is not only how accurate or truthful a data set may be, but also how trustworthy the data source, type, and processing of it is. “**As data veracity improves**, you can be confident that you’re working with the truest, cleanest, most consistent data”.

Are you ready to unlock the value of Big Data? Can Big Data be used in education and how?

Up Next.

[END OF PAGE]

(Learning Object #2.1.1.4 - video)
Educational Data



Big Data's Making Education Smarter

External Video: [Big Data's Making Education Smarter](#) [2:16]

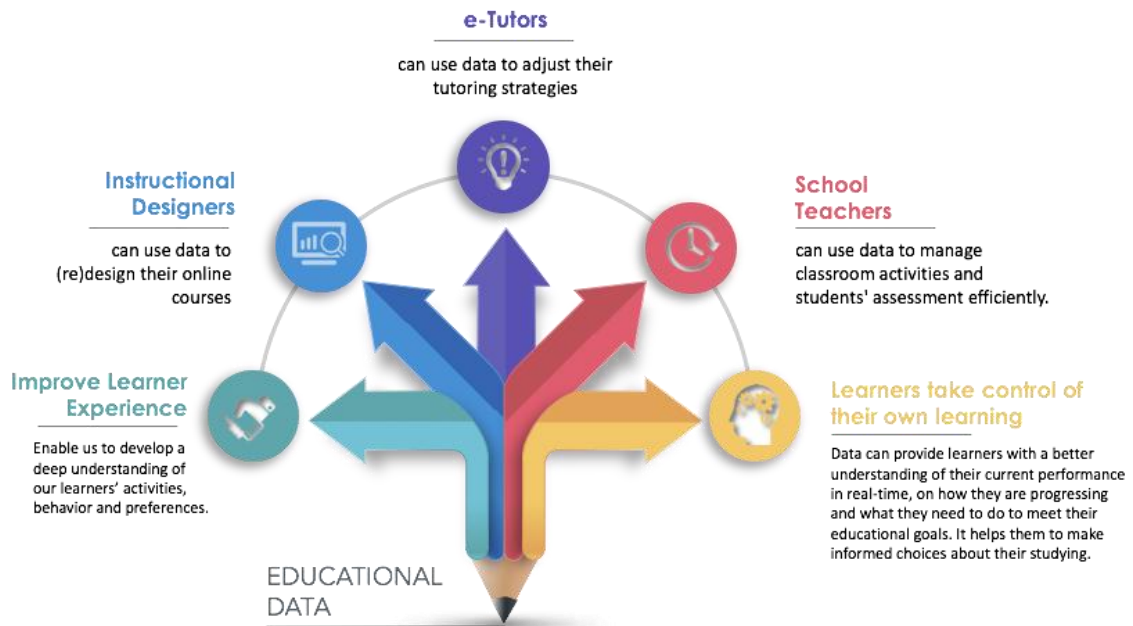
The above video by [intel](#) explains further how big data can make education smarter.

In the context of online education, learners are leaving behind a rich data footprint throughout the course of their study. Educational data comprises a wide range of datasets about learners, their learning and the environments in which they learn, stored in various sources. We will focus on and discuss in detail different types of educational data in the next topic of this Module ([Shacklock, 2016](#)).

Now that we have learned a little more about educational data let's take a closer look at the opportunities revealed to us.

[END OF PAGE]

(Learning Object #2.1.1.5 - html page) Educational Data Opportunities



Educational data and data analytics technologies can support us in developing a better understanding of our learners' activities, behaviour and preferences, by identifying patterns and trends in the data that, in turn, can help us predict possible future outcomes and take actions for improving the learners' experience in our courses.

As presented in the graphic, in both online and blended courses,

- instructional designers can use data to (re)design their courses,
- tutors can use data to adjust their tutoring and learners' support strategies,
- school teachers can use data to better plan inside and outside classroom activities and assess students' learning.

On the other hand, data could potentially enable learners to take control of their own learning. When appropriately delivered, data can provide learners with better insights about their current academic performance in real-time, about their progress (also in comparison to their peers) and recommendations about what they need to do for meeting their learning goals and help them to make informed, data-driven choices about their studying ([Sclater, Peasgood, & Mullan, 2016](#)).

Next, we will discuss the **foundation of data-driven decision-making**.

[END OF PAGE]

(Learning Object #2.1.1.6 - video)

Data-Driven Decision Making



Data Is Power

External Video: [Data is Power](#) [2:32]

The above video by the Data Quality Campaign highlights the importance of collecting and using quality data to transform education.

The provision of educational data by itself does not automatically lead to improved teaching and learning. What is most important is not the amount of data that we have access to, but what we do with it. How will we identify actionable insights from the educational data?

Data-Driven Decision Making is about that.

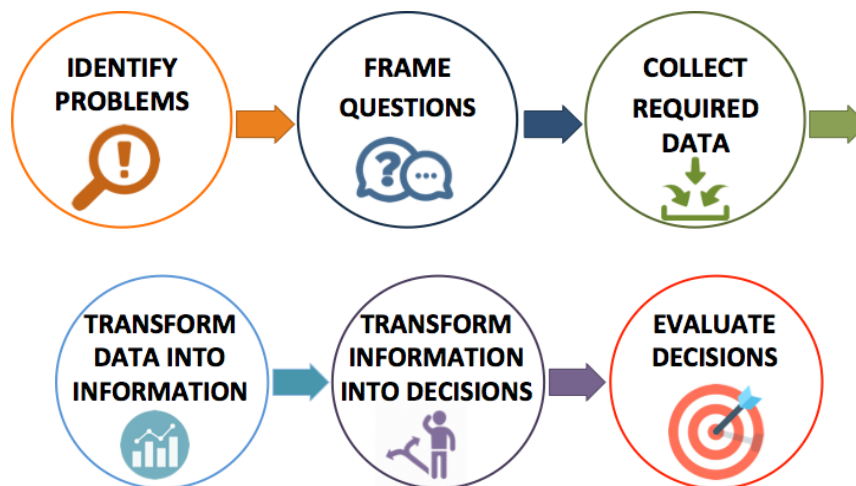
Data-driven decision making (DDDM) is defined as

“the systematic collection, analysis, examination, and interpretation of data to inform practice and policy in educational settings” ([Mandinach, 2012](#)).

Data-driven decision making has become an essential component of educational practice in order to ground decisions based on data and evidence.

[END OF PAGE]

(Learning Object #2.1.1.7 - html page)
Competences for Data-Driven Decision Making



“Don’t approach data analysis as a cool “science experiment” or an exercise in amassing data for data’s sake. The fundamental objective in collecting, analyzing, and deploying data is to make better decisions.” (Díaz, Rowshankish, & Saleh, 2018).

Data-Driven Decision Making (DDDM) crosses all levels of the educational system and uses a variety of data from which decisions can be made.

Therefore, it can be challenging to engage in DDDM due to data being siloed in different sources and at different levels.

Developing **competences for effective DDDM** is essential for education professionals. Such competences require “to effectively transform information into actionable knowledge and practices by collecting, analyzing, and interpreting all types of data.” (Ridsdale et al., 2015).

Decisions fall into two categories (Marsh, Pane, & Hamilton, 2006):

- Using data as a **diagnostic tool** to identify, inform, or clarify issues both at learners' level (e.g. identifying needs) and at institution level (e.g. informing the design of courses or curricula), and
- Using data **to act** (e.g. assessing and acting upon differential outcomes among the learners' population, personalised interventions for at-risk learners).

Data is not a static entity and therefore decisions based on data should not be static either.

Data usage and evaluation should be continuous, and integrated into existing decision-making processes.

As per [Marsh et al. \(2006\)](#), “Once the decision to act has been made, new data can be collected to begin assessing the effectiveness of those actions, leading to a continuous cycle of collection, organization, and synthesis of data in support of decision making”.

Data analytics refers to methods and tools for analysing large sets of different types of data from diverse sources, to support and improve decision-making. Data analytics are mature technologies that are currently applied in real-life financial, business and health systems.

However, it is only recently ([Johnson, Smith, Willis, Levine, & Haywood, 2011, p.28-30](#)), that data analytics have been considered in education - first in higher education, and more recently in school education ([Bienkowski, Feng, & Means, 2012](#)).

More about Educational Data Analytics in Module 3 and Module 4.

[END OF PAGE]

(Learning Object #2.1.1.8 - video)
Use Case: Canterbury Christ Church University, UK



Engaging with students to build a better digital environment: Canterbury Christ Church University

External Video: [Engaging with students to build a better digital environment](#) [2:56]

The above video shows a real-life case study of the implementation of [Jisc digital experience insights service](#) aiming to improve the student experience of blended learning at Canterbury Christ Church University based on educational data analysis.

As the [Project lead Duncan MacIver](#) concludes “*The data we have from the insights service makes a significant difference to where we are moving digitally as an institution. This lends a credible voice to decisions being made and provides us with a level of confirmation that we are taking actions that are of direct benefit to students.*”

[END OF PAGE]

(Learning Object #2.1.1.9 - Activity)
Poll & Discussion

ACTIVITY/PRACTICE QUESTION (Poll):

1. Have you ever used educational data as a diagnostic tool? (e.g., to identify needs)
 - ☐ Yes
 - ☐ No

2. Have you ever used educational data to act upon? (e.g., personalised interventions for at-risk learners)
 - ☐ Yes
 - ☐ No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about the implementation of personalised learning in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

1. *What data are you currently collecting? How are you using this data to make decisions and take actions?*

2. *How are you currently using your data to inform the design of your courses?*

[END OF PAGE]

(Learning Object #2.1.1.10 - html page)
References and Further Readings

REFERENCES

Bienkowski, M., Feng, M., & Means, B. (2012). *Enhancing Teaching and Learning through Educational Data Mining and Learning Analytics: An Issue Brief*. Washington, DC: U.S. Department of Education, Office of Educational Technology.

Díaz, A., Rowshankish, K., & Saleh, T. (2018, September). Why data culture matters. McKinsey Analytics. Retrieved from: <https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/why-data-culture-matters>

IBM. Extracting business value from the 4 V's of big data. IBM Big Data & Analytics Hub. Retrieved from: <https://www.ibmbigdatahub.com/infographic/extracting-business-value-4-vs-big-data>

Jisc (2018, September 10). Canterbury Christ Church University. Jisc Digital experience insights. Retrieved from: <https://digitalinsights.jisc.ac.uk/case-study-listing/engaging-students-build-better-digital-environment/>

Johnson, L., Smith, R., Willis, H., Levine, A., & Haywood, K. (2011). *The 2011 Horizon Report*. Austin, Texas: The New Media Consortium.

Mandinach, E. B. (2012). *A Perfect Time for Data Use: Using Data-Driven Decision Making to Inform Practice*. *Educational Psychologist*, 47(2), 71-85. doi: 10.1080/00461520.2012.667064

Marsh, J. A., Pane, J. F., & Hamilton, L. S. (2006). *Making Sense of Data-Driven Decision Making in Education: Evidence from Recent RAND Research*. Santa Monica, CA: RAND Corporation.

Ridsdale, C., Rothwell, J., Smit, M., Ali-Hassan, H., Bliemel, M., Irvine, D., Kelley, D., Matwin, S., & Wuetherick, B. (2015). *Strategies and Best Practices for Data Literacy Education: Knowledge Synthesis Report*. Halifax, NS: Dalhousie University. doi/10.13140/RG.2.1.1922.5044

Sclater, N., Peasgood, A., & Mullan, J. (2016). *Learning Analytics in Higher Education: A review of UK and international practice. Full report*. Bristol: Jisc.

Shacklock, X. (2016). *From bricks to clicks: The Potential of Data and Analytics in Higher Education*. London, UK: Policy Connect - Higher Education Commission.

FURTHER READINGS

Goldring, E. B., & Berends, M. (2009). *The importance of data-driven decision making. Leading with data: Pathways to improve your school*. Thousand Oaks, CA: Corwin Press.

HM Government (2013). *Seizing the data opportunity: A strategy for UK data capability*. London: BIS.

Hora, M. T., Bouwma-Gearhart, J., Park, H. J. (2014). *Exploring Data-Driven Decision-Making in the Field: How Faculty Use Data and Other Forms of Information to Guide Instructional Decision-Making* (WCER Working Paper No. 2014-3). Retrieved from <https://pdfs.semanticscholar.org/de84/614e7cbef7e360f8ec01615a44d66a2bfoeo.pdf>

Ikemoto, G. S., & Marsh, J. A. (2007). *Chapter 5 Cutting Through the "Data-Driven" Mantra: Different Conceptions of Data-Driven Decision Making*. *Yearbook of the National Society for the Study of Education*, 106(1), 105-131. doi: [10.1111/j.1744-7984.2007.00099.x](https://doi.org/10.1111/j.1744-7984.2007.00099.x)

Laney, D. (2001). *3D Data Management: Controlling Data Volume, Velocity, and Variety*. META Group Inc.

Marsh, J. A., & Farrell, C. C. (2015). *How leaders can support teachers with data-driven decision making: A framework for understanding capacity building*. *Educational Management Administration & Leadership*, 43(2), 269–289. <http://doi.org/10.1177/1741143214537229>

McIntosh, K., Horner, R. H., & Sugai, G. M. (2009). *Sustainability of systems-level evidence-based practices in schools: Current knowledge and future directions*. In W. Sailor, G. Dunlap, G. M. Sugai & R. Horner (Eds.), *Handbook of Positive Behavior Support* (pp. 327–352). New York: Springer. doi: [10.1007/978-0-387-09632-2_14](https://doi.org/10.1007/978-0-387-09632-2_14)

MOEduSAIL – Educational Systems and Instruction for Learning (2019). *Data-Based Decision Making for Teacher Teams*. Retrieved from <http://www.moedu-sail.org/dbdm-materials/>

Renshaw, P., Baroutsis, A., van Kraayenoord, C., Goos, M. and Dole, S. (2013). *Teachers using classroom data well: Identifying key features of effective practices. Final report*. Brisbane: The University of Queensland.

Schildkamp, K., Poortman, C., Luyten, H., & Ebbeler, J. (2017). *Factors promoting and hindering data-based decision making in schools*. *School Effectiveness and School Improvement*, 28(2), 242-258. doi:[10.1080/09243453.2016.1256901](https://doi.org/10.1080/09243453.2016.1256901)

Williams, K. C. (2018). Top Five Business Trends Impacting K-12 Education in 2018. Gartner, Inc. Retrieved from <https://emtemp.gcom.cloud/ngw/globalassets/en/research/documents/top-five-business-trends-impacting-k-12-education-in-2018-3847265-344453.pdf>

[END OF PAGE]

2.1.2 Why Educational Data is important for online and blended teaching and learning?

(Learning Object #2.1.2.1 - Activity) Poll



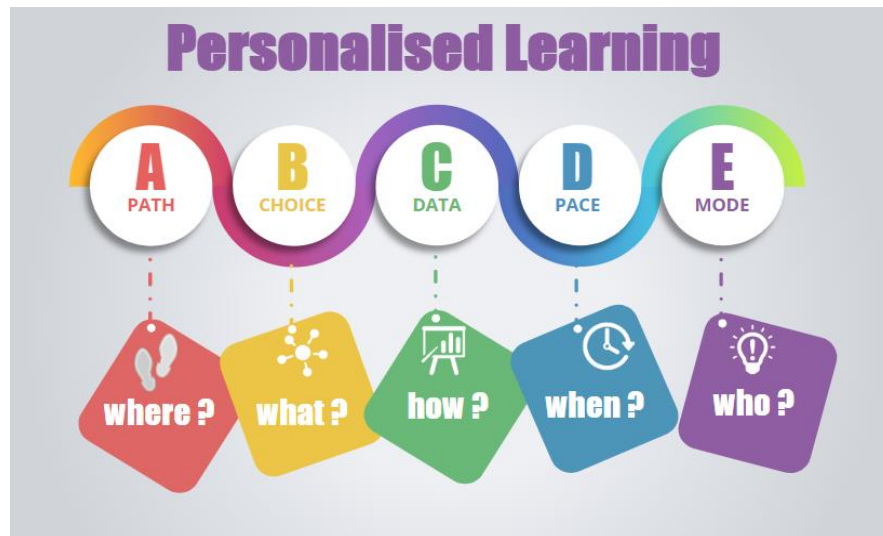
Source: <https://pixabay.com/illustrations/online-library-education-book-4091231/>

ACTIVITY/PRACTICE QUESTION (Poll):

1. Are you familiar with Personalised Learning?
 - ☐ Yes
 - ☐ No

2. Do you think that it is important to support individual learning, based on learner's specific short, mid and long-term needs?
 - ☐ Yes
 - ☐ No

[END OF PAGE]



Personalised learning is identified as one of the major educational challenges of the 21st century ([2017 Horizon Report](#)). Personalised learning refers to the supporting of individual student learning in a pedagogically effective and practically efficient personalised manner, based on their individual short, mid and long-term needs.

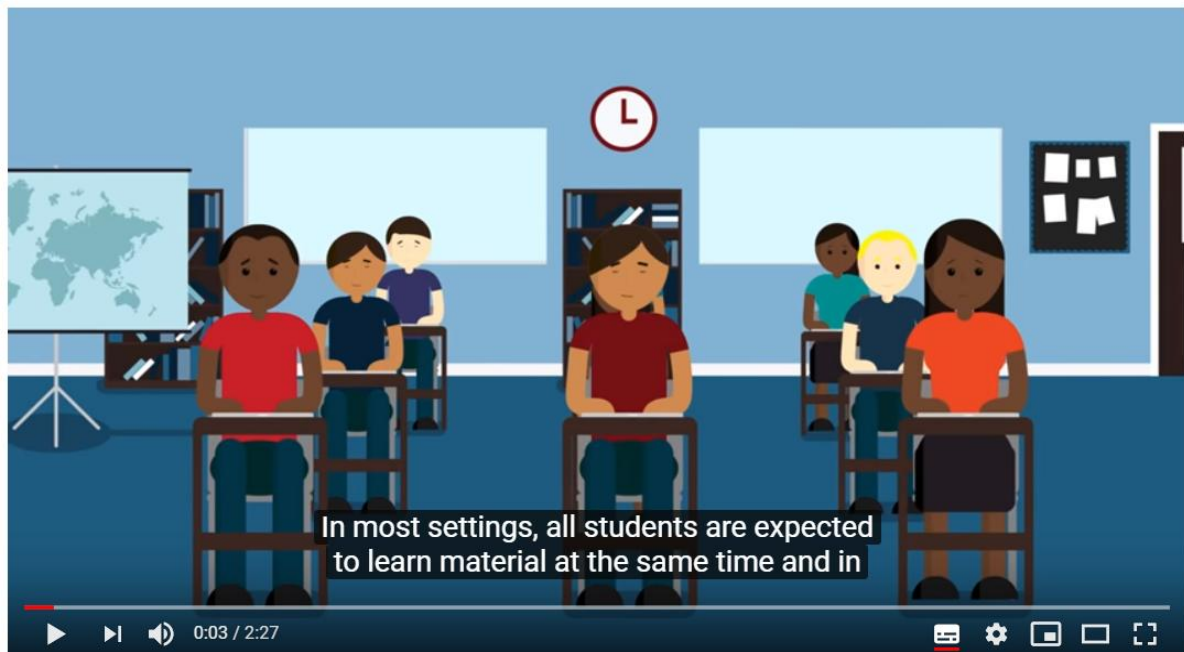
[Education Elements](#) states that personalised learning is increasingly recognized as a promising strategy to

- help students connect with their needs and aspirations,
- close achievement gaps,
- increase student engagement, and
- prepare students to become self-directed, lifelong learners

by meeting their individual needs, customizing their learning experiences to indulge their interests, using customised lessons, units and projects at their own pace.

[END OF PAGE]

(Learning Object #2.1.2.3 - video)
What is Personalised Teaching and Learning



What Is Personalized Learning?

External Video: [Educause: What Is Personalized Learning?](#) [2:27]

Personalised learning has become easier with the leverage of learners' performance, engagement and behaviour data, captured in online and blended learning environments and analysed with the help of data science.

The video above, published by Educause, explains aspects of personalised learning emphasizing the variety of tools and technologies that can support each learner's unique learning style.

The importance of a personalised learning experience, that is tailored to the learners' unique needs, skills, and interests, is also illustrated in the following infographic [You Need Data to Personalize Learning](#) from Data Quality Campaign.

[END OF PAGE]

Online Learner Generated Data



“Every drop-off, click or share is a learner shouting their likes and dislikes. These actions are the eye-rolls, smiles and crossed arms from the classroom, simply in digital format.”(Greany & Niles-Hofmann, [An Everyday Guide to Learning Analytics](#))

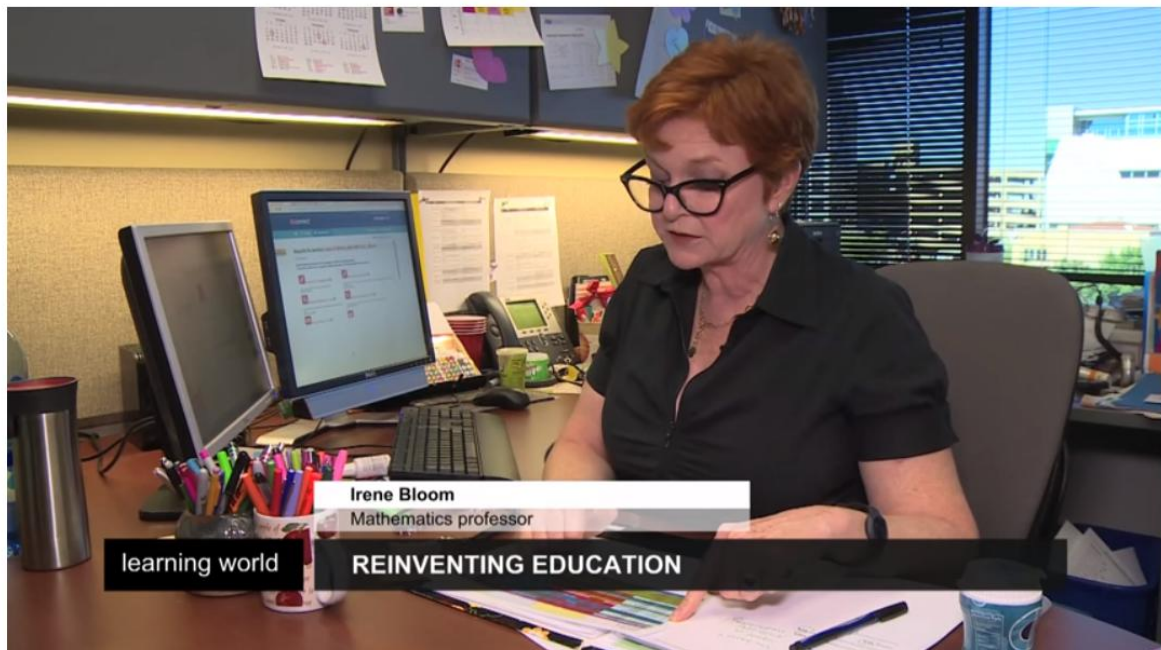
A wide range of data is generated by the learners and stored in online and blended teaching and learning environments. Data is collected from explicit learners' activities, such as completing assignments and taking exams, and from tacit actions, including online social interactions, extracurricular activities, posts on discussion forums, and other activities that are not directly assessed as part of the learner's educational progress ([U.S. Department of Education, 2012](#)).

Such learner-generated data is used to assess learning progress, to predict learning performance, to detect and identify potentially harming behaviours and to act upon the findings.

Nevertheless, as stated in the [2011 Horizon report](#), we should not solely focus on learners' performance. Deeper analysis of the educational data can be used to improve understanding of teaching and learning taking place online and/or in blended courses.

[END OF PAGE]

(Learning Object #2.1.2.5 - video)
Use Case: Arizona State University, USA



Using big data to customize learning (Learning World: S5E35, 2/3)

External Video: [Using big data to customize learning](#) [3:08]

As it can be seen at the above video in Arizona State University, online learner generated data is used to customise teaching and learning in subjects like maths, by tailoring the content to the detected needs of the learners.

[END OF PAGE]

(Learning Object #2.1.2.6 - Activity)
Poll & Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

1. Have you ever used personalised learning strategies to customise students learning experiences
 - ☐ Yes
 - ☐ No
2. What would be the main reason for you to differentiate instruction:
 - ☐ help students connect with their needs and aspirations,
 - ☐ close achievement gaps,
 - ☐ increase student engagement, and
 - ☐ prepare students to become self-directed, lifelong learners

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about the implementation of personalised learning in the following discussion task, by posting your thoughts on the discussion board.

You may discuss:

3. *How can you as an instructional designer, tutor or school teacher develop an evaluation plan for a personalised learning intervention?*
4. *Apart from personalised learning, how can educational data be important to your role as instructional designer, tutor or school teacher?*

[END OF PAGE]

(Learning Object #2.1.2.7 - html page)
References and Further Readings

REFERENCES

Bienkowski, M., Feng, M., & Means, B. (2012). *Enhancing Teaching and Learning through Educational Data Mining and Learning Analytics: An Issue Brief*. Washington, DC: U.S. Department of Education, Office of Educational Technology.

Education Elements (2018). Personalised Learning: The Present and Future of Education. Retrieved from <https://www.edelements.com/personalized-learning>

Freeman, A., Adams Becker, S., Cummins, M., Davis, A., & Hall Giesinger, C. (2017). *NMC/CoSN Horizon Report: 2017 K–12 Edition*. Austin, Texas: The New Media Consortium.

Greany, K., & Niles-Hofmann, L. (2018). *An Everyday Guide to Learning Analytics*. How to use data to decode the digital body language of your audience and design elearning that works. Elucidat. Retrieved from <https://elearningindustry.com/free-ebooks/everyday-guide-to-learning-analytics>

Johnson, L., Smith, R., Willis, H., Levine, A., & Haywood, K. (2011). *The 2011 Horizon Report*. Austin, Texas: The New Media Consortium.

FURTHER READINGS

Baker, R. S., & Inventado, P. S. (2016). *Educational data mining and learning analytics: Potentials and possibilities for online education*. In G. Veletsianos (Ed.), *Emergence and Innovation in Digital Learning* (pp. 83–98). doi:10.15215/aupress/9781771991490.01

Gendron, S. A., & Traub, S. (2015). *Data: The Guide on the Path to Personalized Learning for ALL Students*. International Center for Leadership in Education.

Grant, P., & Basye, D. (2014). *Personalized Learning: a guide for engaging students with technology*. International Society for Technology in Education.

Johnson, L., Adams Becker, S., Estrada, V., & Freeman, A. (2015). *NMC Horizon Report: 2015 K–12 Edition*. Austin, Texas: The New Media Consortium.

Mor, Y., Ferguson, R., & Wasson, B. (2015). [Editorial: Learning design, teacher inquiry into student learning and learning analytics: A call for action: Learning design, TISL and learning analytics](#). *British Journal of Educational Technology*, 46(2), 221-229. doi: 10.1111/bjet.12273.

Next Generation Learning Challenges (2017). New Designs for School. What does next generation learning look like in practice? EDUCAUSE. Retrieved from <http://nextgenlearning.org/personalized-learning>

Pane, J. F., Steiner, E. D., Baird, M. D., Hamilton, L. S. (2015). [Continued Progress: Promising Evidence on Personalized Learning](#). Santa Monica, CA: RAND Corporation.

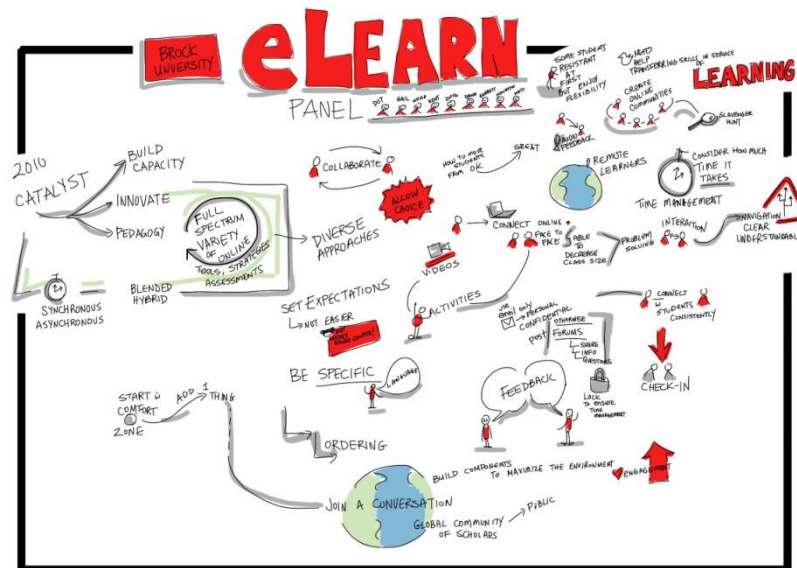
Pane, J. F., Steiner, E. D., Baird, M. D., Hamilton, L. S., & Pane, J. D. (2017). [Informing Progress: Insights on Personalized Learning Implementation and Effects](#). Santa Monica, CA: RAND Corporation.

[END OF PAGE]

2.1.3 How Educational Data can help Instructional Designers and e-Tutors of Online Courses?

(Learning Object #2.1.3.1 - Activity)

Poll



Giulia Forsythe [CCo 1.0]

Source: <https://www.flickr.com/photos/gforsythe/14186637655/in/album-72157644661486231/>

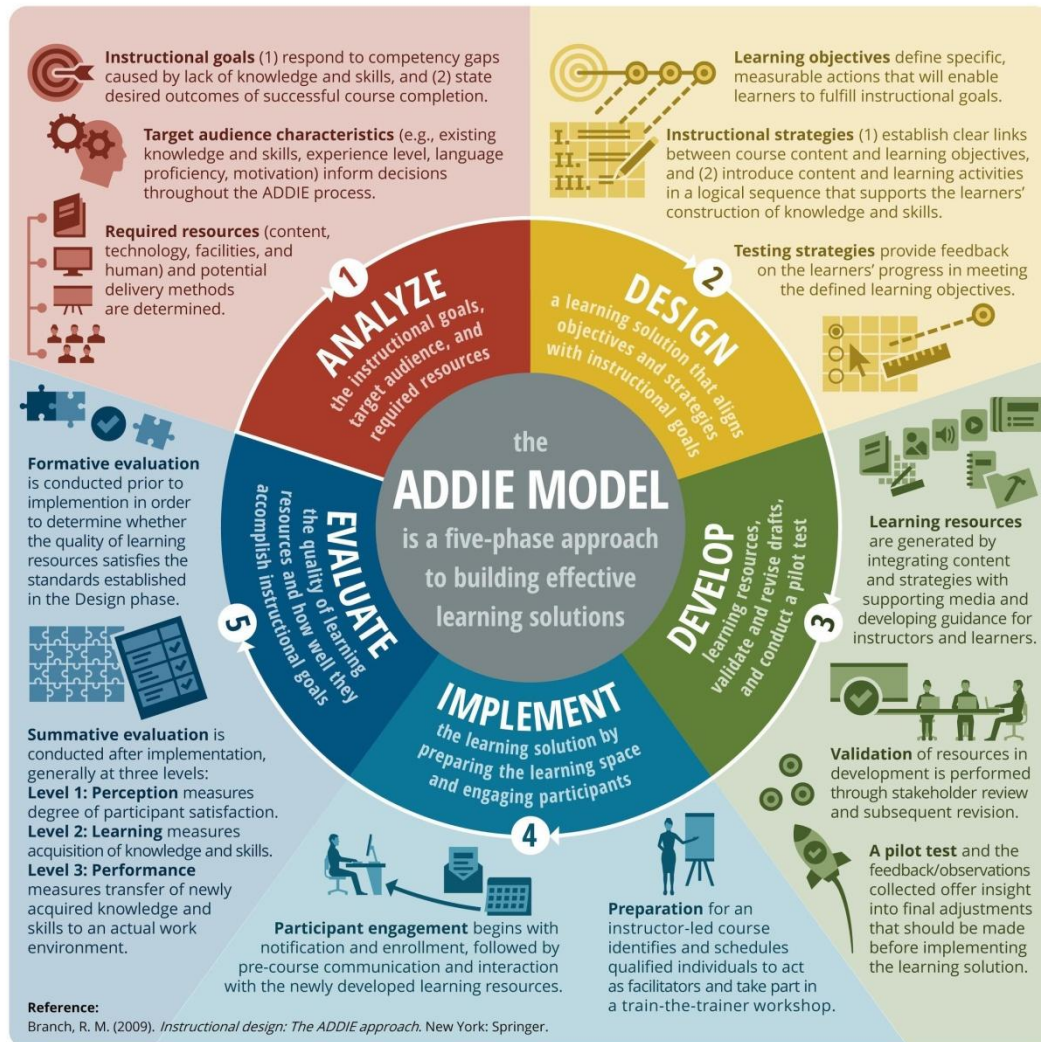
ACTIVITY/PRACTICE QUESTION (Poll):

- As an instructional designer of online courses, have you ever used data to analyse your learners' profile?
 - Yes
 - No
 - I am not an Instructional Designer
- As an instructional designer of online courses, have you ever used data to evaluate and prove the value proposition of the online course?
 - Yes
 - No
 - I am not an Instructional Designer
- As a tutor of online courses, have you ever used data to identify learners who are struggling?
 - Yes

- No
 - I am not an tutor
4. As a tutor of online courses, have you ever used data to customise your feedback?
- Yes
 - No
 - I am not an tutor

[END OF PAGE]

(Learning Object #2.1.3.2 - html page)
Instructional Designers and Trainers



Krisna kristiandi hartono [CC BY-SA 4.0]

Source: https://commons.wikimedia.org/wiki/File:ADDIE_MODEL_INSTRUKSIONAL.jpg

Instructional design - also referred to Learning Design or Educational Design - is a systematic and iterative process for any educational challenge (including professional training and human performance improvement) that requires an educational intervention.

[Reiser \(2001\)](#) states that:

The field of instructional design and technology encompasses the analysis of learning and performance problems, and the design, development, implementation, evaluation and management of instructional and non-instructional processes and resources intended to improve learning and performance in a variety of settings, particularly educational institutions and the workplace. (p.53)

The widely used **ADDIE model**, illustrated in the above infographic from [Obsidian Learning](#), is a five-phase approach to analyse, design, develop, implement and evaluate any teaching and learning product and process in an effective and efficient way.

Within the context of the ADDIE approach

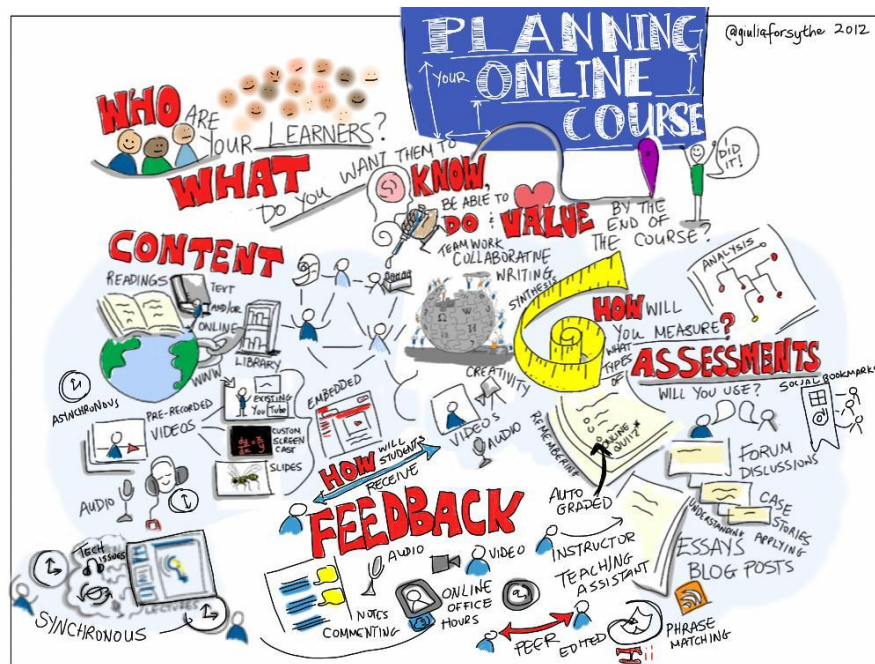
- **Instructional designers** (ID) are the professionals in the field of instructional design, mainly engaged in the analysis, the design, the development and the evaluation phases, whereas,
- **Trainers or tutors** are the professionals engaged mainly in the implementation phase and they can also inform the evaluation phase.

The roles of instructional designers and trainers/tutors in online and blended courses require new competences compared to those in traditional face-to-face education and training programs.

[END OF PAGE]

(Learning Object #2.1.3.3 - html page)

Instructional Designers of online and blended courses



Giulia Forsythe [CCo 1.0]

Source: <https://www.flickr.com/photos/gforsythe/8186356402/>

Instructional Designers are mainly engaged in the analysis, the design, the development and the evaluation phases of the ADDIE process.

Analysis Phase: During this phase, the instructional designer identifies an instructional (educational or learning) problem and analyses the parameters of the context in which teaching and learning will take place, as well as the learners' characteristics and their existing competences (knowledge, skills and attitudes). As a result, the key elements of this phase can be codified as follows:

- A1. **Instructional/educational/learning problem Identification:** aims to address why a teaching/learning process (broadly referred to as *educational intervention*) is needed for the identified problem.
- A2. **Contextual Analysis:** aims to capture where the educational intervention will be implemented, namely the learning environment.
- A3. **Learner Analysis:** aims to analyse for whom the educational intervention will be designed.

The major outcome of the Analysis phase is a granulated overview of the contextual and learner conditions, that will be used to configure and formulate the upcoming Design phase.

Design Phase: During this phase, the instructional designer defines the educational objectives to be achieved, selects an appropriate teaching approach for attaining these objectives, as well as, appropriate assessment methods for evaluating whether and to what extent the educational objectives have been met. As a result, the key elements of this phase can be codified as follows:

DES1. **Definition of Educational Objectives:** this includes the definition of general educational objectives, as well as the development of specific subject matter objectives, aligned to the general objectives.

DES2. **Selection of Teaching Approach/Strategy:** this includes the selection of an appropriate teaching approach/strategy for supporting learners in attaining the educational objectives. Additionally, based on the selected strategy, this phase also includes the formulation of the specific learning activities and their appropriate sequencing in order to attain the expected educational objectives. Finally, a direct mapping between each learning activity to the educational objectives that they aim to cultivate is also performed.

DES3. **Selection of Assessment Method(s):** this includes the selection of appropriate assessment methods for evaluating the level of achievement of the educational objectives. This includes also sequencing and description of assessment activities according to the selected teaching approach/strategy and assessment method(s).

The main outcome of the Design phase is a detailed blueprint of the flow and description of the learning and assessment activities, which also accommodates the contextual and learner considerations from the Analysis phase.

Develop Phase: During this phase, the development or selection of appropriate educational materials and the development/arrangement of the appropriate delivery setting is performed for the outcome of the Design Phase. This phase can involve except from the instructional designer, other individuals such as subject matter experts or technical and media experts. As a result, the key elements of this phase can be codified as follows:

DEV1. **Development or selection of educational resources** for supporting learning and/or assessment activities of the Design Phase

DEV2. **Development or selection of educational tools and/or services** for supporting learning and/or assessment activities of the Design Phase

DEV3. **Development/arrangement of the appropriate delivery setting** where learning will take place. For example, development/selection of a digital delivery system or appropriate arrangement of a physical delivery setting such as a classroom.

The main outcome of the Develop phase is the selection or production of educational materials/tools that can appropriately support the outcome of the Design Phase.

Evaluate Phase: During this phase, an evaluation of both the entire teaching and learning process, as well as each phase, is performed towards identifying whether the desired results have been achieved. As a result, the key elements of this phase can be codified as follows:

E1. **Formative Evaluation:** this includes an ongoing evaluation process during design, development and implementation phases and aims to maximize pedagogical/ andragogical effectiveness (e.g. achievement of educational objectives) and/or implementation efficiency (e.g. time/cost reduction)

E2. **Summative Evaluation:** this is performed after completion of the Implement phase and aims to measure pedagogical/ andragogical effectiveness (e.g. achievement of educational objectives) and/or implementation efficiency (e.g. time/cost reduction).

The main outcome of the Evaluate phase is to identify issues or changes needed, so as to refine the design, development and implementation phases of future designs and to assess whether the desired results have been achieved.

[END OF PAGE]

(Learning Object #2.1.3.4 - html page)
Trainers / Tutors of online and blended courses



Giulia Forsythe [CCo 1.0]

Source: <https://www.flickr.com/photos/gforsythe/8204979572/in/album-72157632001654093/>

Trainers or tutors, as part of their role, they are mainly engaged in the implementation phase of the ADDIE process, whereas they can also inform the evaluation phase.

Implement Phase: During this phase, the outcome of the previous phases is delivered to the learners. Although delivery is typically addressing groups of learners, still emphasis should be given to providing individual learning experiences, including *scaffolding* and *feedback*. To this end, it is important that learners' (and teachers'/tutors') actions are tracked and meaningful educational data is collected (to be analysed and inform reflection and decision making). As a result, the key elements of this phase can be codified as follows:

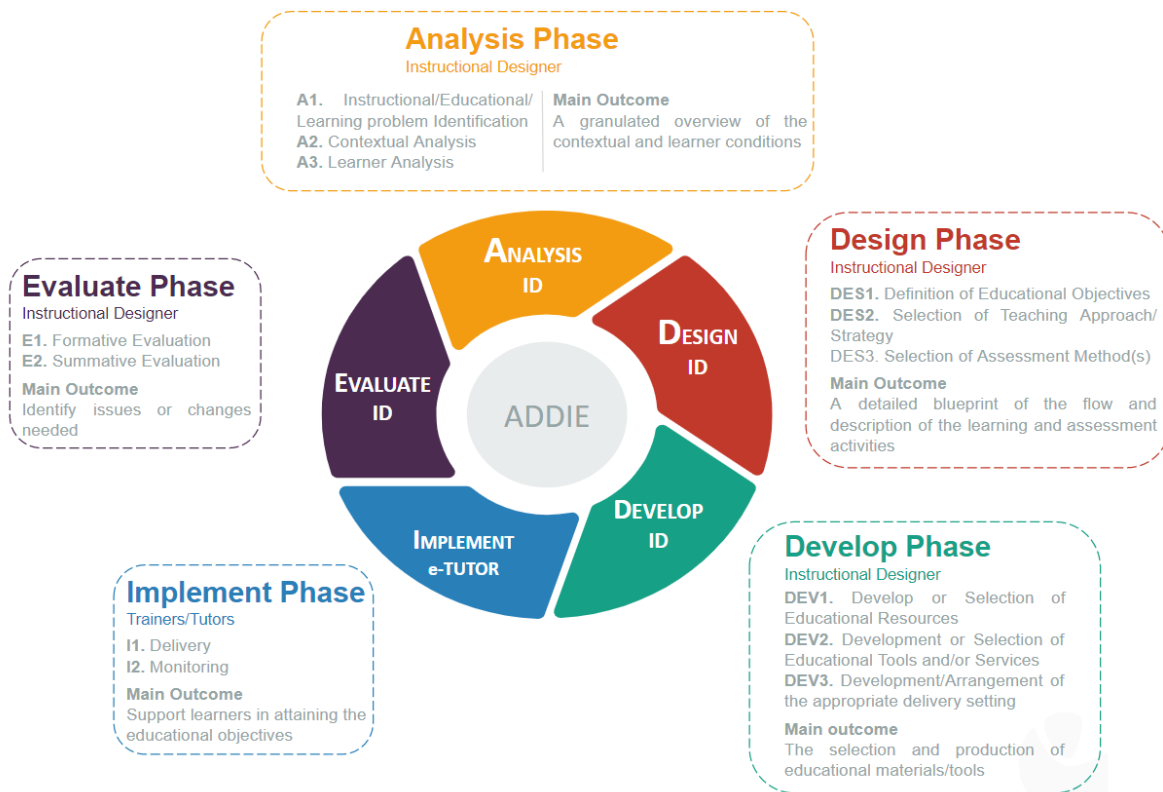
- I1. **Delivery:** this includes the delivery of the product from Analysis, Design and Develop phases to the learners.
- I2. **Monitoring:** this includes tracking of learners' (and teacher/tutors') actions and collecting meaningful educational data based on which teachers can form evidence-based run-time adaptations/revisions (and also specify which and why these adaptations or revisions were performed).

The main outcome of the Implement phase is to support learners in attaining the educational objectives by appropriately monitoring them so, if needed, changes and adaptations can be made.

[END OF PAGE]

(Learning Object #2.1.3.5 - html page)

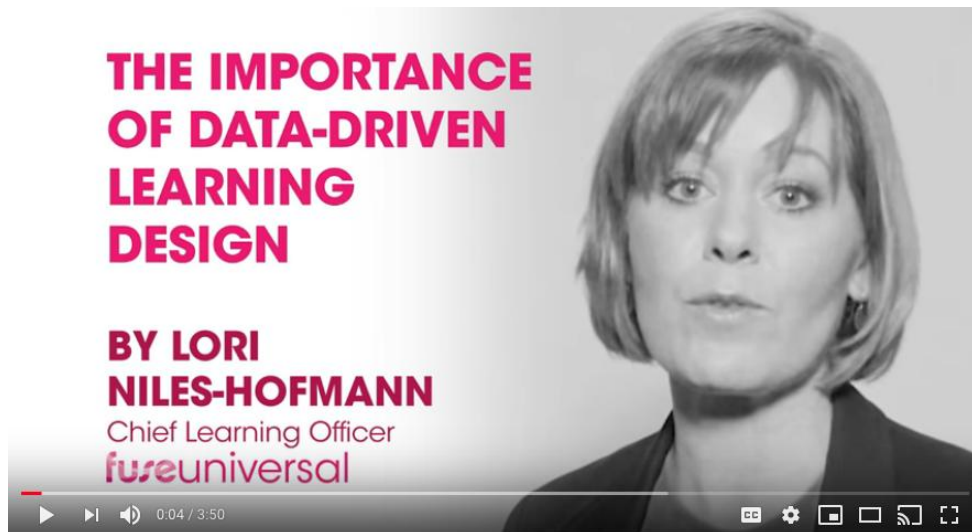
How Educational Data Helps Instructional Designers and e-Tutors



As presented in the above graphic, instructional designers and trainers/tutors, as part of their role, leverage educational data at all phases of the ADDIE process they are engaged in.

[END OF PAGE]

(Learning Object #2.1.3.6 - video)
Data-Driven Learning Design



External Video: [The Importance of Data Driven Learning Design](#) [3:50]

Lori Niles-Hofmann, co-author of “An Everyday Guide to Learning Analytics”, introduces the concept and significance of Data-Driven Learning Design in this video. She states that:

“The concept of data-driven learning design comes from marketing, and if you contrast how marketers design their content campaigns, they really begin with this data approach. They have metrics, which you can’t even conceive of, that are so intricate, that will tell you exactly what their audiences will likely respond to. And if we take a little bit of that lesson over in L&D, we now can design learning that is going to be far more receptive and aligned to our audiences.”

[END OF PAGE]

(Learning Object #2.1.3.7 - Activity)
Poll & Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

1. Have you ever used Data-Driven Learning Design for your Online Courses?
 - Yes
 - No
2. Do you consider that it is important to use educational data to improve the instructional design or the e-tutoring strategy for your online course?
 - Yes
 - No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about the use of educational data, in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

1. *How can you as an Instructional Designer or e-Tutor leverage educational data from online courses? Please share either your past experience or your thoughts for future actions.*
2. *How can you as an Instructional Designer or e-Tutor use educational data to enhance engagement in an online course? Please share either your past experience or your thoughts for future actions.*

[END OF PAGE]

(Learning Object #2.1.3.8 - html page)
References and Further Readings

REFERENCES

Greany, K., & Niles-Hofmann, L. (2018). *An Everyday Guide to Learning Analytics: How to use data to decode the digital body language of your audience and design elearning that works*. Elucidat. Retrieved from <https://elearningindustry.com/free-ebooks/everyday-guide-to-learning-analytics>

Obsidian Learning. (2018, October 16). ADDIE Model. Retrieved from <https://www.obsidianlearning.com/projects/addie-model/>

Reiser, R. A. (2001). *A History of Instructional Design and Technology: Part I: A History of Instructional Media* Author(s). *Educational Technology Research and Development*, 49(1), 53-64. Springer.

FURTHER READINGS

Martin, J. (2010, August 4). Aligning data collection with school mission: Preparing for DoE ONPE Panel. [Blog post]. Retrieved from <https://21k12blog.net/2010/08/04/aligning-data-collection-with-school-mission-preparing-for-doe-onpe-panel/#more-1913>

Niles-Hofmann, L. (2016). *Data-Driven Learning Design. How to Decode Learner Digital Body Language*. Retrieved from: <http://www.loriniles.com/ebook/>

Shacklock, X. (2016). *From bricks to clicks: The Potential of Data and Analytics in Higher Education*. London, UK: Policy Connect - Higher Education Commission.

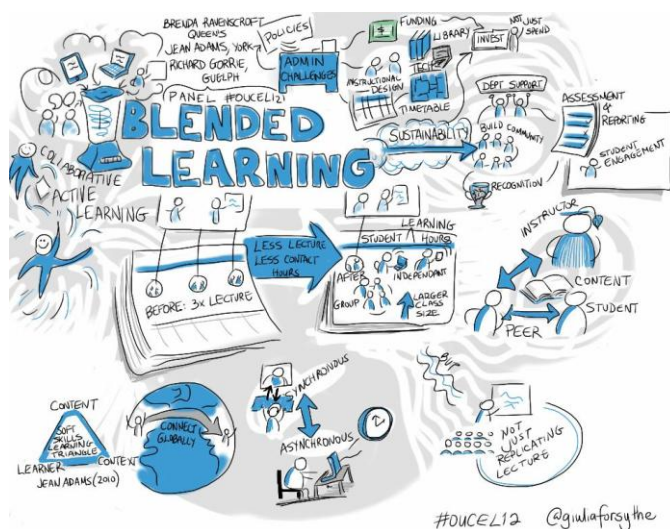
Spearman M. M. (2019) *Using Evidence Based Interventions & Practices: A Process Guide for Improvement*. State of South Carolina Department of Education.

Vai, M., & Sosulski, K. (2011). *Essentials of Online Course Design: A Standards-Based Guide* (2nd ed.). Routledge.

[END OF PAGE]

2.1.4 How Educational Data can help School Teachers of Blended Courses?

(Learning Object #2.1.4.1 - Activity) Poll & Discussion



Giulia Forsythe [CCo 1.0]

Source: <https://www.flickr.com/photos/gforsythe/7704609288/in/album-72157626965187420/>

ACTIVITY/PRACTICE QUESTION (Poll)

1. Are you familiar with strategies for blended learning in school education?
 - Yes
 - No
2. Have you ever used flipped classroom in your school teaching?
 - Yes
 - No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about blended learning and flipped classroom in the following discussion task, by posting your thoughts on the discussion board. You may:

1. share your experience of implementing flipped classroom and/or
2. share your opinion on why to use blended learning (or not!).

[END OF PAGE]

(Learning Object #2.1.4.2 - html page)
Educational Data for school self-evaluation and improvement



Schools are using self-evaluation as an instrument to engage all key stakeholders (namely, school leaders, educators, parents and students) in reflecting and improving school activities.

For example, as presented in the “[School Self-evaluation Guidelines 2016-2020 Primary](#)”, the [Irish Inspectorate of the Department of Education Skills](#) defines **School Self-evaluation** as:

“a collaborative, inclusive, and reflective process of internal school review. An evidence-based approach, it involves gathering information from a range of sources, and then making judgements. All of this with a view to bring about improvements in students’ learning.”

The Annenberg Institute for School Reform (Barnes, 2004) has developed a continuous, non-linear inquiry process for self-evaluation, comprised of six essential activities, depicted in the above graphic.

[END OF PAGE]

(Learning Object #2.1.4.3 - video)

How Educational Data Can Help Schools



Data: It's Just Part of Good Teaching

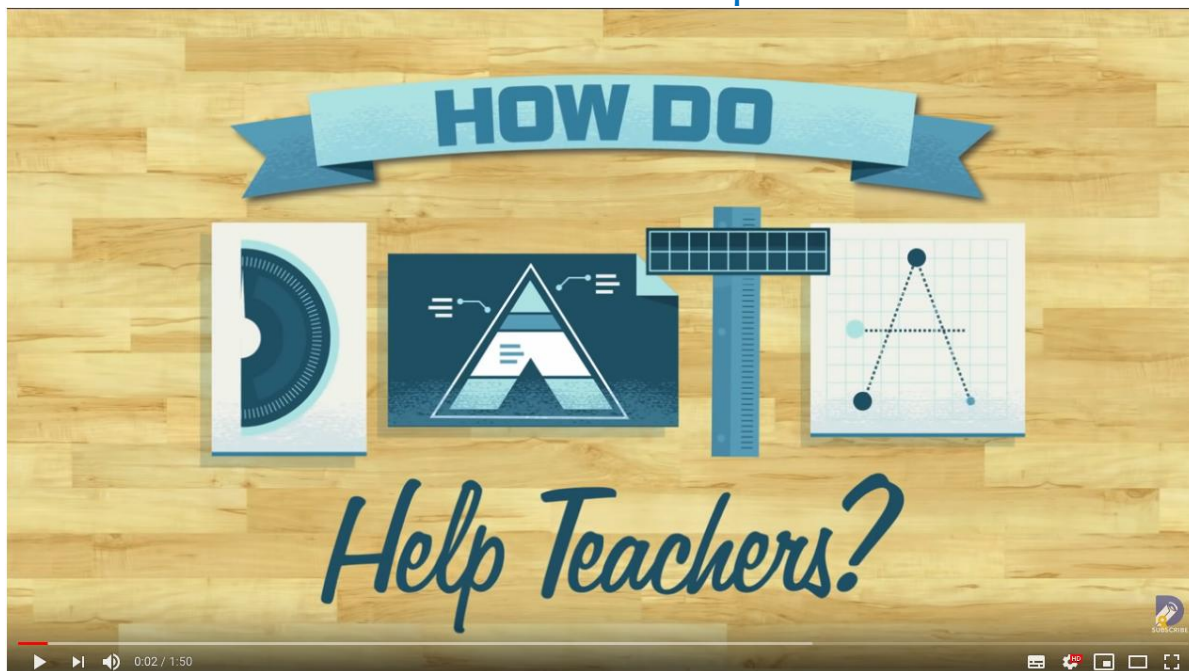
External Video: [Data: It's Just Part of Good Teaching](#) [3:43]

In the above video from the Data Quality Campaign, Sherman Elementary in Rhode Island demonstrates how the effective use of data by a school community can improve students' performance.

[END OF PAGE]

(Learning Object #2.1.4.4 - video)

How Educational Data Can Help School Teachers



External Video: [How Data Help Teachers](#) [1:51]

The video we just watched, from the Data Quality Campaign, demonstrates how data helps school teachers and their students succeed. For more details, you may also review the corresponding [infographic](#), “Ms. Bullen’s Data-Rich Year” by DQC.

[END OF PAGE]

(Learning Object #2.1.4.5 - video)
How Educational Data Can Help Students and Parents



Data Can Help Every Student Excel

External Video: [Data Can Help Every Student Excel](#) [2:00]

This video from the Data Quality Campaign, discusses what does it mean to use data in service of student learning, taking the stand that data is one of the most powerful tools to inform, engage, and create opportunities for students along their education journey.

[END OF PAGE]

(Learning Object #2.1.4.6 - video)
The Flipped Classroom Model



The Flipped Classroom Model

External Video: The Flipped Classroom Model [3:00]

As per [Panopto \(2015\)](#) “The flipped classroom is a teaching strategy in which the traditional class format is turned on its head. This inverted model “flips” the traditional order of class activities so that school work is done at home, and “homework” is done at school. In flipped classes, students review lecture materials prior to class, reserving in-class time for teacher-guided activities that allow students to put the lecture materials into practice. Activities can include in-depth discussion, labs, debates, problem-solving, or just open time for individual assignments — all with the added benefit of having the teacher nearby to help when questions arise.”

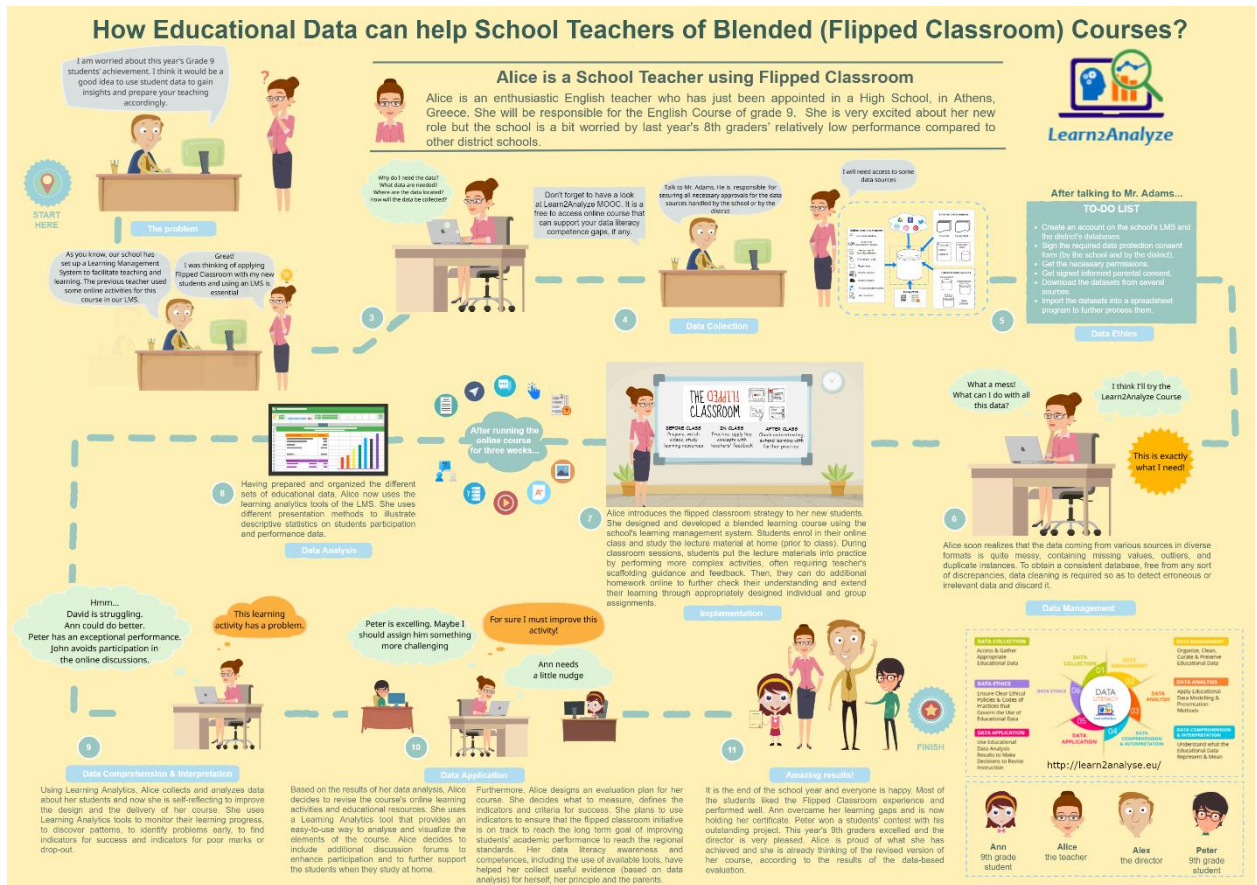
This new approach enables teachers to make the shift from teacher-driven instruction to student-centered learning and thus to reinforce deeper learning.

As [Brame \(2013\)](#) from the University of Vanderbilt, Center for Teaching, suggests, the flipped classroom approach yields statistically significant improvements in engagement, test scores and overall long-term learning.

[END OF PAGE]

(Learning Object #2.1.4.7 - html page)

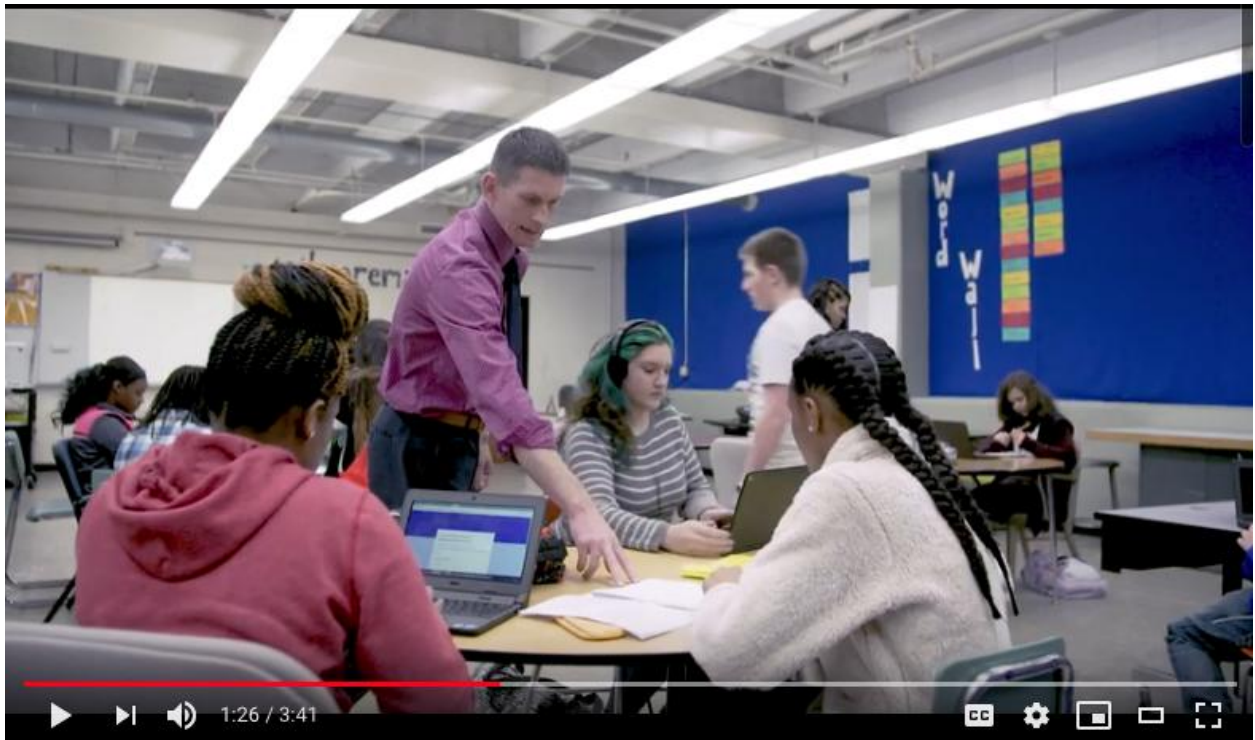
Use-case: Example for the school teacher of blended learning courses in the K-12 education context



[END OF PAGE]

(Learning Object #2.1.4.8 - video)

Real-life case: 4 School Districts' Findings on Implementation of Blended Courses



Why Personalized Learning: 4 Stories from 4 School Districts

External Video: [Why Personalized Learning: 4 Stories from 4 School Districts](#) [3:41]

The above video shows 4 School Districts sharing their findings on the implementation of blended courses aiming to provide a unique personalised learning experience to their students.

(Learning Object #2.1.4.9 - Activity)
Poll & Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

1. Have you ever used flipped classroom in your school teaching?
 - Yes
 - No
2. Do you consider that teachers should incorporate blended learning in school education?
 - Yes
 - No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about using educational data in blended learning environment, in the following discussion task, by posting your thoughts on the discussion board.

1. *Teachers always used data in their everyday practice. Whether you are an instructional designer, an e-tutor or a school teacher, reflect on which particular learners' data do you use and how?*
2. *How data gathered from the online component of a blended learning flipped classroom, can help school teachers improve their teaching?*

Share your experience from implementing flipped classroom and/or share your opinion on why to use blended learning (or not!).

[END OF PAGE]

(Learning Object #2.1.4.10 - html page)
References and Further Readings

REFERENCES

- Barnes, F. D. (2004). *Inquiry and action: Making school improvement part of daily practice*. Providence, RI: Annenberg Institute for School Reform, Brown University.
- Brame, C. J., (2013). Flipping the classroom. *Vanderbilt University Center for Teaching*. Retrieved from <http://cft.vanderbilt.edu/guides-sub-pages/flipping-the-classroom/>
- Inspectorate, Department of Education and Skills. (2016). *School Self-evaluation Guidelines 2016-2020 Primary*. Dublin: Department of Education and Skills.
- Panopto. (2015, January, 12). Infographic: The Growth in Flipped Learning. Retrieved from: <https://www.panopto.com/blog/growth-in-flipped-learning-infographic/>

FURTHER READINGS

- Chapman, C., & Sammons, P. (2013). *School Self-Evaluation for School Improvement: what works and why?* Project Report. CfBT Education Trust, Reading.
- Hamilton, L., Halverson, R., Jackson, S. S., Mandinach, E., Supovitz, J. A., & Wayman, J. (2009). *Using student achievement data to support instructional decision making* (NCEE 2009-4067). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.
- Houston, P. D. (2002). *Using Data to Improve Schools: What's Working*. Arlington, VA: American Association of School Administrators.
- Lewis, J. (2014). *Next Gen Tools. Strategies and Innovations for Implementing Breakthrough Models. Blended Learning Classroom Design*. EDUCAUSE. Retrieved from <https://s3.amazonaws.com/nglc/resource-files/NGB1405-pdf.pdf>
- Matters, G. (2006). *Using data to support learning in schools: Students, teachers, systems*. Melbourne: ACER Press.

Renshaw, P., Baroutsis, A., van Kraayenoord, C., Goos, M., & Dole, S. (2013). *Teachers using classroom data well: Identifying key features of effective practices Final report*. Brisbane: The University of Queensland.

[END OF PAGE]

(Learning Object #2.1.5.1 - Activity)

Poll



1. Do you know what “Educational data literacy” is all about?
 - Yes
 - No
2. Are you aware of the competences required to be data literate?
 - Yes
 - No

[END OF PAGE]

(Learning Object #2.1.5.2 - html page)
Educational Data Literacy

Educational data literacy is defined as:

“ the ability to collect, manage, evaluate, and apply data, in a critical manner”([Ridsdale et al., 2015](#))

“the ability to accurately observe, analyse and respond to a variety of different kinds of data for the purpose of continuously improving teaching and learning in the classroom and school” ([Love, 2012](#))

“the ability to understand and use data effectively to inform decisions ... composed of a specific skill set and knowledge base that enables educators to transform data into information and ultimately into actionable knowledge” ([Mandinach & Gummer, 2013](#))

“[the capacity to] continuously, effectively, and ethically access, interpret, act on, and communicate multiple types of data from state, local, classroom, and other sources in order to improve outcomes for students in a manner appropriate to their professional roles and responsibilities” ([Data Quality Campaign, 2014](#)).

Thus, educational data literacy refers to the **competence set** which is required to identify, collect, combine, analyse, interpret and act upon educational data from different sources, with the aim of continuously improving the teaching, learning and assessment process.

[END OF PAGE]

(Learning Object #2.1.5.3 - html page)
Educational Data Literacy Roadmap

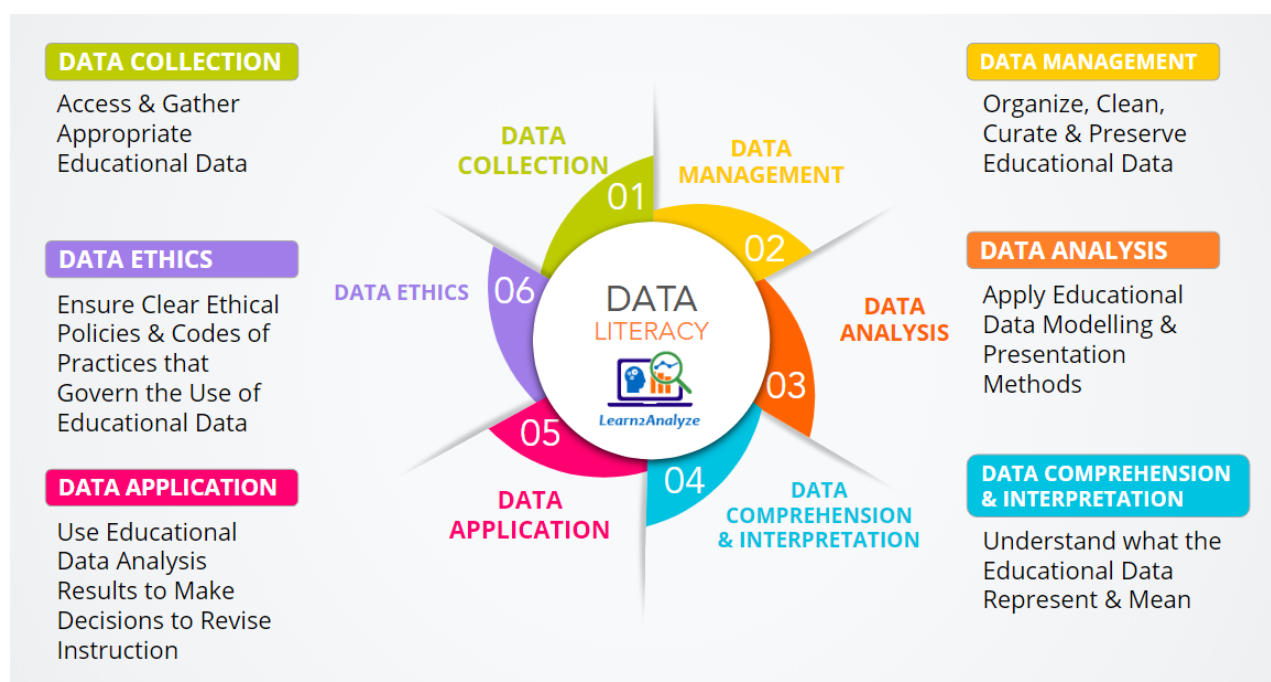


In the “[Roadmap for Educator Licensure Policy Addressing Data Literacy](#)” report, the Data Literacy Campaign recommends the following set of Data Literacy Competences for teachers, as captured in the above graphic:

1. Locate and Collect Relevant Educational Data
2. Synthesise and Analyse Educational Data from Diverse Sources
3. Know about Educational Data beyond Grades
4. Understand How to Use Educational Data beyond Grades
5. Engage in a Data-Driven Continuing Inquiry Process
6. Use Data Analysis to Customise Teaching Plans to Diverse Groups
7. Use Own Data to Reflect on Practice
8. Facilitate Students to Understand their Data
9. Communicate Insights from Data Analysis to Diverse Internal and External Stakeholders
10. Monitor this process in a continuous manner

[END OF PAGE]

(Learning Object #2.1.5.4 - html page)
Educational Data Literacy Competences



Learn2Analyze Educational Data Literacy Competence

As already discussed, Educational Data Analytics are attributed with significant benefits for enhancing **personalised educational support** of the learners as well as **reflective course (re)design** for achieving improved **teaching, learning and assessment**.

However, emerging advancements related to the use of data-driven design and delivery of online and blended learning courses, exploiting Educational Data Analytics are not yet thoroughly addressed by existing competence frameworks for education professionals (instructional designers, trainers, educators, teachers). Existing professional competence frameworks for instructional designers and trainers almost ignore the dimension of Educational Data Literacy.

To this end, the **Learn2Analyze project** has developed a comprehensive proposal for an **Educational Data Literacy Competence Framework** to enhance existing competence frameworks for instructional designers and e-trainers of online courses with new Educational Data Literacy competences.

The Learn2Analyze Educational Data Literacy Competence Framework comprises of 6 competence dimensions and 17 competence statements, as captured in the above graphic.

[END OF PAGE]

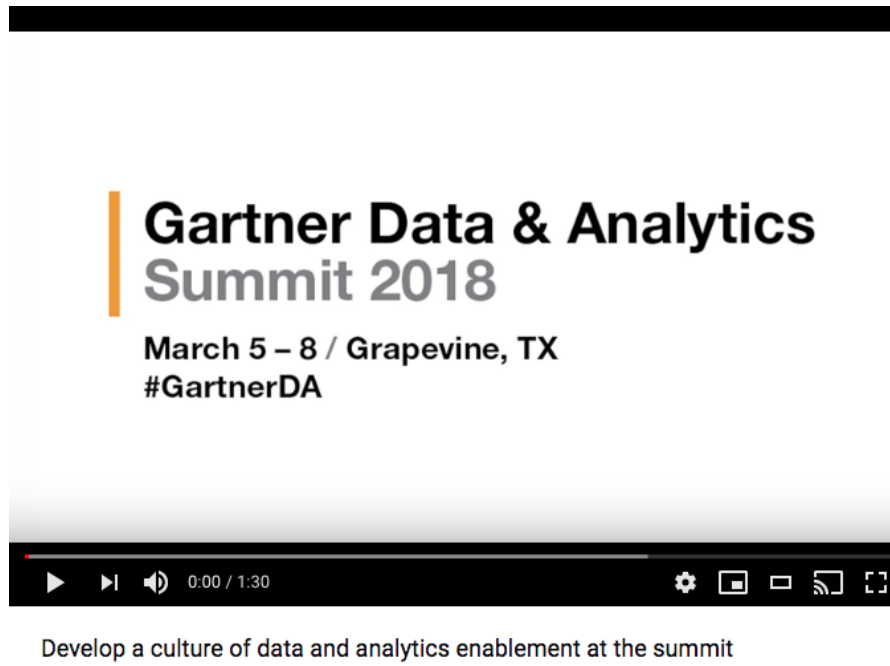
(Learning Object #2.1.5.5 - html page)
The Learn2Analyze EDL-CP

1. Data Collection	<p>1.1 Know - understand - be able to obtain, access and gather the appropriate data and/or data sources</p> <p>1.2 Know - understand - be able to apply data limitations and quality measures (e.g., validity, reliability, biases in the data, difficulty in collection, accuracy, completeness)</p>
2. Data Management	<p>2.1 Know - understand - be able to apply data processing and handling methods (i.e., methods for cleaning and changing data to make it more organized – e.g., duplication, data structuring)</p> <p>2.2 Know - understand - be able to apply data description (i.e., metadata)</p> <p>2.3 Know - understand - be able to apply data curation processes (i.e., to ensure that data is reliably retrievable for future reuse, and to determine what data is worth saving and for how long)</p> <p>2.4 Know - understand - be able to apply the technologies to preserve data (i.e., store, persist, maintain, backup data), e.g., storage mediums/services, tools, mechanisms</p>
3. Data Analysis	<p>3.1 Know - understand - be able to apply data analysis and modeling methods (e.g. application of descriptive statistics, exploratory data analysis, data mining).</p> <p>3.2 Know - understand - be able to apply data presentation methods (e.g., pictorial visualisation of the data by using graphs, charts, maps and other data forms like textual or tabular representations)</p>
4. Data Comprehension & Interpretation	<p>4.1 Know - understand - be able to interpret data properties (e.g., measurement error, outliers, discrepancies within data, key take-away points, data dependencies)</p> <p>4.2 Know - understand - be able to interpret statistics commonly used with educational data (e.g., randomness, central tendencies, mean, standard deviation, significance)</p> <p>4.3 Know - understand - be able to interpret insights from data analysis (e.g., explanations of patterns, identification of hypotheses, connection of multiple observations, underlying trends)</p> <p>4.4 Be able to elicit potential implications/links of the data analysis insights to instruction</p>
5. Data Application	<p>5.1 Know - understand - be able to use data analysis results to make decisions to revise instruction</p> <p>5.2 Be able to evaluate the data-driven revision of instruction</p>
6. Data Ethics	<p>6.1 Know - understand - be able to use the informed consent</p> <p>6.2 Know - understand - be able to protect individuals' data privacy, confidentiality, integrity and security</p> <p>6.3 Know - understand - be able to apply authorship, ownership, data access (governance), re-negotiation and data-sharing</p>

This matrix provides a brief overview of the Learn2Analyze Educational Data Literacy Competence Framework.

[END OF PAGE]

(Learning Object #2.1.5.6 - video)
Expert View - Data Culture



External Video: Develop a culture of data and analytics enablement at the summit [1:30]

In the above video, Gartner's Analyst Rita Sallam discusses how we should focus to develop a culture of data enablement, so as to scale the value of our data analytics investments.

[END OF PAGE]

(Learning Object #2.1.5.7 - Activity)
Poll & Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

1. Have you ever taken any courses in educational data literacy, either as part of your undergraduate or postgraduate studies or as part of your professional development?
 - Undergraduate Studies
 - Postgraduate Studies
 - Professional Development
 - No, I haven't taken any course in educational data literacy
2. Do you consider that educational data literacy is an essential competence set for every educator (instructional designer, e-tutor, school teacher)?
 - Yes
 - No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response to educational data literacy training in the following discussion task, by posting your thoughts on the discussion board. You may:

- share your experience from attending such a course, and/or
- share your thoughts on why to attend such a course (or not!)

[END OF PAGE]

(Learning Object #2.1.5.8 - html page)
References and Further Readings

REFERENCES:

Data Quality Campaign. (2014). Roadmap for Educator Licensure Policy Addressing Data Literacy. Retrieved from <https://dataqualitycampaign.org/resource/roadmap-educator-licensure-policy-addressing-data-literacy/>

Data Quality Campaign. (2014). Teacher Data Literacy: It's About Time. A Brief for State Policymakers. Retrieved from <http://2pido73em6703eytaq1cp8au.wpengine.netdna-cdn.com/wp-content/uploads/2016/03/DQC-Data-Literacy-Brief.pdf>

Love, N. (2012). *Data Literacy for Teachers*. Hawker Brownlow Education. Retrieved from <http://files.hbe.com.au/samplepages/NPR8884.pdf>

Mandinach, E. B., & Gummer, E. S. (2013). *A Systemic View of Implementing Data Literacy in Educator Preparation*. *Educational Researcher*, 42(1), 30–37. doi: [10.3102/0013189X12459803](https://doi.org/10.3102/0013189X12459803)

Ridsdale, C., Rothwell, J., Smit, M., Ali-Hassan, H., Bliemel, M., Irvine, D., Kelley, D., Matwin, S., & Wuetherick, B. (2015). *Strategies and Best Practices for Data Literacy Education: Knowledge Synthesis Report*. Halifax, NS: Dalhousie University. doi/10.13140/RG.2.1.1922.5044

FURTHER READINGS

Mandinach, E. (2013, September 17). Data literacy vs. assessment literacy. [Blog post]. Retrieved from <https://www.msdf.org/blog/2013/09/ellen-mandinach-data-literacy-vs-assessment-literacy/>

Means, B., Chen, E., DeBarger, A. & Padilla, C. (2011). *Teachers' Ability to Use Data to Inform Instruction: Challenges and Supports*. Office of Planning, Evaluation and Policy Development, US Department of Education.

[END OF PAGE]

2.1.6 Quiz

(Learning Object #2.1.6.1 - Activity) Topic 1 Quiz

Question 1: Data-driven decision-making in schools is: (there are 2 correct answers, please select both)

1. a process solely assigned to the school leader for making decisions related to the governance of the school.
2. a process solely related to classroom teaching, where teachers self-reflect on their teaching practice.
3. a process to help support continuous school self-evaluation and improvement.
4. a process that crosses all levels of the educational system

Question 2: School self-evaluation and improvement:

1. Is a continuous process intended to improve the teaching, learning and assessment processes.
2. Is performed with a clear focus to attract more students to the school in the future.
3. Is performed only to assess students.
4. Is an one-off task related to end of year school inspections.

Question 3: Educational data is collected strictly from activities that are directly assessed as part of the learner's educational progress

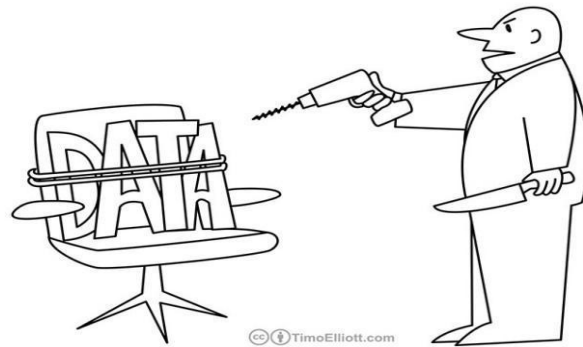
1. True
2. False

2.2 Data is Everywhere (Educational Data Collection)

2.2.1 Posing questions and identifying appropriate educational data

(Learning Object #2.2.1.1 - Activity)

Poll



"If you don't reveal some insights soon, I'm going to be forced to slice, dice, and drill!"

Source: <https://timoelliott.com/blog/cartoons/analytics-cartoons>

Poll: Looking for Answers

Think of a question or an issue you would like to answer or address by collecting educational data and answer the poll below.

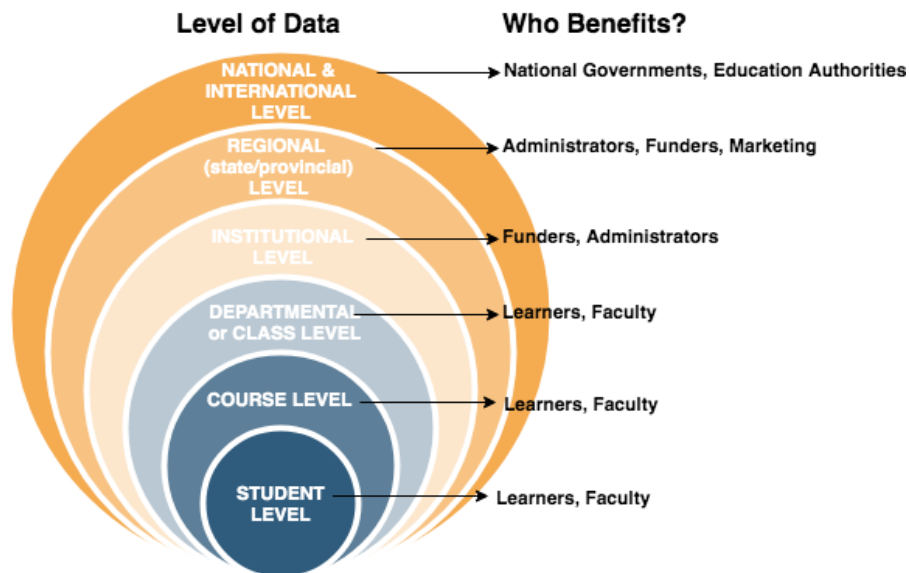
ACTIVITY/PRACTICE QUESTION (Poll):

Would you like to collect educational data

1. to design a new online training course?
2. to find out more about the performance gaps of your learners in an existing online course?
3. to act upon a specific issue you are facing during your e-tutoring?
4. to improve the participation and learning of your school students in a flipped classroom course?

[END OF PAGE]

(Learning Object #2.2.1.2 - html page)
Educational Data: Definition and Categories



In the previous topic of this Module (#2.1) we have reviewed the **key role of educational data**.

Let's have a closer look of what educational data is.



In the school context, educational data can be broadly defined as:

"information that is collected and organised to represent some aspect of schools. This can include any relevant information about students, parents, schools, and teachers derived from qualitative and quantitative methods of analysis." ([Lai & Schildkamp, 2013, p. 10](#))

As this definition suggests, educational data is not restricted to students' grades in national exams and standardised tests (although that is a common misconception). Instead, educational data comprises a wide range of data from various sources, both internal (school-wide and classroom-specific data) and external (state and/or district data) to the school.

This definition can be extended to higher education and professional training institutions, as represented in the above graphic ([Long & Siemens, 2011](#)).

Moreover, according to the definition, we can distinguish two major categories of data, the qualitative and quantitative data.

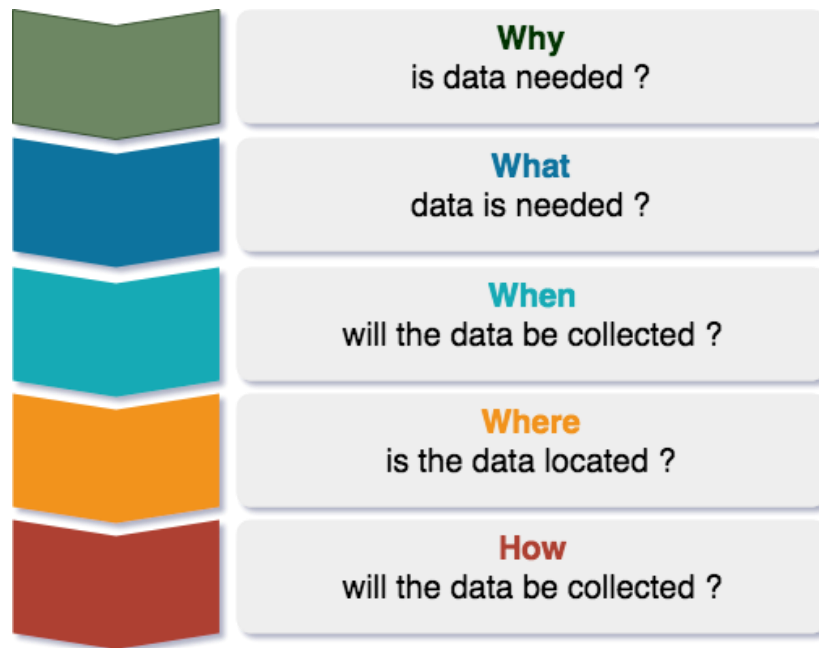
 qualitative data	vs  quantitative data
qualitative data is data that is not easily reduced to numbers. In a school setting, qualitative data may come from observations, work samples, conversations, written documents and more.	quantitative data is any information that can be reduced to a set of numbers. Information from which you can create averages, differences or totals is quantitative data.
is particularly helpful for summarising large amounts of information in a snapshot, tracking trends over time and understanding patterns and differences from one group of participants to another.	is particularly helpful for exploring emerging issues, providing rich description and context about a complicated issue and building theories about what might explain trends and patterns in quantitative data.
help us answer questions about <ul style="list-style-type: none"> • 'what', • 'how' and • 'why' of a phenomenon 	help us answer questions about <ul style="list-style-type: none"> • 'how many' or • 'how much'

A combination of different types of data is most effective in generating powerful evidence to assess learning performance and improve teaching practice. Both quantitative and qualitative data is equally important in these processes.

Now that we have a better understanding of the educational data basics, let's proceed to the next topic and start learning to "speak data".

[END OF PAGE]

(Learning Object #2.2.1.3 - html page)
Data Collection Strategy



Data Collection Strategy

As discussed, for effective Data-Driven Decision Making, we need to be data literate, to **speak the language of data**. According to Gartner analysts Idoine, Schlegel, and Sallam ([Petty, 2018](#)), “learning to “speak data” is like learning any language. It starts with understanding the basic terms and describing key concepts.” In our case, the first key area of data literacy vocabulary is **Educational Data Collection**.

Educational Data is everywhere. To inform our decisions and benefit from them, we need to **collect the necessary data**.

To do this, we need to answer to the "**Four Ws and One How**" questions, presented in the graphic.

We should know why we collect this data, what types of data we need to collect, when and how to get it and where to find it. “Who will collect or grant access to the needed data”, is also a question that should be answered, since, obviously, we can only collect data to which we have access and which we have been granted permission to use.

Just remember that we will probably need to utilize a variety of data types from different sources and use various methods to process and analyse them according to our goals.

Bear this strategy in mind and start posing questions that will help you identify and collect the appropriate educational data. Your ultimate goal is to improve your instructional e-learning strategy and make your online and blended course a success story for your target learners.

Over the next topics, we'll guide you step by step through the effective process for collecting educational data by answering each one of these key questions.

[END OF PAGE]

(Learning Object #2.2.1.4 - html page)
Why is data needed?

	Instructional Designer	e-Tutor	Teacher
Navigation & click stream data	<ul style="list-style-type: none"> Do different course structures show a difference in learner navigation patterns? Where do students exit? How should the course home page be designed to make sure learners come back? Is there an event that is always triggered first? Does it lead to more events or more pages? 	<ul style="list-style-type: none"> How do students navigate through course content? Which files had the most usage? How much time do learners spend in the online learning environment? Is there a relationship between students activity time in the course and their performance? 	<ul style="list-style-type: none"> Are there paths through the course site that are more popular than others, and if so, are those the paths that you want students to follow? Did students go right from homepage to assignments/quizzes without additional navigation?
Discussion Forum Interaction Data	<ul style="list-style-type: none"> How can I generate more activity in the forums? How do discussion features affect student participation? Does a graded discussion facilitate a higher participation rate? When discussions are set to Require Initial Post (post before reading other posts), are there significant differences in student participation? 	<ul style="list-style-type: none"> Which forums generate the most posts and why? Which discussion boards generate the most traffic – have more students' views? Who are the learners actively engaged by providing many comments to peers' postings? Who are the learners whose initial thread became so popular that received quite a number of replies? 	<ul style="list-style-type: none"> How much do students use discussions as an extension of F2F classroom participation? Does discussion interaction reflect students' participation in class activities or subgroups of students with common interests in reality? Should I promote "burstiness" in asynchronous discussions, or longer, more sustained reflection?
Assignments, Quiz submission data	<ul style="list-style-type: none"> Is there a relationship between quiz performance and content access, or overall activities in a LMS? Why students access a particular material more times than other materials? How might we alter prompts or instructions given to better ensure that course goals are met? 	<ul style="list-style-type: none"> What was the overall performance on a quiz? How well an individual student did in comparison to the entire class? Did students struggled with a specific material? Could additional help (intervention) or materials be provided to students that strunggle? 	<ul style="list-style-type: none"> Are student submission activities associated with due dates? How well an individual student did in comparison to the entire class? Why is a particular student struggling?

Most things start with a question

The first question to ask ourselves is “*Why is data needed? Why we need to collect the data, in the first place?* ”.

When you analyse and design any course you need to gather the questions that are related to your instructional design, your teaching and tutoring strategy and your learners’ support:

- What is my Target Audience (whose instructional needs are to be addressed)?
- What are the Learning Environment Characteristics (educational context, limiting factors, affordances and constraints, technical requirements)?
- What criteria will be used to assess the achievement of the expected learning outcomes by the learners?

When the course is up and running:

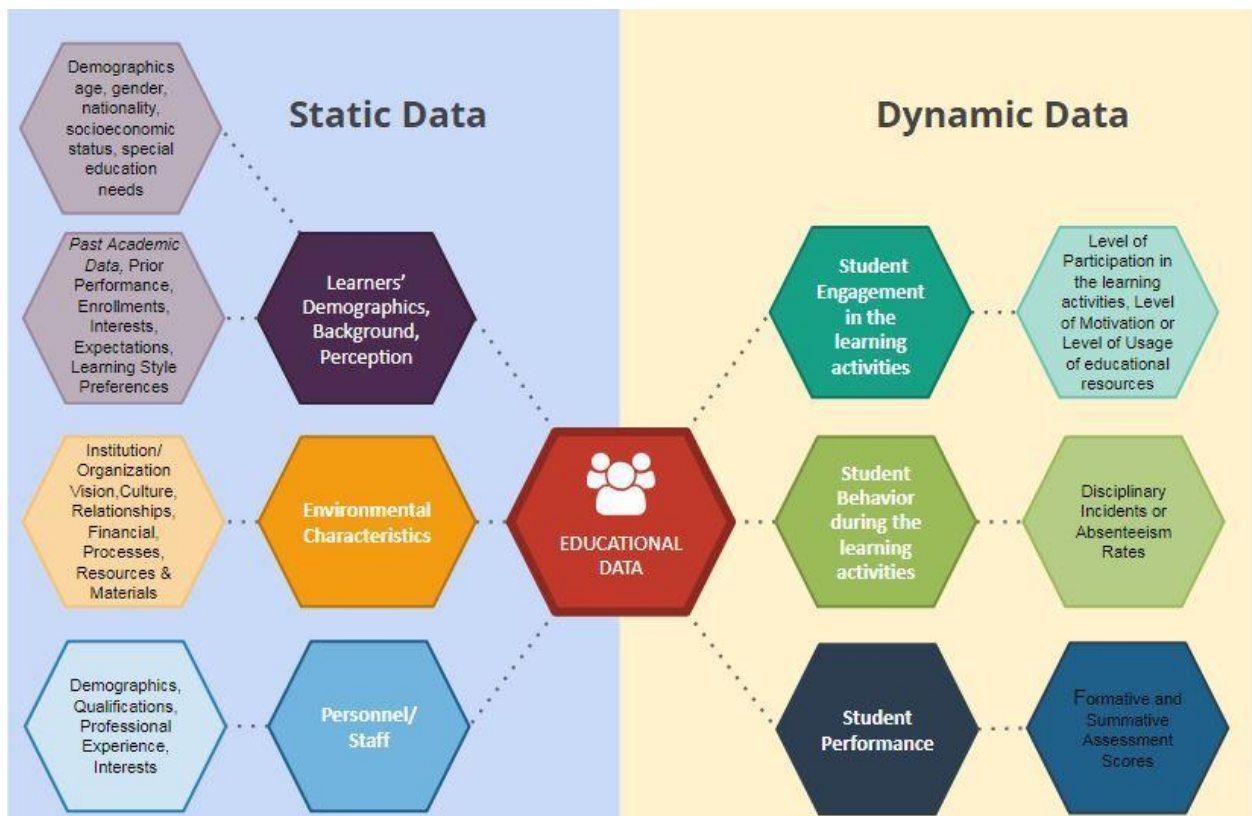
- What is the learners’ activity in the Online Environment?

- What are the tutors' support activities (scaffolding, feedback, answering questions, stimulating engagement)?
- How the combination of the learners' and tutors' activities relate to the academic performance, motivation and/or engagement?

The above graphic summarizes some key questions to help us identify the needed data.

[END OF PAGE]

What data is needed?



Now that we have the right questions in place, we can identify the type of data that may help us find the answers we are looking for.

As suggested by the figure above and this [infographic](#) by the Data Quality Campaign project, the types of educational data commonly used can be classified in two types: Static and Dynamic Data.

Static data, refers to **data which can remain unchanged for large periods of time**. According to [Shacklock \(2016\)](#), it is the data “which is collected, recorded and stored by institutions and traditionally includes student records, staff data, financial data and estates data”.

As [Shacklock \(2016\)](#), points out “Static data has always been a strategic asset for both institutions and government. It informs all operational and business decision-making and planning in an institution, and indicates to government and the public how the sector is performing as a whole.”

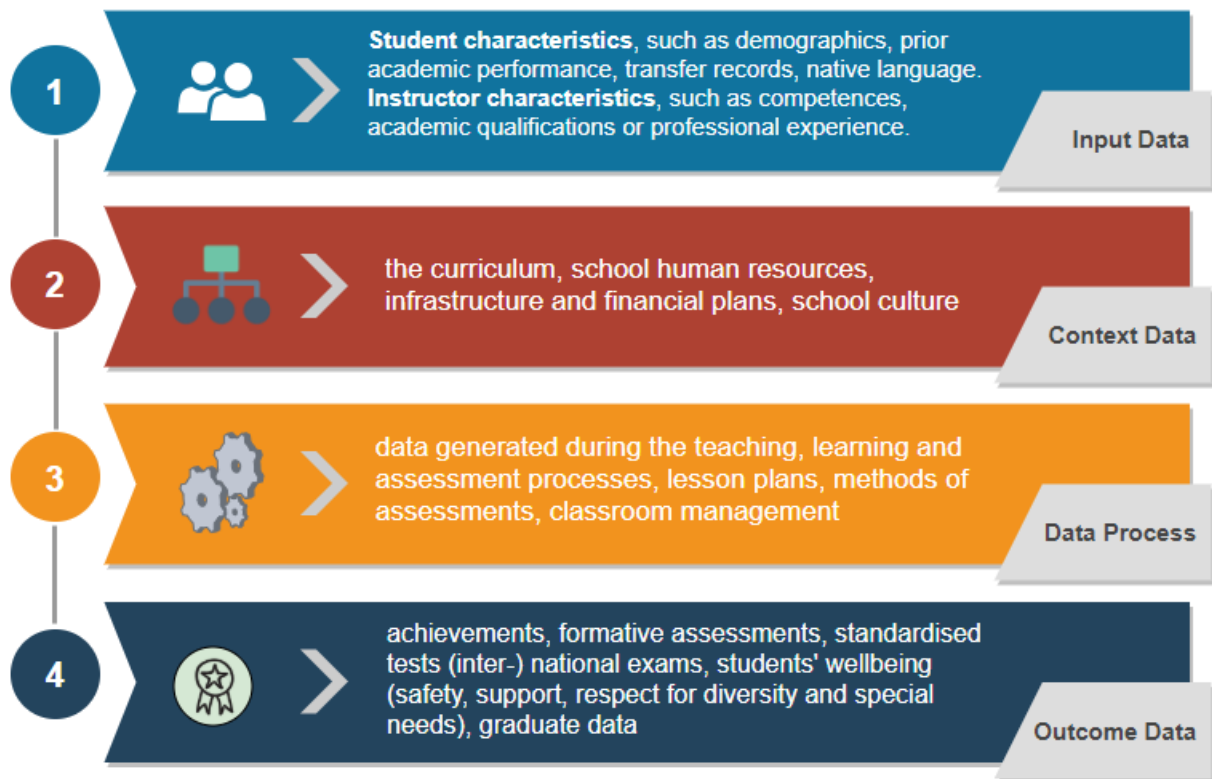
Dynamic data refers to data generated at a more frequent rate and they are mainly related to **learners' activities during the learning process**. Such data is usually collected by the e-tutors, classroom teachers typically through Learning Management Systems.

If we manage to collect, link and analyse dynamic data, then we can probably get an instant, accurate view of how an individual learner or a group of learners is performing.

[END OF PAGE]

(Learning Object #2.2.1.6 - html page)

When will the data be collected?



[Lai and Schildkamp](#) (2013, p. 11-12) have extended [Ikemoto and Marsh's](#) (2007) categories of educational data, to *input data*, *context data*, *process data* and *outcome data*. Each category indicates **when** data will be collected. The figure presents examples of educational data for each category.

[END OF PAGE]

(Learning Object #2.2.1.7 - video)
Animation - Using Data



Driving Toward Greater Post-Secondary Attainment Using Data

External Video: [Driving Toward Greater Post-Secondary Attainment Using Data](#) [3:17]

So far, we discussed **why** we want to collect data, **what** data we need and **when** it will be collected.

To get a better understanding of a real-life case, watch this video from the Institute for Higher Education Policy (IHEP), StriveTogether and the Data Quality Campaign (DQC), presenting an overview of how communities use data to support students and improve educational outcomes.

Stay with us and find answers to the remaining questions: **where** the data is located, **how** it will be collected.

[END OF PAGE]

(Learning Object #2.2.1.8 - Activity)
Poll/Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

1. Have you ever used educational data to redesign your course?
 - ☐ Yes
 - ☐ No
2. Have you ever used educational data to analyse your learners' needs?
 - ☐ Yes
 - ☐ No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about the use of educational data in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

1. *As an instructional designer or a school teacher, you want to collect data to redesign your course. Describe your evaluation plan. Define the questions you need to answer and the data you will need to collect. Please share either your past experience or your thoughts for future actions.*
2. *As a tutor of an online course, you want to collect data to enhance your learners' participation in the course. Define the questions you need to answer and the data you will need to collect. Please share either your past experience or your thoughts for future actions.*

[END OF PAGE]

REFERENCES

Ikemoto, G. S., & March, J. A (2007). [Cutting Through the “Data-Driven” Mantra: Different Conceptions of Data-Driven Decision Making](#). In *Evidence and decision making*, Edited by: Moss, P. A. 105–131. Malden, MA: Blackwell.

Lai, M. K., & Schildkamp, K. (2013). [Data-based Decision Making: An Overview](#). In K. Schildkamp, M.K. Lai & L. Earl (Eds.), *Data-based decision making in education: Challenges and opportunities*. Dordrecht: Springer.

Long, P.D, & Siemens G. (2011). [Penetrating the fog: Analytics in learning and education](#). EDUCAUSE Review, 46(5), 31–40.

Pettey, C. (2018, March 5). How data and analytics leaders learn to master information as a second language. Retrieved from <https://www.gartner.com/smarterwithgartner/gartner-keynote-do-you-speak-data/>

Shacklock, X. (2016). [From bricks to clicks: The Potential of Data and Analytics in Higher Education](#). London, UK: Policy Connect - Higher Education Commission.

FURTHER READINGS

Centre for Education Statistics and Evaluation. (2018). [Using Data with Confidence](#). NSW Department of Education.

Khalil, M., & Ebner, M. (2015). [Learning Analytics: Principles and Constraints](#). doi:10.13140/RG.2.1.1733.2083.

Matters, G. (2006). [Using data to support learning in schools: Students, teachers, systems](#). Melbourne: ACER Press.

Peersman, G. (2014). [Overview: Data Collection and Analysis Methods](#) in *Impact Evaluation: Methodological Briefs - Impact Evaluation No. 10, Methodological Briefs no. 10*.

Qi, J., & Esco, J. (2017). [Leveraging Canvas Learning Data To Inform Mooc Design](#). Retrieved from:

<https://cpb-us-e1.wpmucdn.com/sites.dartmouth.edu/dist/c/571/files/2015/04/IC17Presentation.pdf>

Qi, J., & Coogan, P. (2015). *Leveraging Canvas Participation Data to Inform Course Design*. Dartmouth College. Retrieved from:

<https://cpb-us-e1.wpmucdn.com/sites.dartmouth.edu/dist/c/571/files/2015/04/LeveragingCanvasData1.pdf>

Romero, C., Romero, J. R., & Ventura, S. (2014). *A Survey on Pre-Processing Educational Data*. *Educational Data Mining Studies in Computational Intelligence*, 29-64. Springer. doi:10.1007/978-3-319-02738-8_2

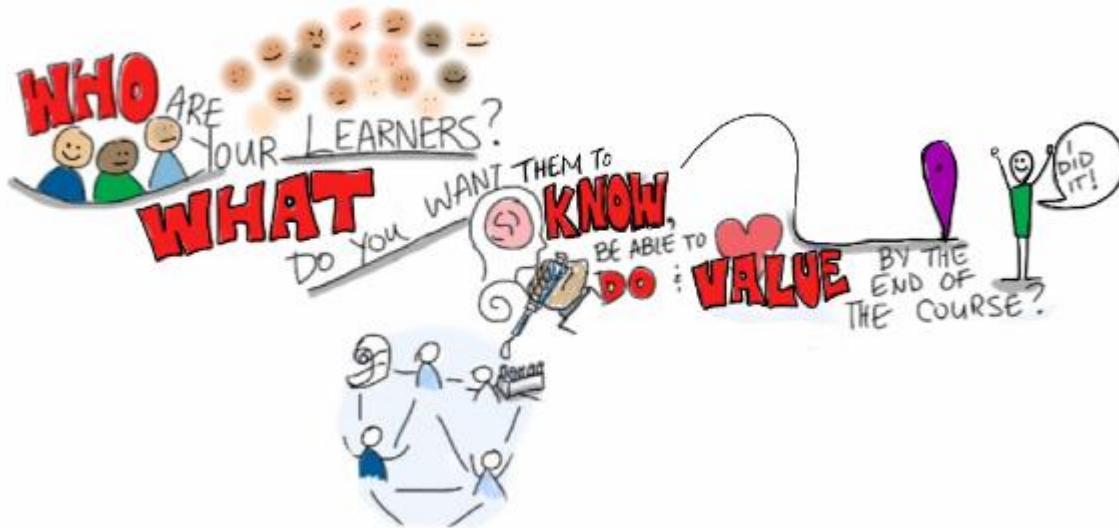
Treser, M. (2015). *Elearning Industry: Getting to know ADDIE*. Retrieved from <https://elearningindustry.com/getting-know-addie-analysis>

[END OF PAGE]

2.2.2 Matching appropriate educational data with data sources

(Learning Object #2.2.2.1 - Activity)

Poll



[Giulia Forsythe \[CCo 1.0\]](#)

[Source: https://www.flickr.com/photos/gforsythe/8203776321/in/album-72157626965187420/](https://www.flickr.com/photos/gforsythe/8203776321/in/album-72157626965187420/)

1. Have you ever attempted to collect educational data from external data sources?
 - ☐ Yes
 - ☐ No
2. Have you ever tried to get permission to collect educational data?
 - ☐ Yes
 - ☐ No

[END OF PAGE]

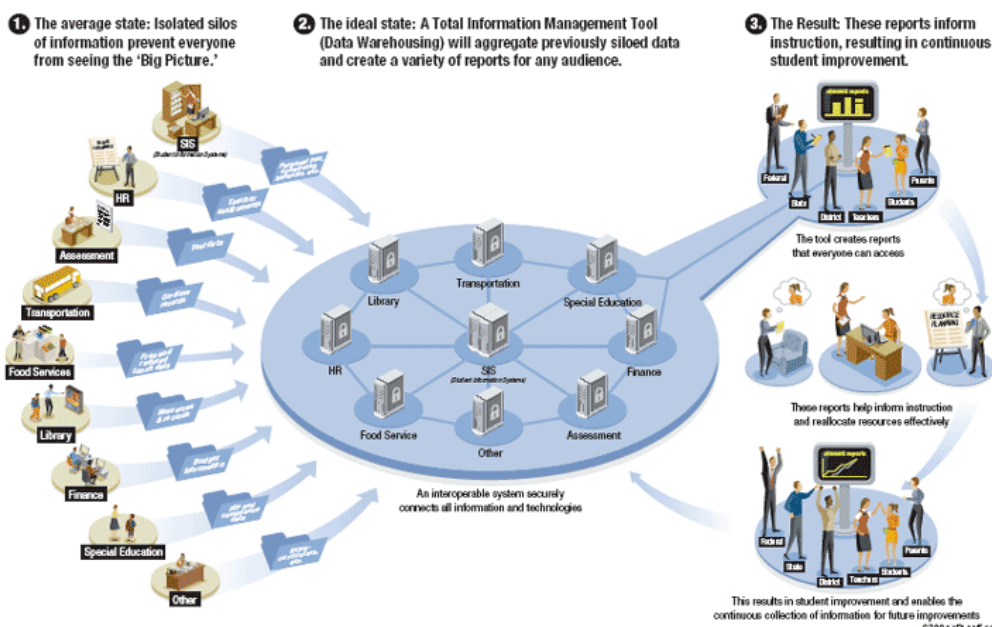
(Learning Object #2.2.2.2 - html page)

Where to get the data?

Improving achievement through Student Data Management

XPLANATIONS® by XPLANE®

On average, there is little aggregation of student data in today's school systems. Information is siloed, redundant and difficult to share. The technologies used — if any — are aging and frequently incompatible. An ideal state has complete aggregation and alignment. It is easier to ensure that students meet challenging standards, teachers target instruction, parents know teachers are helping their children, school districts know how to allocate resources effectively and the government knows how schools are doing.



Source: https://upload.wikimedia.org/wikipedia/commons/d/df/Student_Data_Management.gif

In this section we will discuss **where** to find the educational data you need and **how**.

WHERE applies to the location where you might have to go for the data collection, according to the data you need.

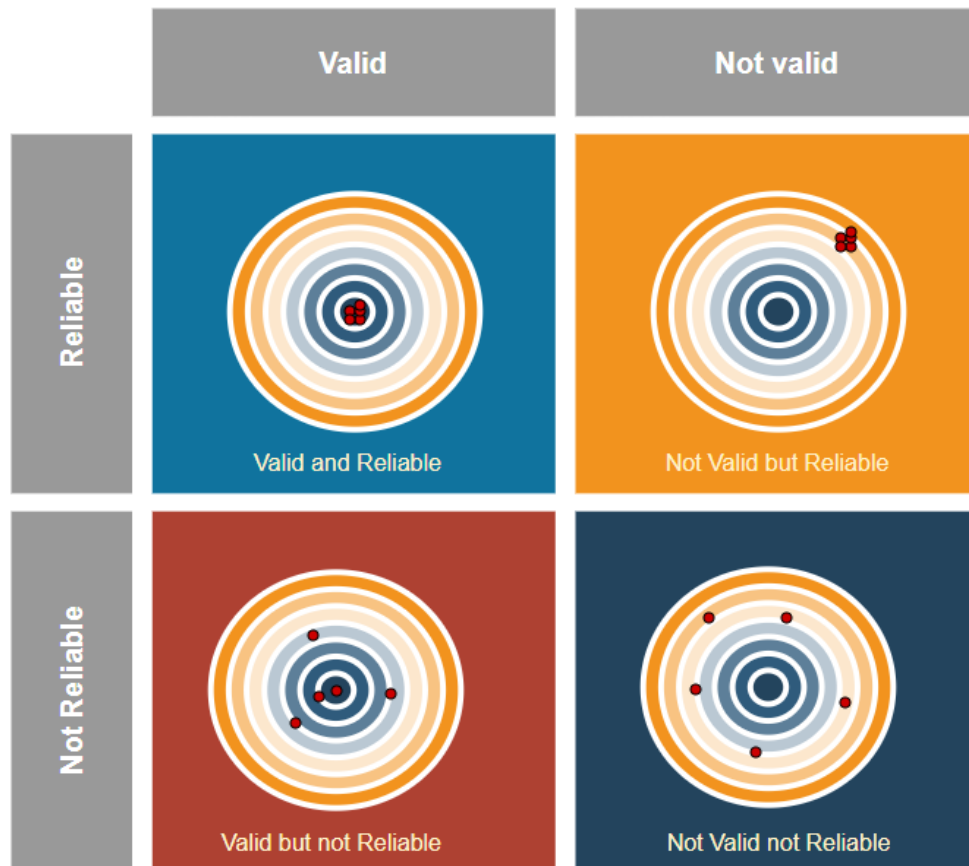
There are **numerous data sources of learners' information** available:

- data stored in institutional student information systems, e.g. high school grades, socio-economic status, citizenship and immigration status, parents' education and language skills,
- trace data recorded within Learning Management Systems and other online learning environments such as e-libraries and virtual labs,
- data from systems that analyse discussion in online forums,
- survey data (e.g., questionnaires)

[END OF PAGE]

(Learning Object #2.2.2.3 - html page)

Quality measures of data



By EGalvez (WMF) - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=31697223>

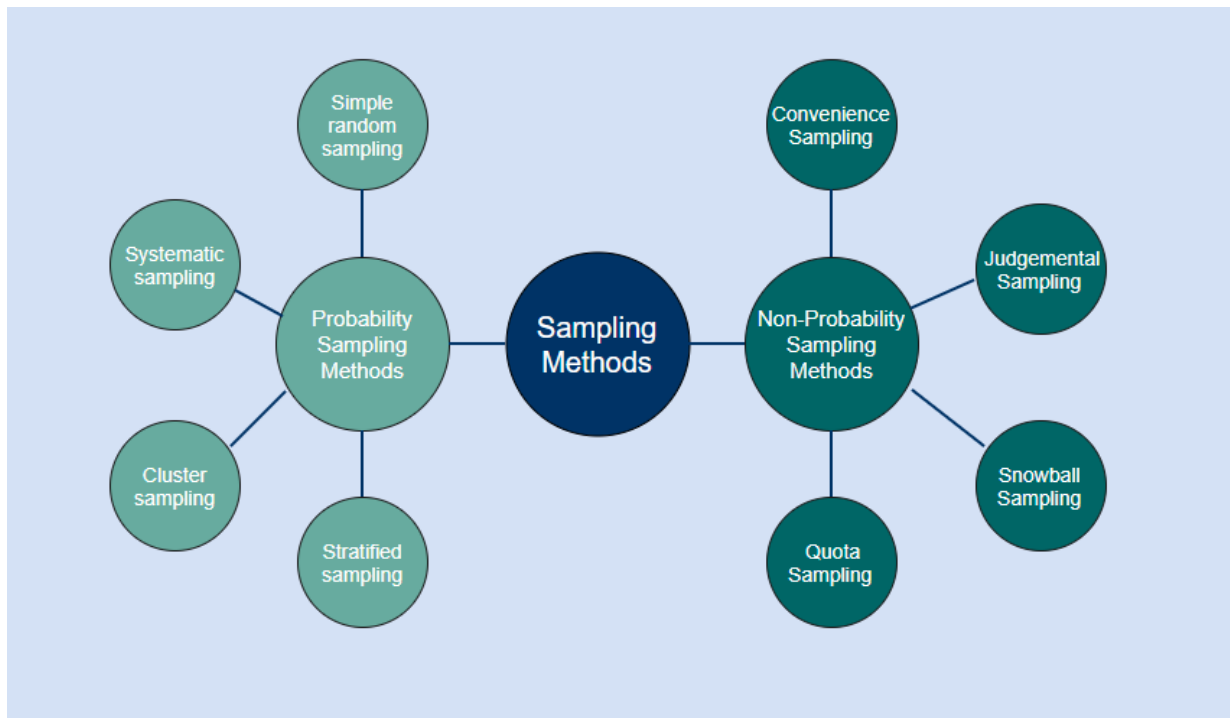
Difference between reliability and validity

Before proceeding further with data collection, we need to agree on a few basic concepts related to the nature of data itself. As Guerra-Lopez (2008) points out, data must meet three basic characteristics:

- **Relevancy:** The data must directly relate to the research questions being answered.
- **Reliability:** The data must be measured, trustworthy, and consistent.
- **Validity:** The data must measure what we intend to measure.

[END OF PAGE]

How to collect data?



Sampling procedures

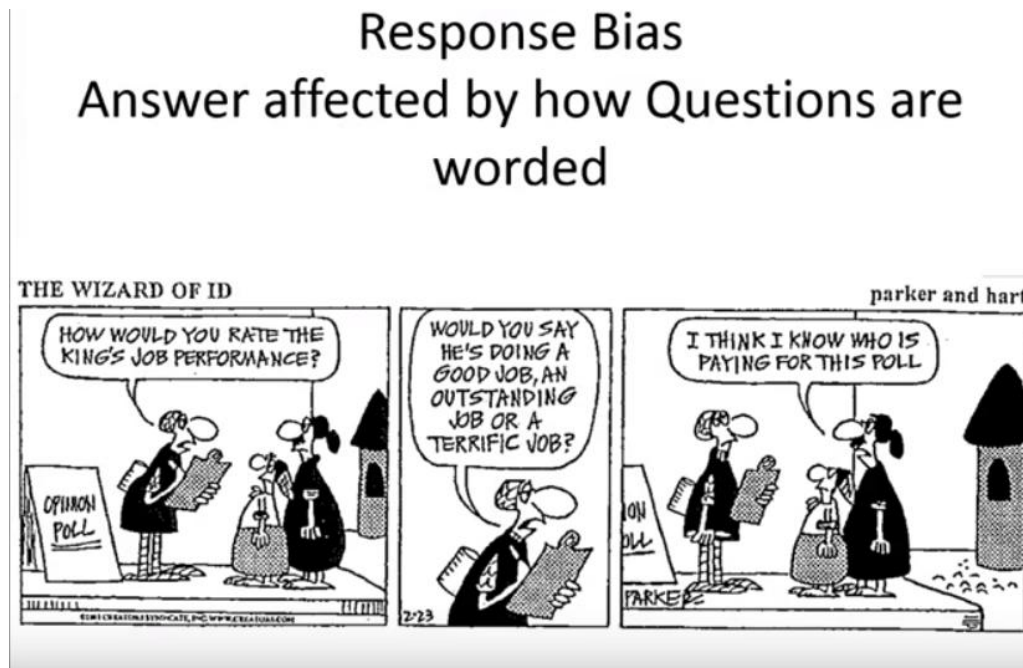
What methods will be used to select a representative group of people from the learners' target audience? How can we avoid **biases** in sampling?

Rothwell, Benscoter, King, and King (2016) argue that the four types of sampling procedures commonly used are: (1) convenience or judgmental sampling, (2) simple random sampling, (3) stratified sampling, and (4) systematic sampling.

To determine which one to select, we need to consider our goals and objectives, certainty needed in the conclusions, the willingness of decision makers in the organisation to allow information to be collected for our study, and the resources (time, money, and staff) available (Rothwell, Benscoter, King, & King, 2016).

[END OF PAGE]

Biases



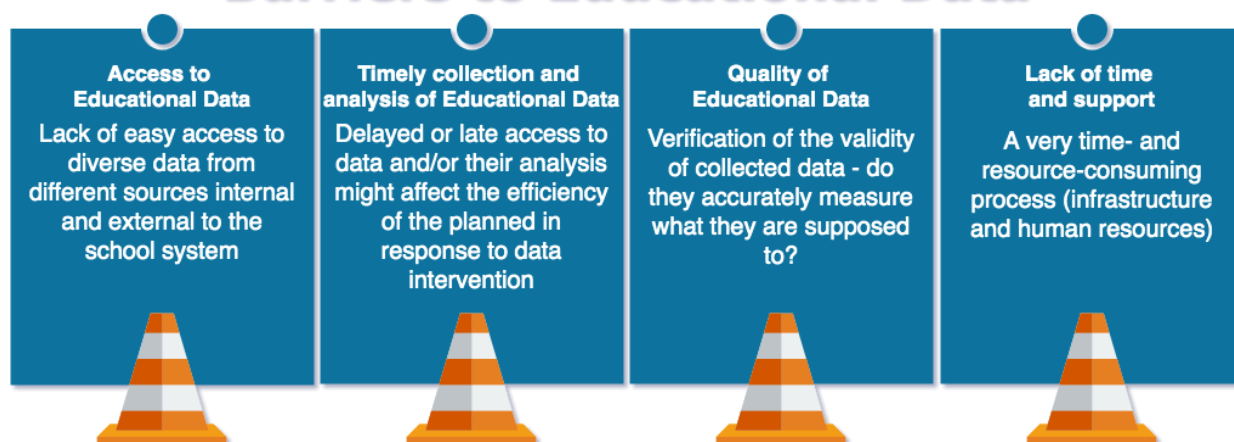
Video: [Bias when collecting data](#) [5:59]

Biases are systematic errors in the way the sample represents the population. This video explains different kind of biases that occur when collecting data.

- **Voluntary bias** occur when the responders choose themselves to participate.
- **Undercoverage bias** occur when some members of the population are inadequately represented in the sample.
- **Overcoverage bias** occur when some members of the population are overrepresented in the sample.
- **Non-response bias** or participation bias occur when the sample is unwilling to participate.
- **Convenience sample bias** or availability bias occur when collecting the data that is easier to obtain, rather than collecting more relevant data.
- **Response bias** occur when respondents provide dishonest or misleading answers, due to many reasons such as survey design, survey fatigue, missing answers etc.

[END OF PAGE]

Barriers to Educational Data



What data do we need versus what data can we access? With whom in the organisation should we interact during our data collection process? How many people? For what issues? Whose approval is necessary to collect information?

Perhaps the most common failure during the collection process is failing to receive enough—or the right—permissions to collect data. To overcome this problem, we should make sure we have secured all necessary approvals before collecting data.

Failure to complete this step successfully can create significant, and often unfortunate, barriers to cooperation within the organisation.

In their 2006 report, [Making Sense of Data-Driven Decision Making in Education](#), Julie Marsh and her colleagues (Marsh et al. 2006, p. 9) identified a number of barriers to the effective and efficient take-up of educational data use.

[END OF PAGE]

(Learning Object #2.2.2.7 - Activity)
Poll/Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

1. Are you aware of the different kind of biases in sampling?
 - Yes
 - No
2. Have you ever tried to get permission to collect data?
 - Yes
 - No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about data collection, in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

1. *How can you as an instructional designer or tutor avoid biases in educational data collection? Please share either your past experience or your thoughts for future actions.*
2. *You are an instructional designer or tutor or school teacher and you want to collect and analyse educational data from your course discussion forum to evaluate learners' participation. Describe your evaluation plan.*

[END OF PAGE]

References

REFERENCES

Guerra-López, I. (2008). *Performance Evaluation: Proven Approaches for Improving Program and Organizational Performance*. San Francisco, CA: Jossey Bass.

Marsh, J. A., Pane, J. F., & Hamilton, L. S. (2006). *Making Sense of Data-Driven Decision Making in Education: Evidence from Recent RAND Research*. Santa Monica, CA: RAND Corporation.

Rothwell, W. J., Bencoter, G. M., King, M., & King, S. B. (2016). *Mastering the instructional design process: A systematic approach*. Hoboken: John Wiley & Sons.

FURTHER READINGS

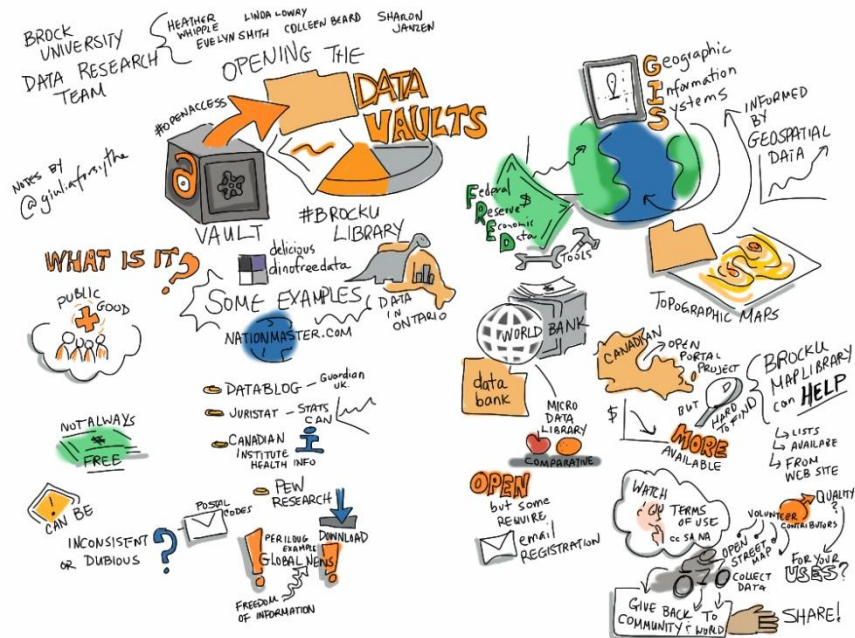
Yupangco, J. (2017, December 21). What Sources Of Learning Analytics Should You Be Collecting? Retrieved from <https://elearningindustry.com/sources-of-learning-analytics-should-collecting>

[END OF PAGE]

2.2.3 Combining data from different educational data sources

(Learning Object #2.2.3.1- Activity)

Poll



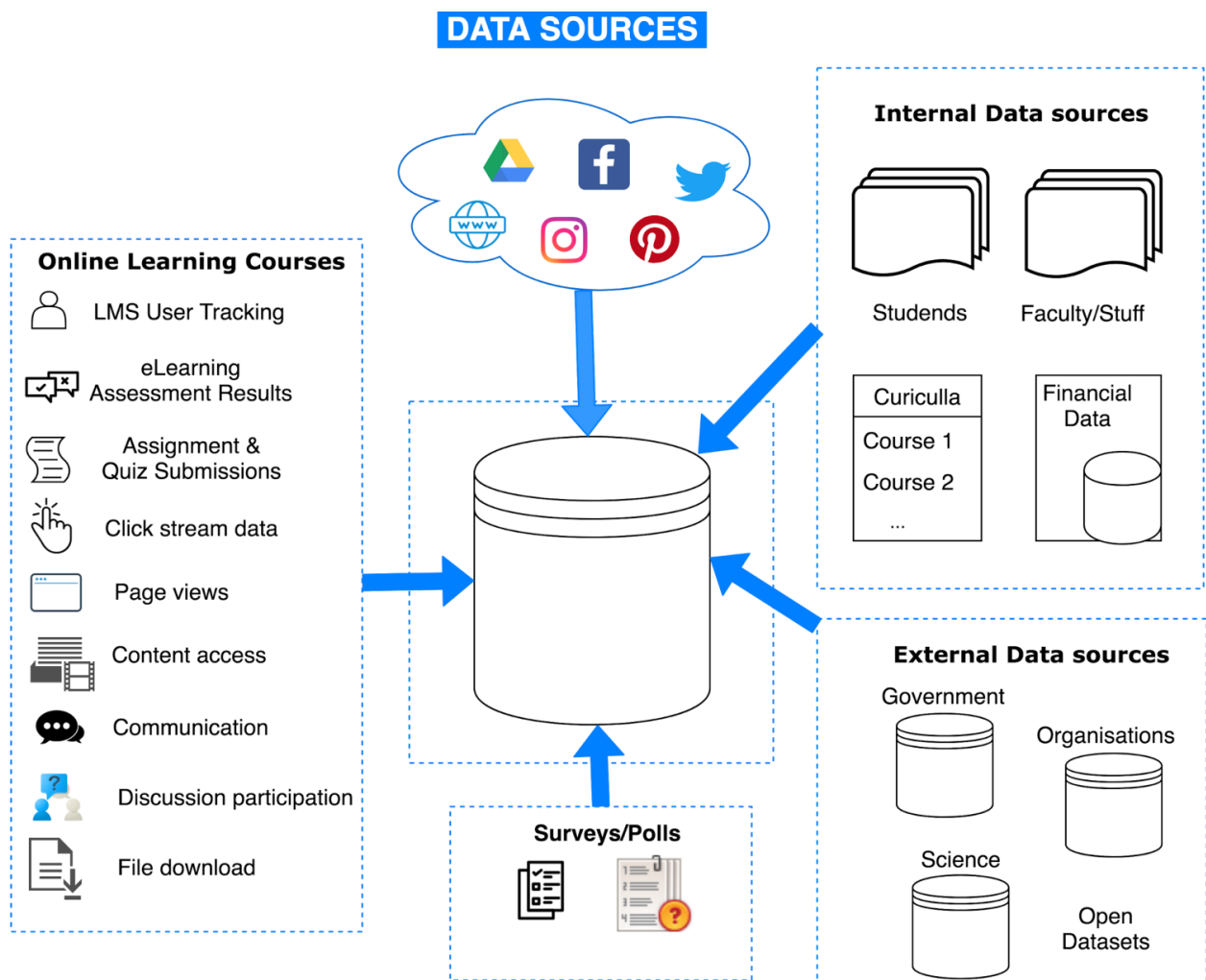
Giulia Forsythe [CC BY 2.0]

Source: <https://www.flickr.com/photos/gforsythe/8126486040/>

1. Have you ever used raw data from open datasets?
 - o Yes
 - o No
2. Have you ever used learners' data from your institution's Information Management System?
 - o Yes
 - o No
3. Have you ever gathered learners' data through a survey?
 - o Yes
 - o No

[END OF PAGE]

(Learning Object #2.2.3.2 - html page)
What data sources are available?



As we have already seen, there are many different data sources that contain useful educational data.

[Shacklock \(2016\)](#) reports that “some institutions are beginning to explore the possibility of incorporating more types of data into their analytics systems. The University of Lancaster is considering capturing and using data on which students are accessing library PCs and for how long, NTU are also looking at capturing data on e-book usage”.

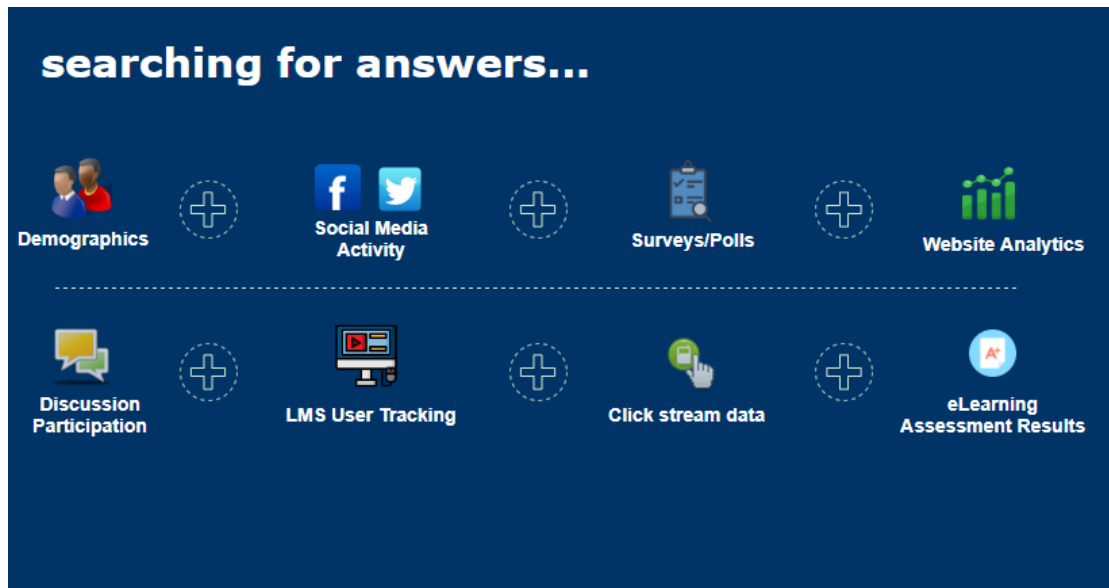
The above figure summarizes indicative educational data sources that store data from various sources:

- Internal Data Sources
- Online Learning Courses

- Surveys and polls
- Cloud applications
- Social media
- External data sources, like open repositories

[END OF PAGE]

(Learning Object #2.2.3.3 - html page)
Data we have - Data we get



Once we decide upon the “Ws” of the data we need, we have to define **HOW** we will collect the data. Open Knowledge Foundation in “[Data Wrangling Handbook](#)” (2013) distinguishes three basic ways of getting hold of data:

1. **Finding data** – this involves searching and finding data that has already been released e.g. through [open data repositories](#).
2. **Getting hold of more data** – asking from official sources to release ‘new’ data, e.g. through [Freedom of Information requests](#).
3. **Collecting data yourself** – This means gathering data through:
 - surveys and polls
 - internal data sources, like Institutions’ Management Information Systems and/or Students Information Systems.
 - online educational environments, such as LMSs, MOOCs, ITSs which record any learner activity involved, such as reading, writing, taking tests, performing various tasks and commenting with peers.

[END OF PAGE]

(Learning Object #2.2.3.4 - video)
Why to combine different data sources?



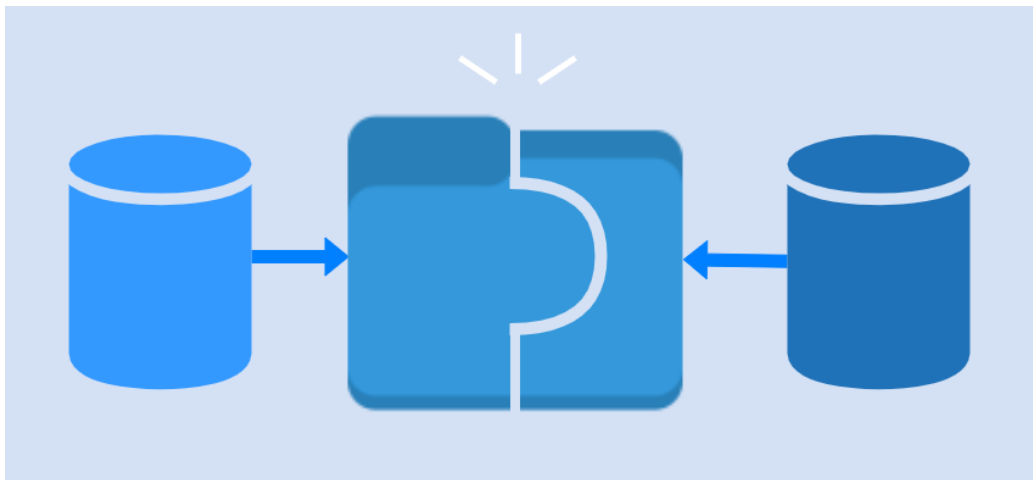
Educational Data - Creating Common Data Formats

Video: [Educational Data - Creating Common Data Formats](#) [2:13]

In the above video, Richard Culatta discusses the need for common educational data formats and the potential such formats have to improve learning.

[END OF PAGE]

(Learning Object #2.2.3.5 - html page)
How to combine different data sources?



There are various sources of educational data where data is stored in different formats. [Romero, Romero and Ventura \(2014\)](#) state that “the goal of data **aggregation/ integration** is to group together data from multiple sources into a coherent recompilation, normally into a database”.

Aggregation is the process of grouping together same type of data from different organisations/institutions and **integration** is the process that groups different types of data from the same organisation/institution.

Using aggregation and integration we can combine data from different sources and in different formats, for example performance data, attendance records, past academic data and forum participation data into a single database.

[END OF PAGE]

(Learning Object #2.2.3.6 - Activity)
Poll/Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

Have you ever combined data from different data sources to enhance learning experience?

- ☐ Yes
- ☐ No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

1. You are an instructional designer and you need to collect data in order to redesign your online course. Describe your plan to ask permission to collect the appropriate data. You can use Freedom of Information request (The Freedom of Information Act (FOIA) gives you the right to access recorded information held by public sector organisations)
2. You are an instructional designer or tutor or school teacher and you want to improve learners retention. How can you benefit from combining different data sources?

[END OF PAGE]

References

REFERENCES

Open Knowledge Foundation. (2013). Data Processing Pipeline. *Data Wrangling Handbook*.

Retrieved from

<https://buildmedia.readthedocs.org/media/pdf/datapatterns/latest/datapatterns.pdf>

Romero, C., Romero, J. R., & Ventura, S. (2014). *A Survey on Pre-Processing Educational Data*. *Educational Data Mining Studies in Computational Intelligence*, 29-64. Springer. doi:10.1007/978-3-319-02738-8_2

Shacklock, X. (2016). *From bricks to clicks: The Potential of Data and Analytics in Higher Education*. London, UK: Policy Connect - Higher Education Commission.

FURTHER READINGS

Bienkowski, M., Feng, M., & Means, B. (2012). *Enhancing Teaching and Learning through Educational Data Mining and Learning Analytics: An Issue Brief*. Washington, DC: U.S. Department of Education, Office of Educational Technology.

Brown, M. (2012). *Learning analytics: Moving from concept to practice*. Washington, DC: EDUCAUSE Learning Initiative.

Ellis, R. A., Han, F., & Pardo, A. (2017). *Improving learning analytics – combining observational and self-report data on student learning*. *Educational Technology & Society*, 20 (3), 158-169.. Educational Technology & Society.

Friesen, N. (2013). Learning Analytics: Readiness and Rewards/L'analyse de l'apprentissage: état de préparation et récompenses. *Canadian Journal of Learning and Technology/La revue canadienne de l'apprentissage et de la technologie*, 39(4), 1-12.

Government Digital Service. (2017, April 05). How to make a freedom of information (FOI) request. Retrieved from <https://www.gov.uk/make-a-freedom-of-information-request>

Johnson, L., Adams, S., Cummins, M., Estrada, V., Freeman, A., & Ludgate, H. (2013). *The NMC Horizon Report: 2013 Higher Education Edition*. Austin, TX: The New Media Consortium.

- Matters, G. (2006). [Using data to support learning in schools: Students, teachers, systems](#). Melbourne: ACER Press.
- Rajbhandari, L., & Schober, J. (2013). [Data Warehouse and Analytics Discussion Paper](#). Northwestern University.
- Reyes, J. A. (2015). [The skinny on big data in education: Learning analytics simplified](#). *TechTrends*, 59(2), 75-80. doi:10.1007/s11528-015-0842-1
- Romero, C., Romero, J. R., & Ventura, S. (2014). [A Survey on Pre-Processing Educational Data](#). *Educational Data Mining Studies in Computational Intelligence*, 29-64. Springer. doi:10.1007/978-3-319-02738-8_2
- Verbert, K., Manouselis, N., Drachsler, H., & Duval, E. (2012). [Dataset-driven research to support learning and knowledge analytics](#) [Electronic version]. *Educational Technology & Society*, 15(3), 133-148.
- Wagner, E., & Ice, P. (2012). [Data changes everything: Delivering on the promise of learning analytics in higher education](#). *Educause Review*, 47(4), 32-36.

[END OF PAGE]

2.2.4 Educational Data Ethics: informed consent

(Learning Object #2.2.4.1 - Activity)

Poll



Madhumathi S V [[CC BY-SA 4.0](#)]

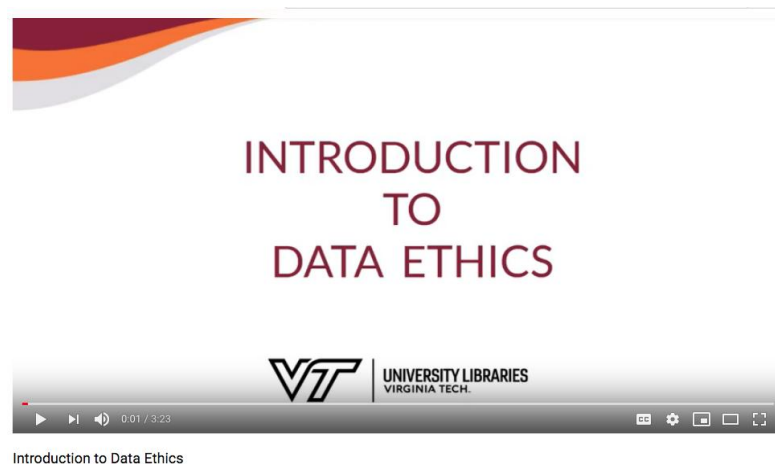
Source: https://commons.wikimedia.org/wiki/File:Business_ethics.jpg

1. Do you read carefully terms and conditions for the use of your personal data?
 - ☐ Yes
 - ☐ No
2. Do you know what informed consent is?
 - ☐ Yes
 - ☐ No
3. Are you aware of the General Data Protection Regulation (GDPR)?
 - ☐ Yes
 - ☐ No

[END OF PAGE]

(Learning Object #2.2.4.2 - video)

Introduction to Data Ethics



Introduction to Data Ethics

External Video: [Introduction to data ethics](#) [3:23]

The video we just watched introduced us the basic principles of data ethics.

As Pentland states when describing Big Data, “*the ability to track, predict and even control the behaviour of individuals and groups of people is a classic example of Promethean fire: it can be used for good or ill*” ([Pentland, 2013](#)).

New regulations, like the **GDPR (General Data Protection Regulation)** that we will discuss later on, along with recent events such [as the Cambridge Analytic and Facebook scandal](#), have **raised awareness of data ethics issues that can arise from data misuse**.

[Open Data Institute](#) (ODI) defines Data Ethics as

“a branch of ethics that evaluates data practices with the potential to adversely impact on people and society – in data collection, sharing and use.”

Several frameworks, policies and guidelines have been developed to address data ethics issues, including [JISC’s code of practice](#) in 2015 (updated in 2018), the [LACE](#) (Learning Analytics Community Exchange) framework in 2016 and the ICDE (International Council for Open and Distance Education) [Global guidelines](#) in 2019. To help identify potential ethical issues associated with a data project or activity and the steps needed to act ethically, Open Data Institute has also designed the [Data Ethics Canvas](#) in 2018.

We will further discuss the basic common principles of these practices in Module 3.

As emphasized by [Shacklock \(2016\)](#) *“Institutions should put in place clear ethical policies and codes of practices that govern the use of educational data. These policies should, at a minimum, address privacy, security of data and consent.”*

Up next, we will discuss informed consent which is declared by most international guidelines as one of the pivotal principles in Data Ethics and “is explicitly mentioned as a principle in article 7 of the International Covenant on Civil and Political Rights (1966), a United Nations Treaty” ([European Commission, 2013](#)).

[END OF PAGE]

(Learning Object #2.2.4.3 - video) Defining Informed Consent



What is the GDPR?

External Video: [What is the GDPR?](#) [1:11]

This brief video provides an overview of the European Union data protection rules, also known as the [EU General Data Protection Regulation \(or GDPR\)](#), that apply since 25 May 2018 to all entities who collect, store and process any personal data belonging to EU citizens and residents (even organisations that are not EU-based). GDPR has strengthened the conditions for consent ([GDPR.eu, 2019](#)).

In the next section, we will discuss this new regulation and how should be applied by the various entities. First, let's see what informed consent is all about.

According to [Griffiths et al. \(2016\)](#)

“Informed consent refers to the requirement for an individual to give consent for the collection and analysis of the data which they generate.”

while

“Transparency refers to the degree to which users can observe the ways in which the data they generate is used”.

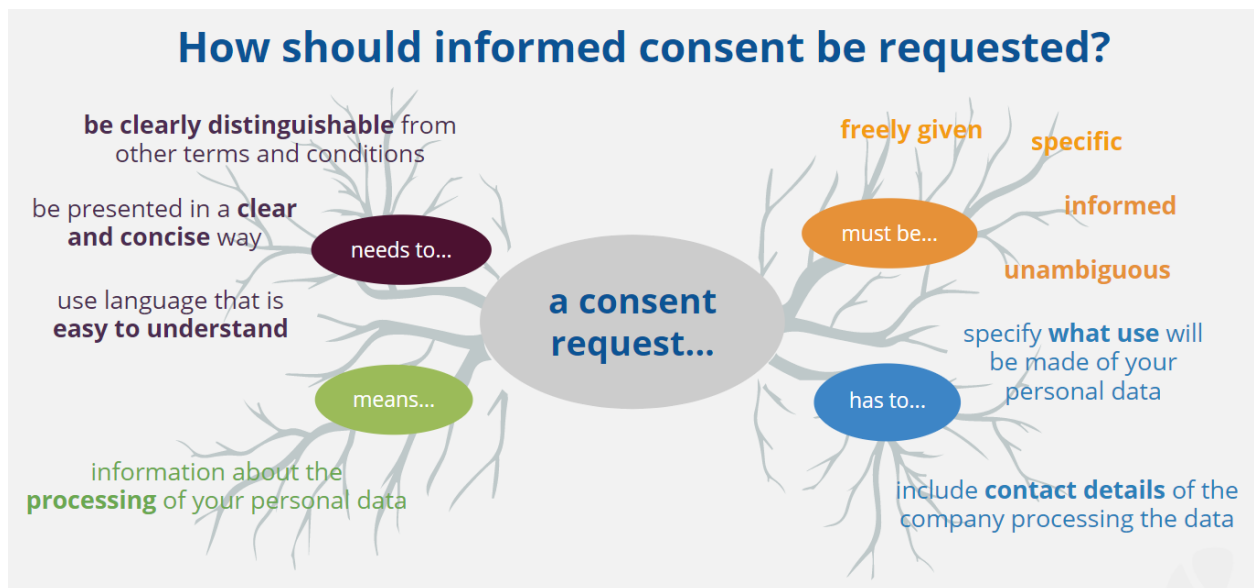
As per [European Commission's report \(2013\)](#) regarding Ethics for Researchers “Informed consent consists of three components: **adequate information, voluntariness and competence.**”

Thus, prior to consenting, individuals should be clearly informed of the data collection goals, possible adverse impacts and the means available to them to refuse or withdraw consent, without consequences, at any time.

Moreover, individuals must be competent to understand the information and should be fully aware of the consequences of their consent. Greater attention is required for some **special categories of people**, such as children, vulnerable adults and people with certain cultural or traditional backgrounds.

At this point, it is important to understand the distinction between **consent** and **informed consent**. For informed consent, we need to ensure that individuals genuinely understand how we intend to use their data e.g., by running focus groups and/or publishing explanatory documents.

[END OF PAGE]



As per [European Commission guidelines about GDPR](#),

*“when a company or organisation asks for **consent** to collect or reuse personal information, the data subjects **have to make a clear action agreeing** to this, for example by signing a consent form or selecting yes from a clear yes/no option on a webpage”.*

*“It is not enough to simply opt out, for example by checking a box saying they don't want to receive marketing emails. **They have to opt in** and agree to their personal data being stored and/or re-used for this purpose.”*

[European Commission](#) emphasizes that informed consent means that before you consent, you must **be given information** about the processing of your personal data, including at least:

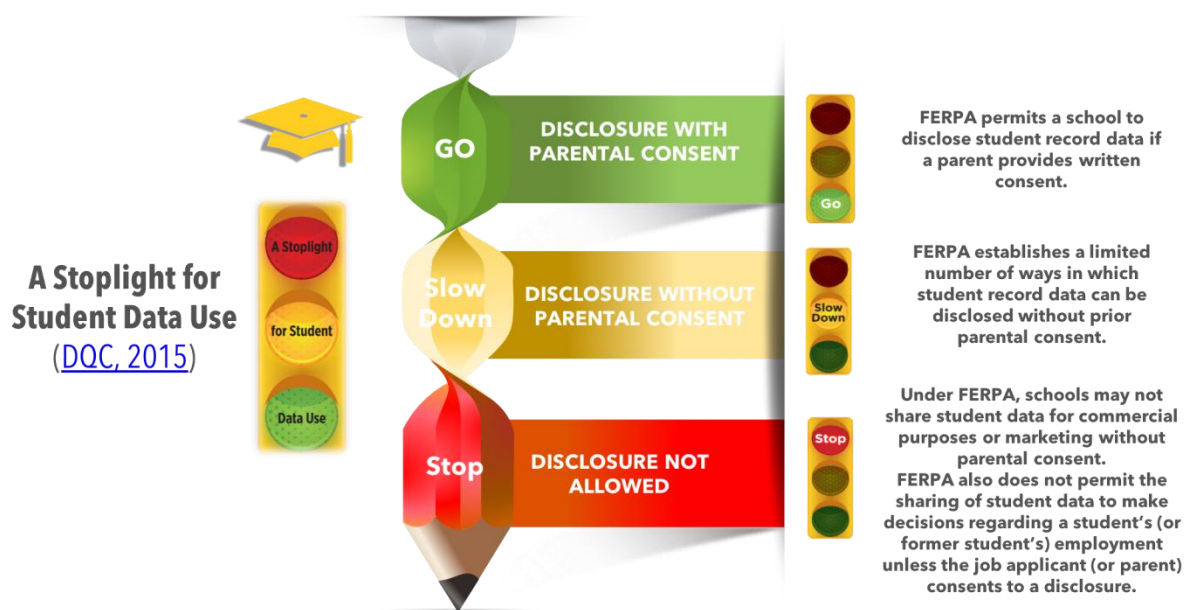
- the **identity** of the organisation processing data;
- the **purposes** for which the data is being processed;
- the **type** of data that will be processed;
- the possibility to **withdraw** consent;
- where applicable, the fact that the data will be used **solely** for automated-based decision-making, including profiling;
- information about whether the consent is related to an **international transfer** of your data, the possible risks of data transfers to countries outside the EU if those

countries are not the subject of a Commission adequacy decision and there are no adequate safeguards.

The way individuals are informed is crucial for the informed consent process. We should ensure that they fully realize the expected consequences of granting or withholding consent.

[END OF PAGE]

(Learning Object #2.2.4.5 - html page)
Informed Consent and Children



With regards to the collection of personal data about **children**, additional protection should be granted since children are less aware of the risks and consequences of sharing data and of their rights.

In U.S., the foundational federal law on student privacy, the **Family Educational Rights and Privacy Act (FERPA)**, establishes student privacy rights by restricting with whom and under what circumstances schools may share students' personally identifiable information. [DQC has developed a tool](#) that summarizes some of the main provisions of FERPA and can be used as a guide to help interested parties to understand when they need to take a closer look at the law or consult an expert. You may also review some basic principles in the above graphic.

[Under GDPR](#), any information addressed specifically to a child should be adapted to be **easily accessible, using clear and plain language**.

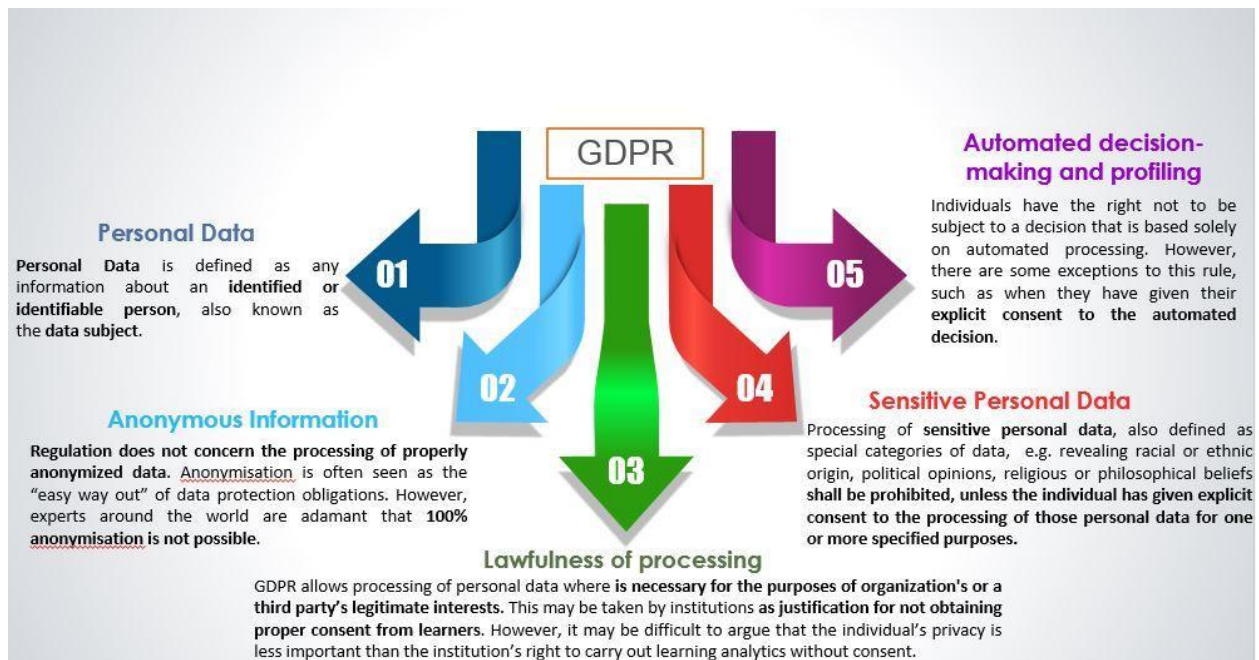
For most online services (social networking sites) **the consent of the parent or guardian** is required in order to process a child's personal data on the grounds of consent up to a certain age.

The age threshold for obtaining parental consent is established by each EU Member State and can be between 13 and 16 years, according to [National Data Protection Authority](#).

As per European Commission clarifications for the [Rights for Citizens](#), “Companies have to make reasonable efforts, taking into consideration available technology, to check that the consent given is truly in line with the law. This may involve implementing age-verification measures such as asking a question that an average child would not be able to answer or requesting that the minor provides his parents' email to enable written consent”.

[END OF PAGE]

(Learning Object #2.2.4.6 - html page)
Informed Consent and Educational Data



Within the context of education, there are quite different approaches relating to the consent in collecting learners' data, according to national guidelines (when available).

The figure depicts the main principles and challenges that should be taken under consideration to comply with GDPR.

As presented, data-related activity can still be lawful, by complying with legal obligations e.g. GDPR, even though it may be considered that data is not treated ethically.

Sclater (2017) also argues that “*consent is required for use of sensitive data and in order to take interventions directly with students on the basis of the analytics. This implies that if the data in question are not considered ‘sensitive’, and do not form the basis for any intervention, consent is not required (on the basis that this may be considered as of legitimate interest)*”.

Moreover, as per the [ICDE's recent report \(2019\)](#), many institutions seek for consent to collect student data for additional purposes, beyond institutional reporting and basic student support, at the point of registration. As emphasized, “*expectation that users should consent to uses of personal data unknown at the point of registration seems to be an unreasonable and unethical one.*”

An alternative approach supported by most of the existing guidelines ([Higher Education Commision](#), [JISC's code of practice](#), [ICDE Global guidelines](#)) might be to differentiate between the granting of initial consent for the collection of data and the obtaining of additional consent at the point where a specific personal intervention is proposed, or in the case where new data is incorporated into the institution's system, or existing data is used in new ways.

As concluded in [ICDE report \(2019\)](#) *“national legislation will influence positions taken, but generally this principle (of consent) should be built around a minimum of informed consent (that is, transparency before registration).”*

(Learning Object #2.2.4.7 - video)
Expert View - Code of Ethics



Video: [Why develop a data science code of ethics?](#) [3:06]

In this video experts from the data science community explain why it's important to have a code of ethics.

[END OF PAGE]

(Learning Object #2.2.4.8 - Activity)
Poll/Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

Now that we have discussed the new GDPR rules and aspects of data ethics, do you think that additional professional development courses are needed about the code of ethics on educational data collection?

- Yes
- No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response in the following discussion tasks, by posting your thoughts on the discussion board. You may:

1. Discuss what information must be given to individuals, whose data is collected. You can search for additional information on the [European Commission's website](#)
2. Using information from the [European Commission website](#), create an infographic presenting the General Protection Data Regulations. You may post your infographic on the discussion board.

[END OF PAGE]

(Learning Object #2.2.4.9 - html page)
References

REFERENCES

Broad, E., Smith, A., & Wells, P. (2017). *Helping organisations navigate ethical concerns in their data practices*. Open Data Institute. Retrieved from:
<https://www.scribd.com/document/358778144/ODI-Ethical-Data-Handling-2017-09-13#download>

DQC (2015). A Stoplight for Student Data Use. Retrieved from
<https://2pido73em67o3eytaq1cp8au-wpengine.netdna-ssl.com/wp-content/uploads/2016/03/DQC-FERPA-Stoplight.pdf>

Drachsler, H., & Greller, W. (2016). *Privacy and Analytics – it's a DELICATE Issue. A Checklist for Trusted Learning Analytics*. In LAK '16 Conference Proceedings of the Sixth International Conference on Learning Analytics & Knowledge Conference. Edinburgh: ACM. doi:10.1145/2883851.2883893

European Commission (2013). *Ethics for researchers. Facilitating Research Excellence in FP7*. Luxembourg: Publications Office of the European Union.

European Commission. (2018, January). National Data Protection Authorities. Retrieved from
https://ec.europa.eu/commission/sites/beta-political/files/national-data-protection-authorities-jan_2018_en.pdf

European Commission. (2018, March 22). Data protection and online privacy. Retrieved from
https://europa.eu/youreurope/citizens/consumers/internet-telecoms/data-protection-online-privacy/index_en.htm

European Commission. (2018, August 01). Can personal data about children be collected? Retrieved from https://ec.europa.eu/info/law/law-topic/data-protection/reform/rights-citizens/how-my-personal-data-protected/can-personal-data-about-children-be-collected_en

European Commission. (2018, August 01). Rights for citizens. Retrieved from
https://ec.europa.eu/info/law/law-topic/data-protection/reform/rights-citizens_en

European Commission. (2018, August 01). When is consent valid? Retrieved from https://ec.europa.eu/info/law/law-topic/data-protection/reform/rules-business-and-organisations/legal-grounds-processing-data/grounds-processing/when-consent-valid_en

GDPR.EU. (2019, February, 13). Does the GDPR apply to companies outside of the EU? Retrieved from <https://gdpr.eu/companies-outside-of-europe/>

Griffiths, D., Drachsler, H., Kickmeier-Rust, M., Steiner, C., Hoel, T., & Greller, W. (2016). [*Is Privacy a Show-stopper for Learning Analytics? A Review of Current Issues and their Solutions.*](#) *Learning Analytics Review*, 6, January 2016, ISSN: 2057-7494. LACE project.

Open Data Institute. (2018, March 24). No one owns data: we need to strengthen our rights. Retrieved from <https://theodi.org/article/no-one-owns-data-we-need-to-strengthen-our-rights/>

Open Data Institute. (2018, April 25). Updating the Data Ethics Canvas. Retrieved from <https://theodi.org/article/no-one-owns-data-we-need-to-strengthen-our-rights/>

Pentland, A. S. (2013). [*The data-driven society.*](#) *Scientific American*, 309(4), 78-83.

Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). Official Journal L 119. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32016R0679>

Sclater, N., & Bailey, P. (2015). *Code of practice for learning analytics*. Jisc. Retrieved from: <https://www.jisc.ac.uk/guides/code-of-practice-for-learning-analytics>

Sclater, N. (2017). Consent and the GDPR: what approaches are universities taking? *Effective Learning Analytics*.

Shacklock, X. (2016). [*From bricks to clicks: The Potential of Data and Analytics in Higher Education.*](#) London, UK: Policy Connect - Higher Education Commission.

Slade, S., & Tait, A. (2019). [*Global guidelines: Ethics in Learning Analytics.*](#) International Council for Open and Distance Education.

FURTHER READINGS

UK, Information Commissioner's Office (ICO). (2019, May 17). Guide to the General Data Protection Regulation (GDPR). Retrieved from: <https://ico.org.uk/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr/>

UK, Information Commissioner's Office (ICO). (2017, October 20). Overview of the General Data Protection Regulation (GDPR). Retrieved from: <https://ico.org.uk/media/for-organisations/data-protection-reform/overview-of-the-gdpr-1-13.pdf>

[END OF PAGE]

2.2.5 Quiz

(Learning Object #2.2.5.1 - Activity)

Topic 2 Quiz

Question 1: Match the data from the left column to the appropriate type from the right column (static or dynamic)

1. Personnel qualifications	A. STATIC DATA
2. Summative assessment scores	
3. Financial Processes	
4. Level of participation in learning activities	
5. Demographics	B. DYNAMIC DATA
6. Past Academic Data	
7. Disciplinary incidents	
8. Formative assessment scores	

1-A, 2-B, 3-A, 4-B, 5-A, 6-A, 7-B, 8-B

Question 2: Which of the following ways of protecting student data is best for students?

- A. Stop using digital technology in the classroom with students
- B. Ensure that all digital tools have undergone a privacy assessment
- C. Implement a comprehensive digital privacy and security program in school

D. Both B and C

2.3 Adding value to educational datasets (Educational Data Management)

2.3.1 Making data tidy (Data cleaning)

(Learning Object #2.3.1.1 - Activity)

Poll



Digitalbevaring.dk

Jørgen Stamp [CC BY 2.5 dk]

Source: https://commons.wikimedia.org/wiki/File:BitPreservation_DigitalPreservation.png

ACTIVITY/PRACTICE QUESTION (Poll):

1. Have you ever collected educational data?

- ☐ Yes
- ☐ No

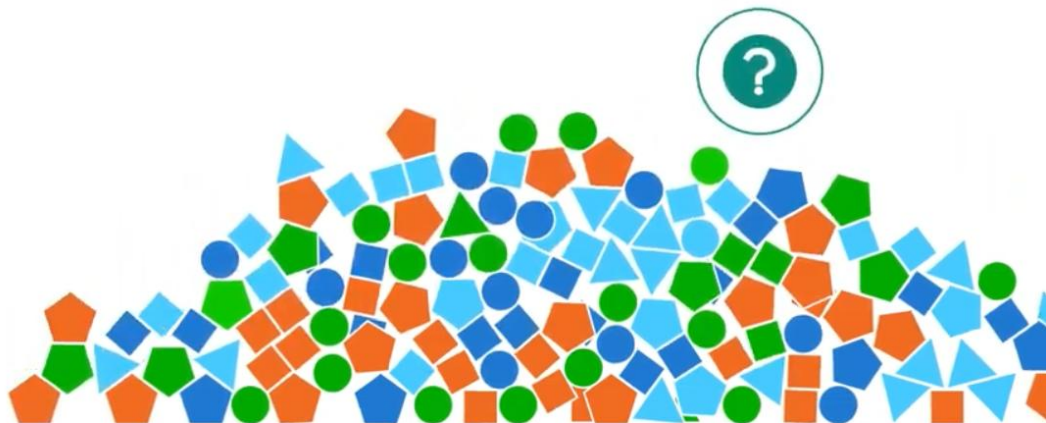
2. What type of inconsistencies did they have?

- ☐ Missing Values
- ☐ Typos
- ☐ Errors in data types
- ☐ Outliers
- ☐ Date format
- ☐ Double instances

[END OF PAGE]

(Learning Object #2.3.1.2 - video)

Unlock the Potential of data



Discovery

Data Wrangling for Faster, More Accurate Analysis

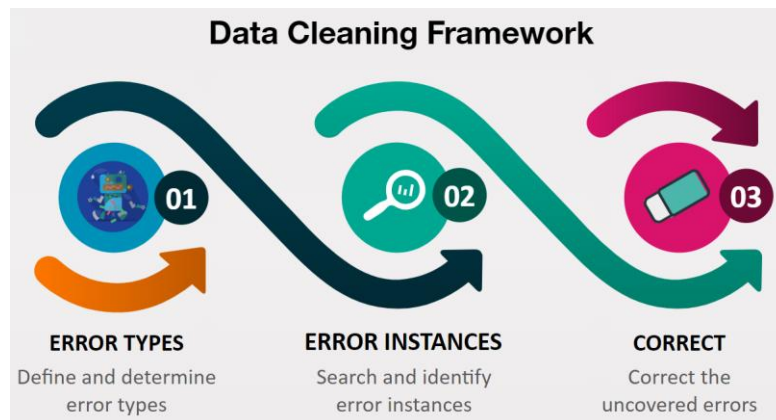
Video: [Data Wrangling for Faster, More Accurate Analysis](#) [1:47]

We are surrounded by a sea of data. As per [BrightBytes](#) “The widespread availability of accurate and usable data has the potential to unlock a universe of information for educators.” We could add, that without the appropriate process of getting data ready to use (whether you call it wrangling, cleansing or simply cleaning), “data is simply a scatter of numbers”.

In this topic, we will continue studying the language of data. It is time for the second key area of data literacy vocabulary, **Educational Data Management**. The first step in this imperative process is **Data Cleaning**.

[END OF PAGE]

Data Cleaning Framework



The above graphic presents the framework of data cleaning as defined by Maletic and Marcus (2000) in [Data Cleansing: Beyond Integrity Analysis](#)

As mentioned, educational data comes from various sources. There is data from online learning environments, data from state tests, demographic data, data from management information systems, from open educational resources and much more. It would be really useful if we could unify all these little pieces to reveal the big picture and realize the untapped potential.

All this data could be really messy. It may come in diverse formats and it may contain various types of inaccuracies like missing values, outliers, duplicate instances. To obtain an integrated and consistent database that is free from any sort of discrepancies, data clean up is required.

As Romero et al. (2014) describe in [A Survey on Pre-Processing Educational Data](#), the **data cleaning** task concerns the detection of erroneous or irrelevant data and how to discard it.

Let's move on and find out the most common discrepancies in data, like:

- missing data,
- outliers,
- inconsistent data,
- double instances,

and how to handle them.

[END OF PAGE]

Missing Data



“Missing values occur when no value is stored for the variable in the current observation”

([Little & Rubin, 2002](#))

When using an e-learning environment, it is very common for learners to study at their own pace, to follow their own learning path. They usually skip some activities and complete only a part of the tasks in the course. Sometimes they even drop out and never come back. Thus, missing data is very common when collecting educational data.

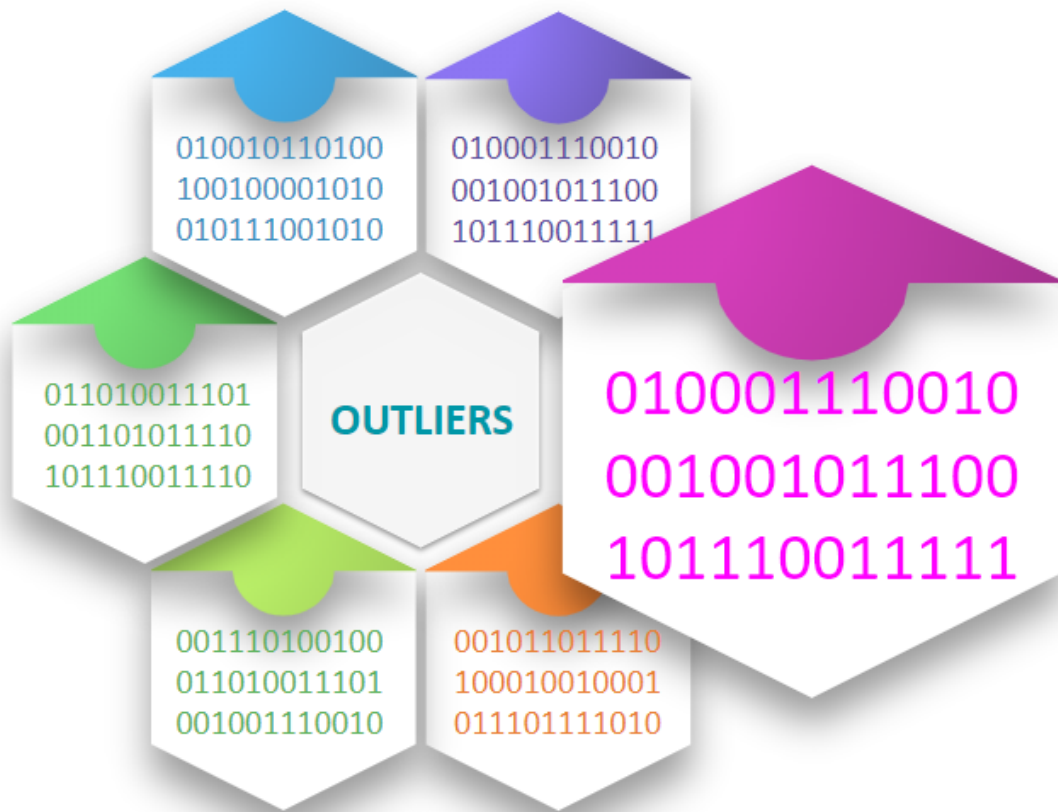
[Romero et al. \(2014\)](#) suggest several ways to handle missing data:

- Use a **label**, like “null” (unspecified), or “?” (missing)
- Use a substitute value like the attribute **mean** or the mode

- By determining what is the most probable value to fill the missing value, using **regression**.
- In some extreme cases, in order to clean data and ensure their completeness, learners who have all or almost all their values missed can be **removed** from data.

[END OF PAGE]

Outliers



An **outlier** is an observation that has values which deviate from the expected, either too large or too small from most other observations. They may be caused by typographical errors or errors in measurement. Remember [when NASA lost a Spacecraft due to a Metric Math mistake?](#)

In datasets, different scales of numerical values are often used to make it easier for humans to read. For example, in budget datasets, the units are often in the millions. 1,500,000 often becomes 1.5m. However, smaller amounts like 400,000 are still written in full. As a result, 1.5m looks like it is an outlier, while it is an inconsistency in data types and formats.

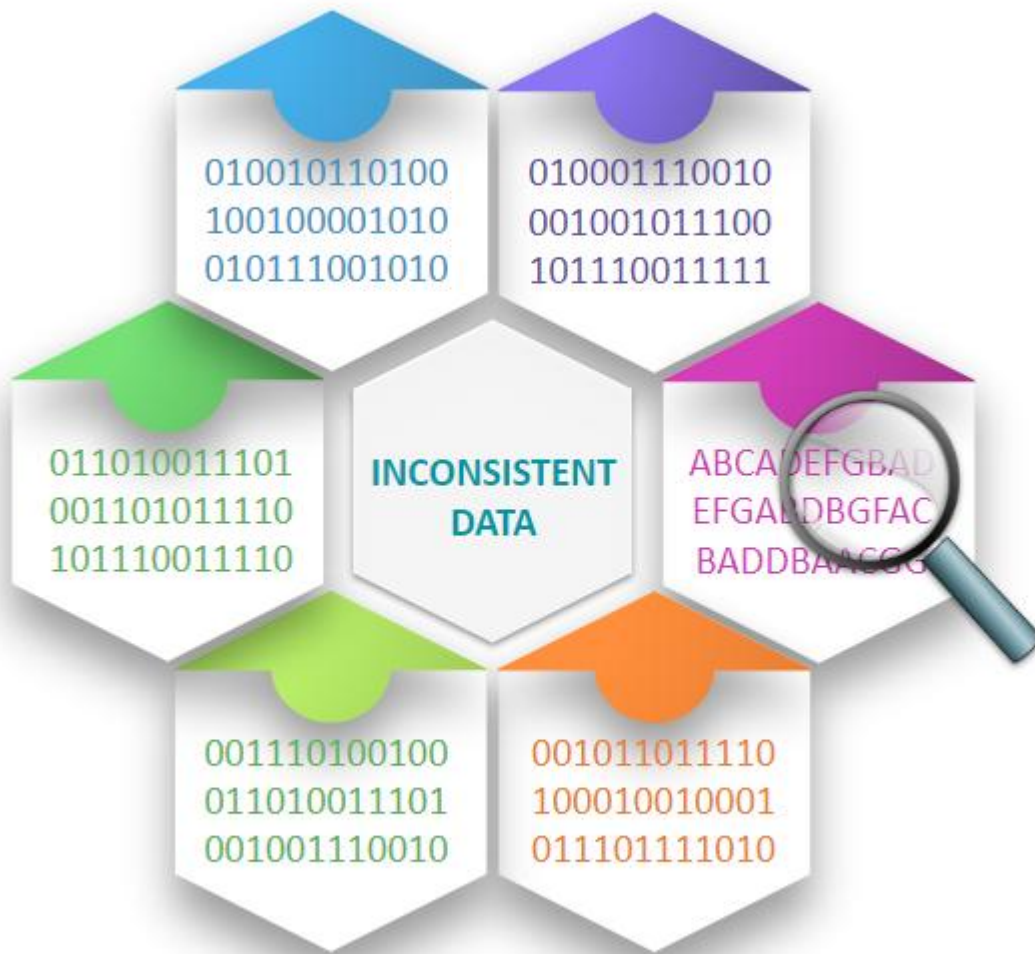
However, [Romero, Ventura, Pechenizkiy and Baker \(2010\)](#) indicate that “outliers may be phenomena of interest in a dataset, it could be correct and represent real variability for the given attribute.”

In the context of educational data, outliers can be often true observations ([Romero et al., 2014](#)). For example, there are always exceptions among learners, who succeed with little effort or fail against all expectations. In another example, very high values are often recorded for *time-spent* because the learner had not signed-out before leaving the digital learning environment.

It is clear that not all outliers are errors. It depends on the aims of the analysis, whether these outliers should be eliminated or not, and requires knowledge of the context in which the data was produced and collected.

[END OF PAGE]

Inconsistent data



“Inconsistent data appears when a data set or group of data is dramatically different from a similar data set (conflicting data set) for no apparent reason.“, ([Romero et al., 2014](#))

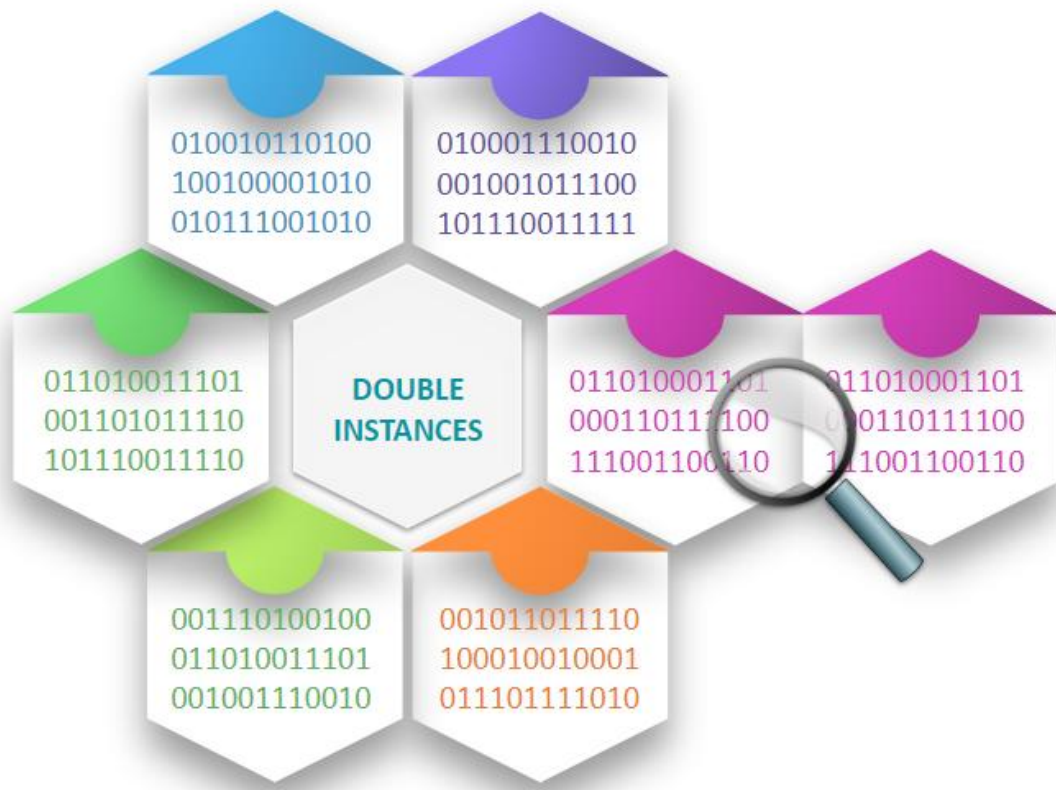
For example, imagine negative values for the age of a person or height data measured either in meters or in centimetres. In fact, some incorrect data may also result from inconsistencies in naming conventions or data codes in use, or inconsistent formats for input fields, such as a date ([Chakrabarti et al., 2009](#)). The most common error is the mixed use of American (MM/DD/YYYY) and European (DD/MM/YYYY) formats (see [Date formats around the world](#)).

People often try to save time when entering data by abbreviating terms. If these abbreviations are not consistent, it can cause errors in the dataset. Differences in capitalisation, spacing, and genders of adjectives can all cause errors. There can be

numerous inconsistencies. We have to deliberately deal with them. At the same time, it is in every case better to log the details of our procedure cautiously for future reference.

[END OF PAGE]

Double instances



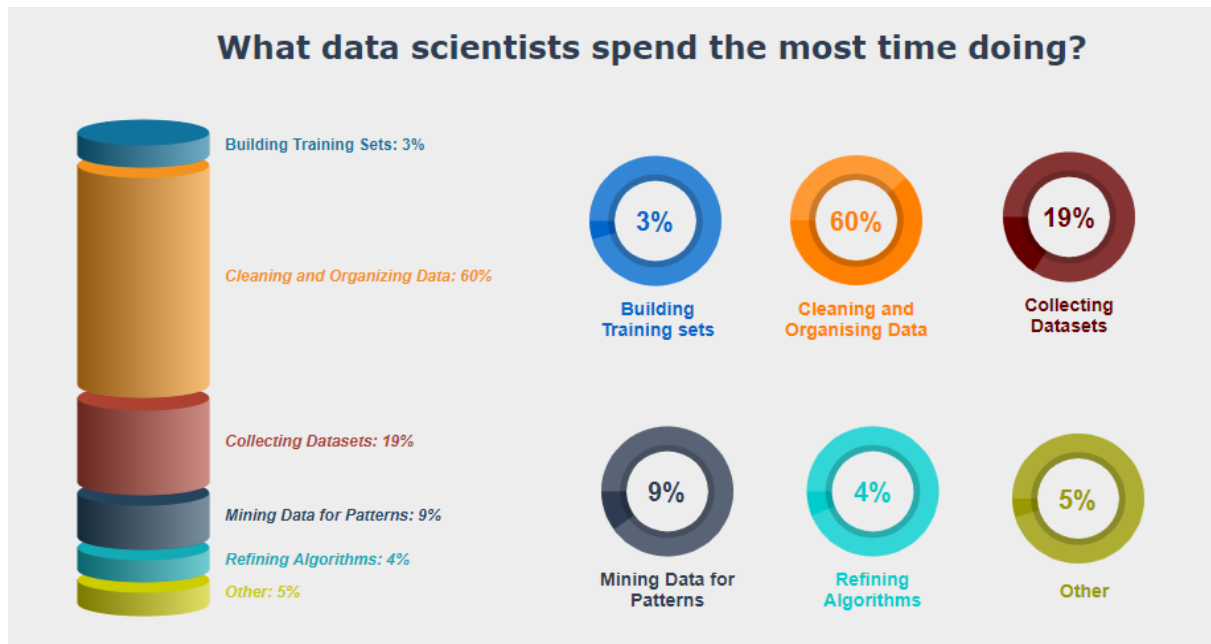
Data deduplication is a process that reduces storage overhead by eliminating redundant copies of data and, ensuring that storage media retain only unique instances of data.

A duplicate record is where the same piece of data has been entered more than once. Duplicate records often occur when datasets have been combined or because it was not known there was already an entry.

In educational organisations, **data integration and correlation** are essential activities related to data collection. Information obtained from multiple sources usually leads to duplicated data observations and inaccurate data. This duplicate elimination is one of the most important steps in the data cleaning process. The procedure of detecting and eliminating duplicates from a particular data set is called *Deduplication*.

[END OF PAGE]

The workload of data cleaning



According to [Crowdfunder Data Science Report 2016](#), scientists spend the most time collecting and cleaning data. Messy data is by far the most time-consuming aspect of the typical data scientist's workflow.

"The point with data is that it needs to be regularly maintained to ensure that data remains clean and crystal clear." Ronald van Loon, Top 3 Global Machine Learning and Big Data Influencer

"Much of the data may be unstructured, noisy and in need of thorough cleansing and preparation before it is ready to yield working insights," Big Data expert, Bernard Marr, founder of Intelligent Business Performance Institute.

[END OF PAGE]

(Learning Object #2.3.1.9 - Activity)

Poll/Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

Is it always correct to eliminate outliers from a dataset?

- Yes
- No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about data cleaning in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

1. *Identify factors that contribute to inconsistencies to educational datasets generated from online courses*
2. *How can we explain the existence of outliers in educational data?*

[END OF PAGE]

References

REFERENCES

BrightBytes. (2017, June 29). BrightBytes Acquires Trusted IPaaS Provider Authentica Solutions. Retrieved from <https://www.brightbytes.net/resources-archive/pressrelease>

Chakrabarti, S., Cox, E., Frank, E., Güting, R. A., Han, J., Jiang, X., Kamber, M., Lightstone, S. S., Nadeau, T. P., Neapolitan, R. E., Pyle D., Refaat, M., Schneider, M., Teorey, T. J., Witten, I. H. (2009). *Data mining: Know it all*. Burlington Mass.: M. Kaufmann.

CrowdFlower. (2016). *Data Science Report* (Rep.). Retrieved from CrowdFlower website https://visit.figure-eight.com/rs/416-ZBE-142/images/CrowdFlower_DataScienceReport_2016.pdf

Harish, A. (2019, March 21). When NASA Lost a Spacecraft Due to a Metric Math Mistake. [Blog post]. Retrieved from <https://www.simscale.com/blog/2017/12/nasa-mars-climate-orbiter-metric/>

Little, R. J. A., & Rubin, D. B. (2002). *Statistical Analysis with Missing Data, Second Edition*. John Wiley & Sons, Inc. doi: 10.1002/9781119013563

Maletic, J. I., & Marcus, A. (2000). *Data Cleansing: Beyond Integrity Analysis*. *Fifth Conference on Information Quality (IQ 2000)*, 200–209.

Romero, C., Romero, J. R., & Ventura, S. (2014). *A Survey on Pre-Processing Educational Data*. *Educational Data Mining Studies in Computational Intelligence*, 29-64. Springer. doi:10.1007/978-3-319-02738-8_2

Romero, C., Ventura, S., Pechenizkiy, M., & Baker, R. S. J. d. (2010). *Handbook of Educational Data Mining*. Boca Raton, FL: CRC Press.

FURTHER READINGS

Acaps. (2016). Technical Brief Data Cleaning. Retrieved from Acaps: https://www.acaps.org/sites/acaps/files/resources/files/acaps_technical_brief_data_cleaning_april_2016_o.pdf

Chapman, A. D. (2005). *Principles and Methods of Data Cleaning – Primary Species and Species Occurrence Data*, version 1.0. Report for the Global Biodiversity Information Facility, Copenhagen.

Chapman, A. D. (2005). *Principles of Data Quality*, version 1.0. Report for the Global Biodiversity Information Facility, Copenhagen.

Data Cleaning: In-Depth Guide [Web log post]. (2019, January 1). Retrieved from <https://blog.aimultiple.com/data-cleaning/>

Data Science Primer. (2017, June 9). Chapter 3: Data Cleaning Steps and Techniques. Retrieved from <https://elitedatascience.com/data-cleaning>

de Jonge, E., & van der Loo, M. (2013). *An introduction to data cleaning with R*. Hague: Statistics Netherlands.

Elgabry, O. (2019, February 28). The Ultimate Guide to Data Cleaning. When the data is spewing garbage. Retrieved from <https://towardsdatascience.com/the-ultimate-guide-to-data-cleaning-3969843991d4>

OpenRefine. (2010, July 11). Introduction to OpenRefine. Retrieved from <http://openrefine.org/>

Osborne, J. W., & Overbay, A. (2004). *The Power of Outliers (and Why Researchers Should Always Check for Them)*. *Practical Assessment, Research, and Evaluation*, 9(6).

Osborne, J. W. (2010). *Data Cleaning Basics: Best Practices in Dealing with Extreme Scores*. *Newborn and Infant Nursing Reviews*, 10(1), 37-43. doi:10.1053/j.nainr.2009.12.009

Peugh, J. L., & Enders, C. K. (2004). *Missing Data in Educational Research: A Review of Reporting Practices and Suggestions for Improvement*. *Review of Educational Research*, 74(4), 525-556. doi:10.3102/00346543074004525

SaiGayatri Vadali. (2017, December 28). Day 7: Data cleaning - All you need to know about it. Retrieved from: <https://becominghuman.ai/day-7-data-cleaning-all-that-you-need-to-know-about-it-23b05738abe7>

Wickham, H. (2014). *Tidy Data*. *Journal of Statistical Software*, 14(10). doi:10.18637/jss.v059.i10

[END OF PAGE]

2.3.2 Data to describe data (Metadata)

(Learning Object #2.3.2.1 - Activity)

Poll



Digitalbevaring.dk

Jørgen Stamp [CC BY 2.5 dk]

Source: https://commons.wikimedia.org/wiki/File:Metadata_DigitalPreservation.png

1. Have you ever tagged a friend in a photo that you have posted e.g., in facebook?

- ☐ Yes
- ☐ No

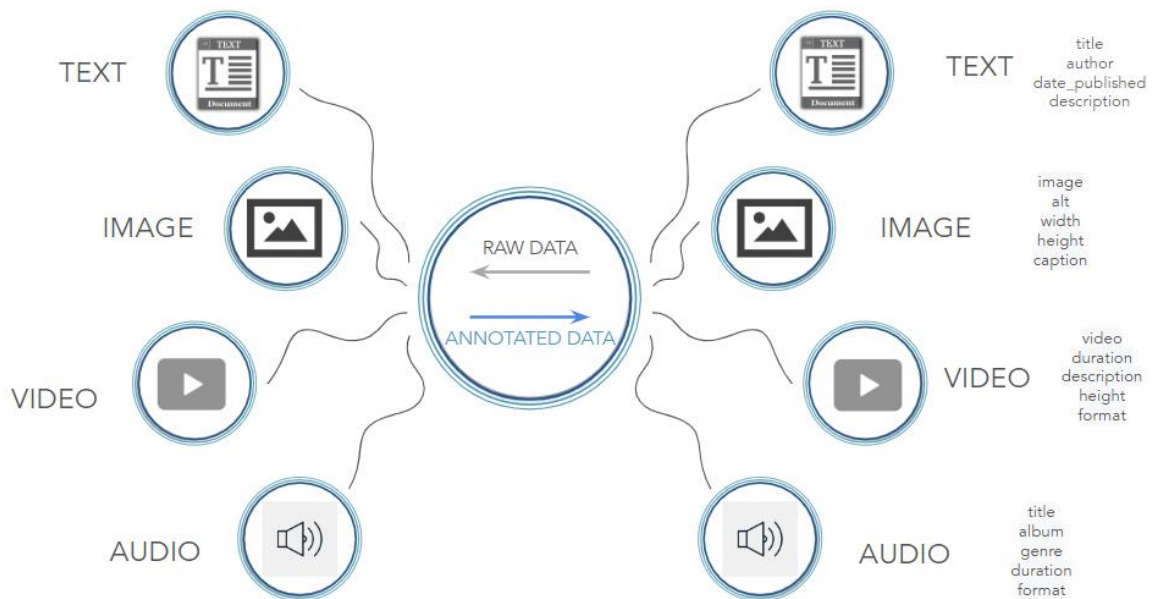
2. Have you ever kept notes in an article?

- ☐ Yes
- ☐ No

[END OF PAGE]

Learning Object #2.3.2.2 - html page)

What is Metadata?



Metadata is usually defined as “data about data”.

“It is information about a data set that is structured (often in machine-readable format) for purposes of search and retrieval. Metadata elements may include basic information (e.g., title, author, date created) and/or specific elements inherent to data sets (e.g., spatial coverage, time periods).”

Johnson, L.R., et al. (2018).

However, in the context of education, metadata can more aptly be defined as tags used to describe educational assets.

Metadata **helps**:

- to organize,
- find and
- understand data

Metadata **answers** the following questions about data:

- Who created it?
- What is it?
- When was it created?

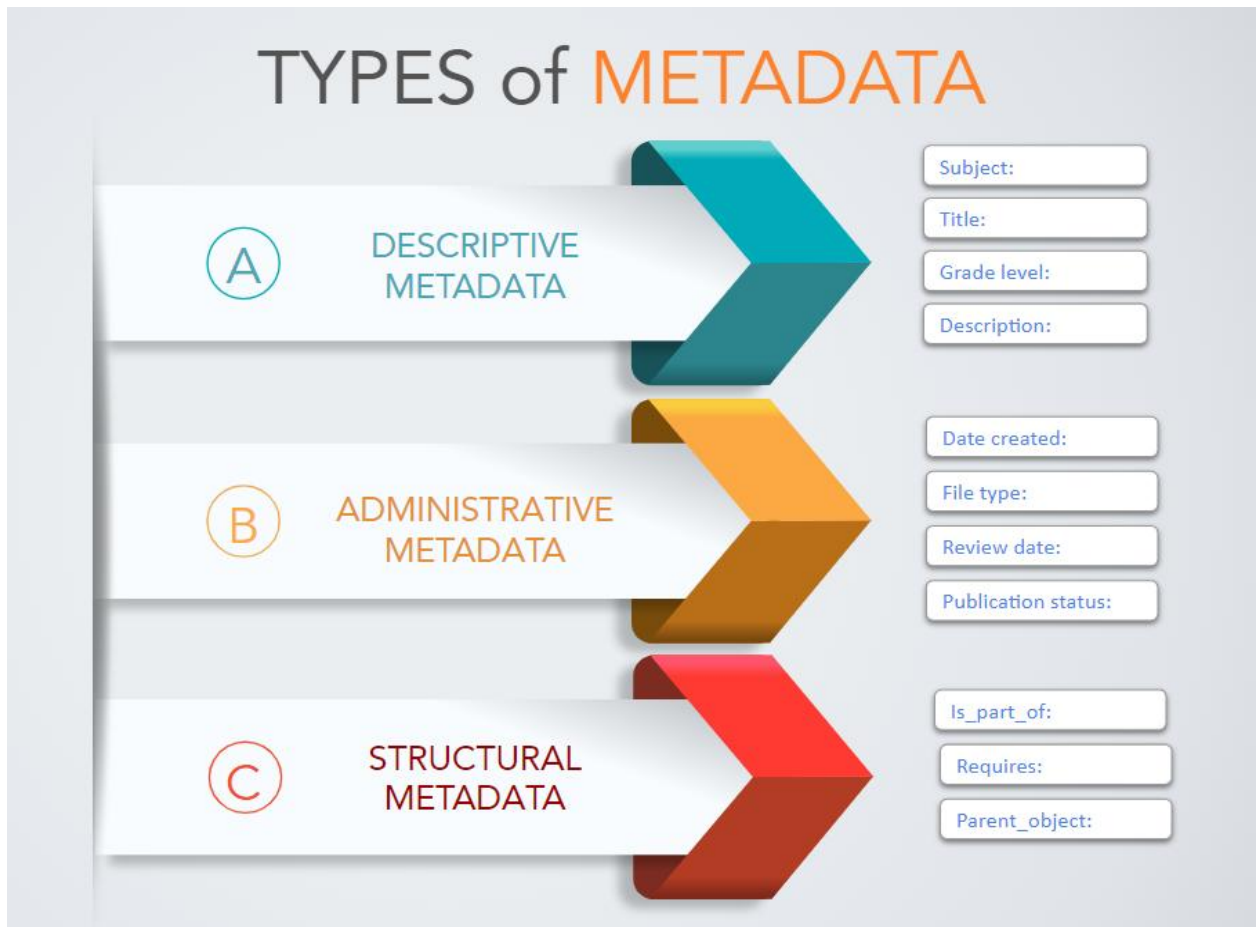
- How was it generated?
- Where was it created?
- How may it be used?
- Are there restrictions on it?

Practical examples of metadata:

<https://dataedo.com/kb/data-glossary/what-is-metadata>

[END OF PAGE]

Types of Metadata



In [Understanding Metadata](#) 2017, from the National Information Standards Organization, Riley J. distinguishes the three types of metadata:

- Descriptive metadata
- Administrative metadata
- Structural metadata

Descriptive metadata can **describe** a learning asset or resource related to education — including learning standards, lessons, assessment items, books, etc. — for purposes such as identification, search and discovery. Descriptive metadata can be thought of as a keyword or tag on an asset that makes it easier to find. Examples include subject, grade level, and related skills and concepts.

Administrative metadata is used to **manage** a learning asset. Examples of this type of

metadata include status, disposition, rights and licensing.

Structural metadata describes how data is **organized** or **formatted** and is often governed by a [widely-adopted standard](#) that ensures the data is accurately represented when exchanged and presented. Structural metadata enables content to be machine readable.

Metadata are used for the purposes of:

- **Discovery** of information
- **Identification** of a resource
- **Interoperability**, exchange of content between systems
- **Digital-object management** i.e., deliver the appropriate version.
- **Preservation** helps signaling when preservation actions should be undertaken
- **Navigation** within parts of items

[END OF PAGE]

(Learning Object #2.3.2.4 - video)
Understanding Metadata



Meta... What? Metadata!

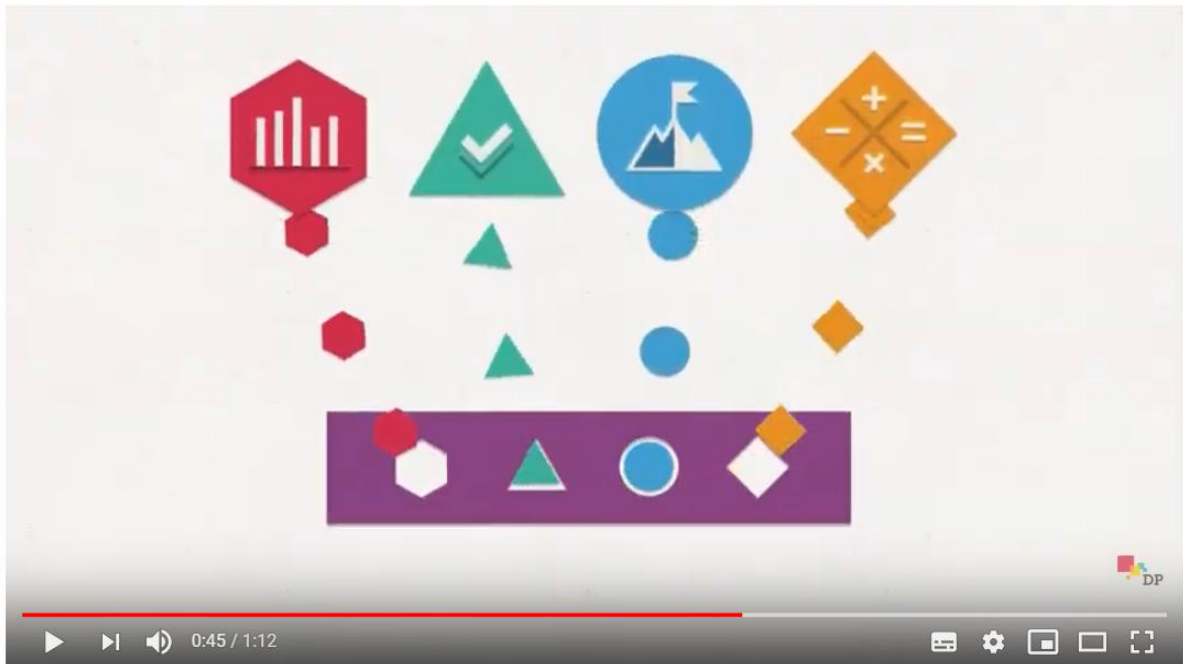
Video: [Meta... What? Metadata!](#) [5:25]

This video from the National Archives of Australia help us understand the importance of metadata in order to describe, use, find and manage content and data.

[END OF PAGE]

(Learning Object #2.3.2.5 - video)

Data Interoperability



Learn More About Data Interoperability

Video: [Learn More About Data Interoperability](#) [1:12]

The [National Information Standards Organization](#) describes “**data interoperability**, as the effective exchange of content between systems. Interoperability relies on metadata describing that content so that the systems involved can effectively profile incoming material and match it to their internal structures.”

[END OF PAGE]

(Learning Object #2.3.2.6 - Activity)

Poll/Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

Do you know the difference between raw data and annotated data?

- Yes
- No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about metadata, in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

- *About the advantages of enhancing educational data through data description*

[END OF PAGE]

References

REFERENCES

Common Education Data Standards (CEDS). (2017). Retrieved from

<https://ceds.ed.gov/dataModel.aspx>

Johnson, L.R., et al. (2018). [How Important Are Data Curation Activities to Researchers? Gaps and Opportunities for Academic Libraries](#). *Journal of Librarianship and Scholarly Communication*, 6(General Issue), eP2198. <https://doi.org/10.7710/2162-3309.2198>

Kononow, P. (2018, September 16). What is Metadata (with examples). Dataedo. Retrieved from <https://dataedo.com/kb/data-glossary/what-is-metadata>

Riley, J. (2017) [Understanding Metadata: What is Metadata, and what is it for?](#). Baltimore: National Information Standards Organization (NISO).

FURTHER READINGS

Hswe, P., & Musser, L. (n.d.). 2.1 What is Metadata? Penn State University Libraries.

Retrieved from <https://www.e-education.psu.edu/dmpt/node/660>

Ladd, M. (2018, April 5). What is Metadata and How Does It Impact Education? [Blog post].

Retrieved from <https://certicasolutions.com/metadata-impact-education/>

Mason, J. (2004). [Context and Metadata for Learning, Education, and Training](#). In Rory McGreal (Ed.), *Online Education Using Learning Objects* (pp. 168-182). London: Routledge Farmer.

National Forum on Education Statistics. (2009). [Forum Guide to Metadata: The Meaning Behind Education Data](#) (NFES 2009–805). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Richter, T., & Pawlowski, J. (2007). [The Need for Standardization of Context Metadata for e-Learning Environments](#). e-ASEM Conference. Seoul.

Verbert, K., Manouselis, N., Drachsler, H., & Duval, E. (2012). [Dataset-driven research to support learning and knowledge analytics](#). [Electronic version]. *Educational Technology & Society*, 15(3), 133-148.

[END OF PAGE]

2.3.3 The significance of Data Curation

(Learning Object #2.3.3.1- Activity)

Poll



Digitalbevaring.dk

Jørgen Stamp [CC BY 2.5 dk]

Source: https://commons.wikimedia.org/wiki/File:Knowledge3_DigitalPreservation.png

1. Are you familiar with the term data curation?

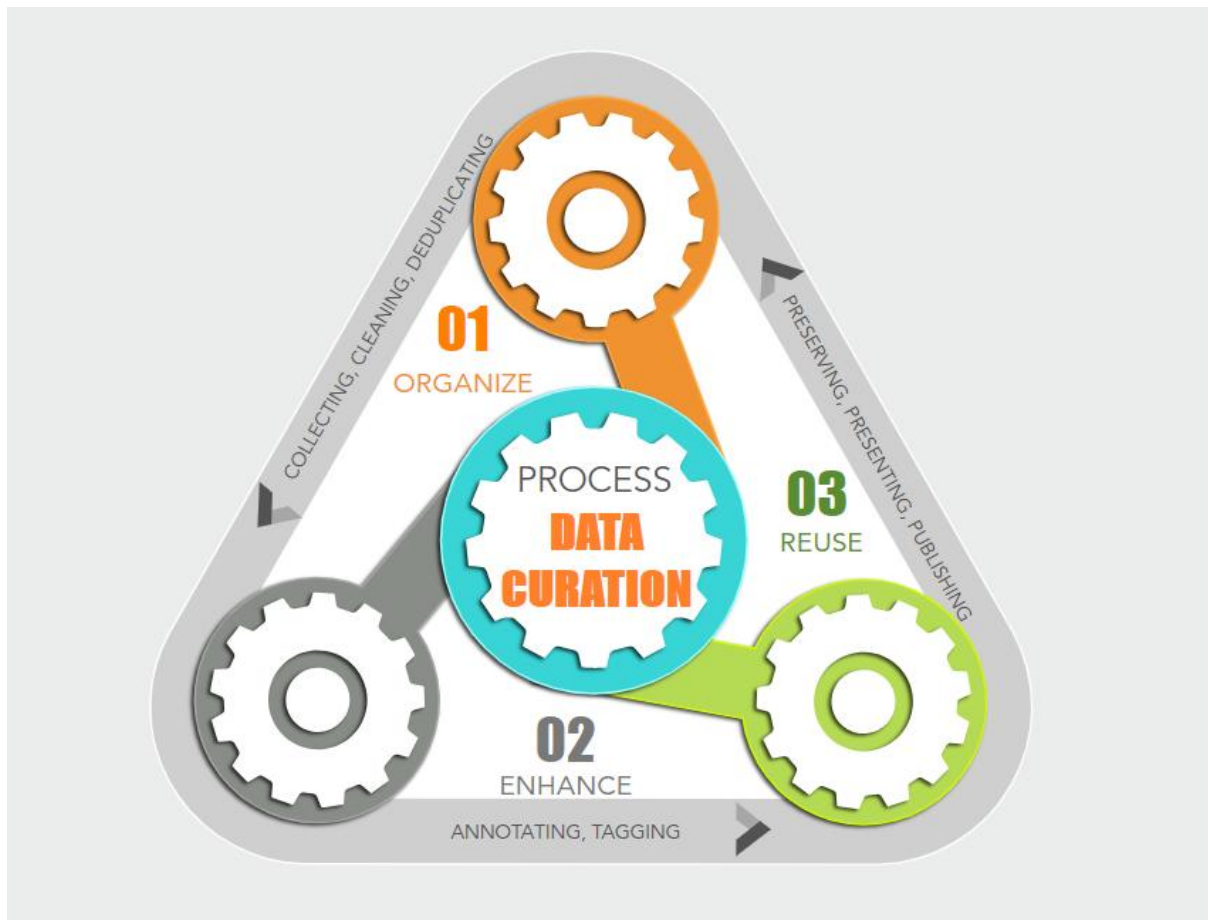
- ☐ Yes
- ☐ No

2. Do you know the actions that data curation includes?

- ☐ Yes
- ☐ No

[END OF PAGE]

Maintaining the value of data



According to [ICPSR](#), "Through the curation process, data are organized, described, cleaned, enhanced, and preserved for public use, much like the work done on paintings or rare books to make the works accessible to the public now and in the future. Without curation, however, data can be difficult to find, use, and interpret."

[Michael Stonebraker \(2014\)](#), defines **data curation** as the process of turning independently created data sources (structured and semi-structured data) into unified data sets ready for analytics, using domain experts to guide the process. It involves:

- **Identifying** data sources of interest (whether from inside or outside the enterprise)
- **Verifying** the data (to ascertain its composition)
- **Cleaning** the incoming data (for example, 99999 is not a legal zip code)
- **Transforming** the data (for example, from European date format to US date format)
- **Integrating** it with other data sources of interest (into a composite whole)

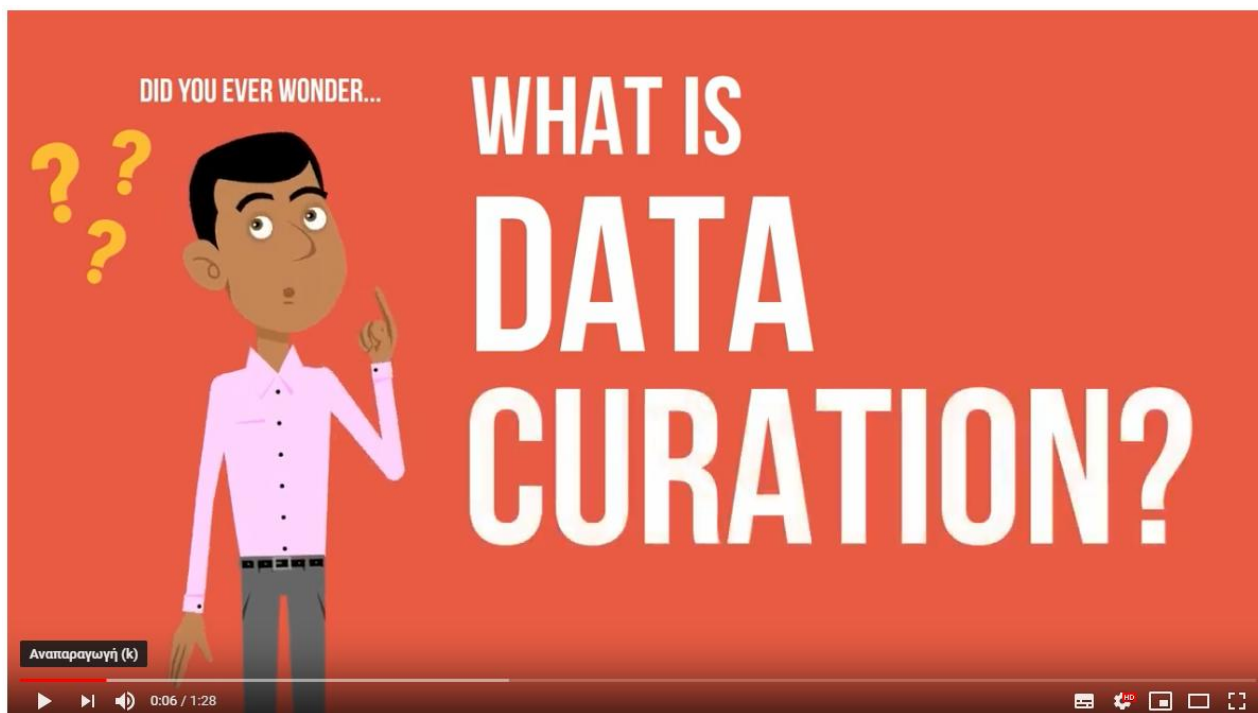
- **Deduplicating** the resulting composite data set.

[Castanedo \(2015\)](#), on the other hand, describes **data curation** as the process that involves data cleaning, schema definition/mapping, and entity matching to transform raw data into consistent data that can then be analysed. Schema definition/mapping is making associations among data attributes and features. Entity matching is finding data in different data sources that refer to the same entity. Entity matching is essential to remove duplicate records.

[END OF PAGE]

(Learning Object #2.3.3.3 - video)

What is data curation?



ICPSR 101: What is Data Curation?

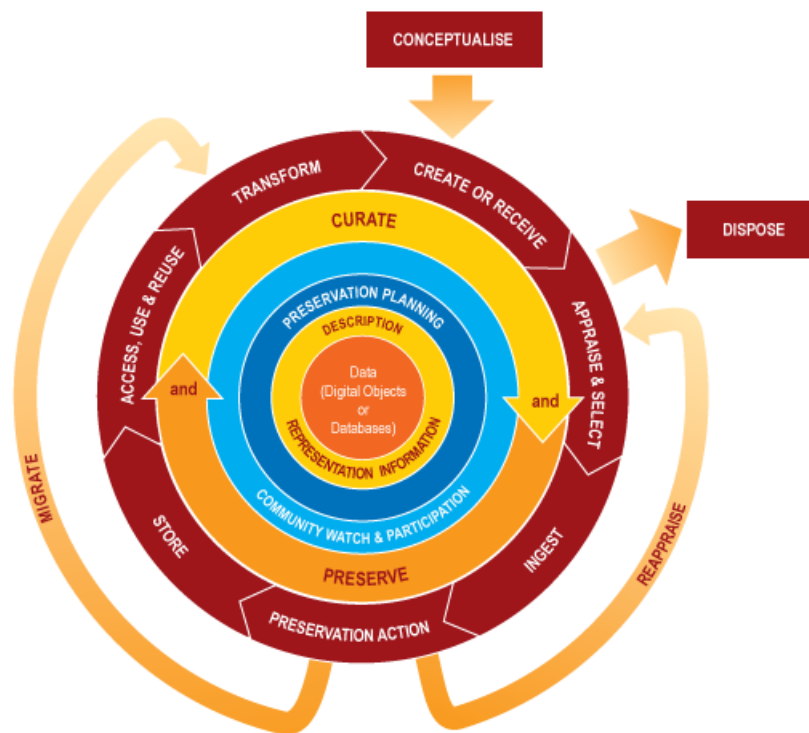
External Video: [ICPSR 101: What is Data Curation?](#) [1:29]

In this video, ICPSR explains the intricacies of the work data processors do every day to find and fix issues in the data, ensuring their long-term availability and value to the research community.

[END OF PAGE]

(Learning Object #2.3.3.4 - html page)

Data Curation Lifecycle Model



The DCC Curation Lifecycle Model

Source: diagram from [Higgins \(2007\)](#)

According to The Digital Curation Centre (DCC) this diagram provides a graphical, high-level overview of the stages required for successful curation and preservation of data from initial conceptualisation or receipt through the iterative curation cycle.

We can identify four full life cycle actions:

- Description and Representation
- Preservation Planning
- Community Watch and Participation
- Curate and Preserve

The outer cycle represents the sequential actions of the data curation process:

- Conceptualise

- Create or Receive
- Appraise and Select
- Ingest
- Preservation Action
- Store
- Access, Use and Reuse
- Transform

[END OF PAGE]

(Learning Object #2.3.3.5 - video)

Expert view - Data Curation



External Video: [Data Curation @UCSB](#) [2:29]

“Digital curation is all about maintaining and adding value to a trusted body of digital information for future and current use; specifically, the active management and appraisal of data over the entire life cycle” ([Jisc](#), 2006).

Now that we have completed the hard work to make our data tidy and meaningful, we will put in a little extra effort to preserve our valuable results.

Next on, we will discuss **Digital Educational Data Preservation** which is considered a key task in the data curation process, to safeguard our unique educational data from getting stolen, destroyed or simply lost.

[END OF PAGE]

(Learning Object #2.3.3.6 - Activity)

Short answer & Discussion

ACTIVITY/PRACTICE QUESTION (Short answer)

Name some of the data curation actions described in this session

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

- About the significance of data curation in educational data management.

[END OF PAGE]

References

REFERENCES

Castanedo, F. (2015). *Data Preparation in the Big Data Era: Best Practices for Data Integration*. Sebastopol, CA: O'Reilly Media, Inc. Retrieved from: https://www.tamr.com/wp-content/uploads/2015/09/Data_Preparation_in_the_Big_Data_Era_Tamr.pdf

Higgins, S. (2008). [The DCC curation lifecycle model](#). *International Journal of Digital Curation*, 3(1), 134-140. doi: 10.2218/ijdc.v3i1.48

ICPSR. (2018). Data Management & Curation. Institute for Social Research at the University of Michigan. Retrieved from

<https://www.icpsr.umich.edu/icpsrweb/content/datamanagement/index.html>

Jisc. (2006). Digital Preservation: Continued access to authentic digital assets. Retrieved from

<https://www.webarchive.org.uk/wayback/archive/20140613220103/http://www.jisc.ac.uk/media/documents/publications/digitalpreservationbp.pdf>

Stonebraker, M. (2014, October 16). Three Approaches to Scalable Data Curation. Strata Hadoop World in New York 2014. Retrieved from

<https://conferences.oreilly.com/strata/stratany2014/public/schedule/detail/36021>

FURTHER READINGS

Freitas, A., & Curry, E. (2015). [Big Data Curation](#). In J. Cavanillas, E. Curry, & W. Wahlster (Eds), *New Horizons for a Data-Driven Economy: A Roadmap for Usage and Exploitation of Big Data in Europe*, 87-118. Cham: Springer. doi: 10.1007/978-3-319-21569-3_6

Johnston, L. R., Carlson, J., Hudson-Vitale, C., Imker, H., Kozlowski, W., Olendorf, R. & Stewart, C. (2018). [How Important is Data Curation? Gaps and Opportunities for Academic Libraries](#). *Journal of Librarianship and Scholarly Communication*, 6(1), p.eP2198. doi: [10.7710/2162-3309.2198](https://doi.org/10.7710/2162-3309.2198)

Shacklett, M. (2016, August 12). Data curation takes the value of big data to a new level.
Retrieved from <https://www.techrepublic.com/article/data-curation-takes-the-value-of-big-data-to-a-new-level/>

[END OF PAGE]

2.3.4 Storage issues for preserving educational data

(Learning Object #2.3.4.1 - Activity)

Poll



Jørgen Stamp [[CC BY 2.5 dk](#)]

Source: https://commons.wikimedia.org/wiki/File:What_is_Digital_Preservation.png

1. Have you ever preserved files e.g., personal photos?
 - ☐ Yes
 - ☐ No
2. Are you aware of measures against cyber threats?
 - ☐ Yes
 - ☐ No

[END OF PAGE]

(Learning Object #2.3.4.2 - video)

Why digital preservation matters



Why Digital Preservation is Important for Everyone

External Video: [Why Digital Preservation is Important for Everyone](#) [2:51]

As explained in the short Library of Congress video, traditional information sources such as books, photos and sculptures can easily survive for years, decades or even centuries but digital items are fragile and require special care to keep them useable. Rapid technological changes also affect digital preservation. As new technologies appear, older ones become obsolete, making it difficult to access older content.

This video explores the complex nature of the problem, how digital content, unlike content on traditional media, depends on technology to make it available and requires active management to ensure its ongoing accessibility.

“Preservation is no longer simply a concern for memory institutions in the long term but for everyone interested in using and accessing digital materials. The greater the importance of digital materials, the greater the need for their preservation: digital preservation protects investment, captures potential and transmits opportunities to future generations and our own. Digital materials - and the opportunities they create - are fragile” ([Digital Preservation Handbook](#)).

[END OF PAGE]

Issues for Effective Educational Data Digital Preservation



[Jisc, 2006](#) defines **Digital Preservation** as “the series of actions and interventions required to ensure continued and reliable access to authentic digital objects for as long as they are deemed to be of value. This encompasses not just technical activities, but also all of the strategic and organisational considerations that relate to the survival and management of digital material”.

According to [Principles and Good Practice for Preserving Data](#), “A sustainable preservation programme addresses organisational issues, technological concerns and funding questions”.

The simple questions to be answered:

- **Organisational Issues:** “What are the requirements and parameters for the organisation’s digital preservation programme?”
- **Technological Issues:** “How will the organisation meet defined digital preservation requirements?”
- **Resources Issues:** “What resources will be needed to develop and maintain the digital preservation programme?”

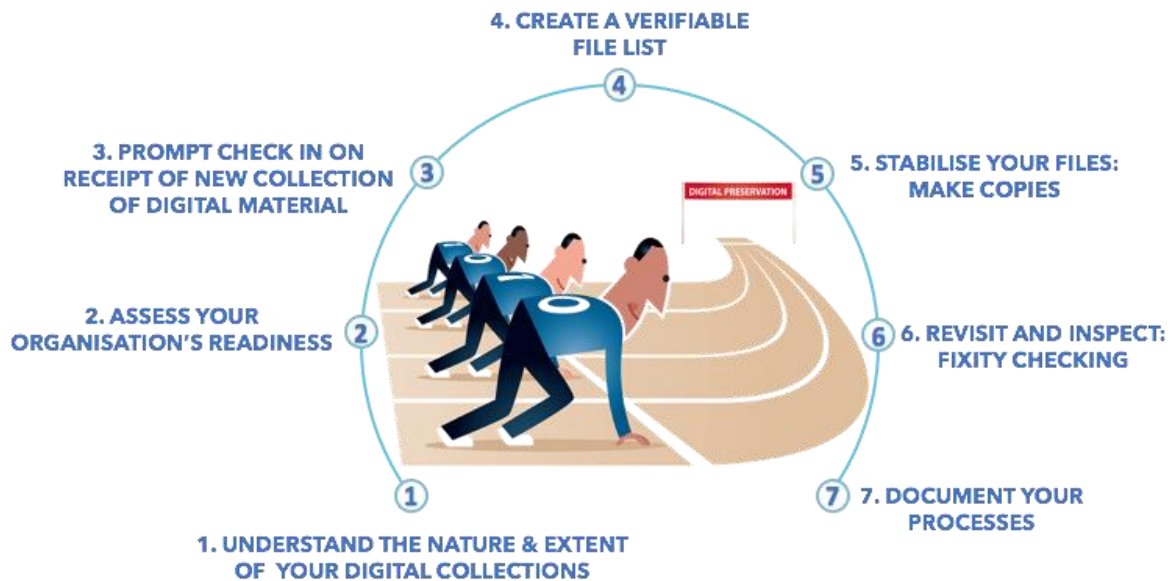
The graphic above based on [Digital Preservation Handbook](#), presents the most important aspects we need to consider and manage, so as to ensure an effective digital preservation process for our educational data.

Even though our main focus is not to drill down deep into technical details and aspects of digital preservation issues, which are not part of educators' main role, however it is essential to get an overview and understanding so as to be able to collaborate effectively with the responsible technical team, using a common language. Thus in the next sections of this topic we will discuss briefly such issues for the effective educational data digital preservation.

[END OF PAGE]

(Learning Object #2.3.4.4 - html page)

Getting Started with Preservation



The first steps that need to be undertaken in order to begin to build or enhance the needed digital preservation activities are summarized in the above graph. You may further review detailed information in [Digital Preservation Handbook](#).

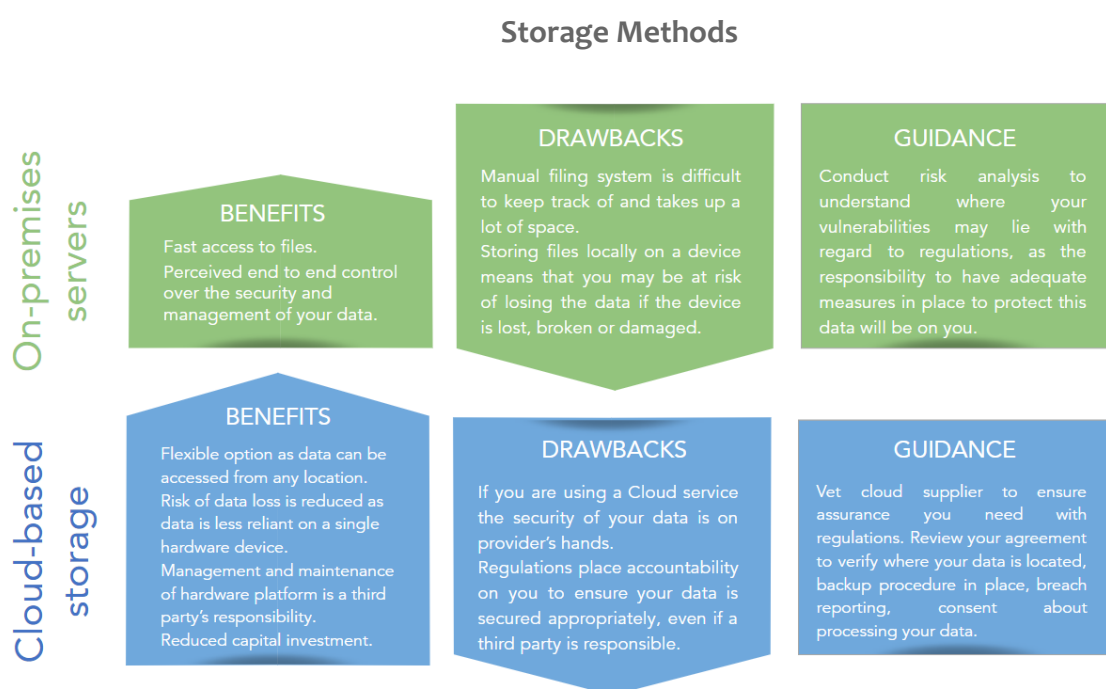
Special focus should be given on these key technical elements of digital preservation, as specified under [USGS Guidelines, 2014](#):

- **Storage & Geographic Location** – Storage systems, locations, and multiple copies to prevent loss of data.
- **Data Integrity** – Procedures to prevent, detect, and recover from unexpected or deliberate changes to data.
- **Information Security** – Procedures to prevent human-caused corruption of data, deletion and unauthorized access.
- **Metadata** – Documentation of the data to enable contextual understanding and long-term usability.
- **File Formats** – File types, data structures, and naming conventions to aid long-term preservation and reuse.
- **Physical Media** – Reduce obsolescence risks that can threaten the readability of physical media.

To assess an organization's readiness it is recommended that these components are checked against the National Digital Stewardship Alliance (NDSA) ['Levels of Digital Preservation'](#):

- Level 1 - protect your data
- Level 2 - know your data
- Level 3 - monitor your data
- Level 4 - repair your data

[END OF PAGE]



The storage technology has changed dramatically over the last twenty years. Initially, the norm was storing data using discrete media items, such as CDs/DVDs and hard-disk drives.

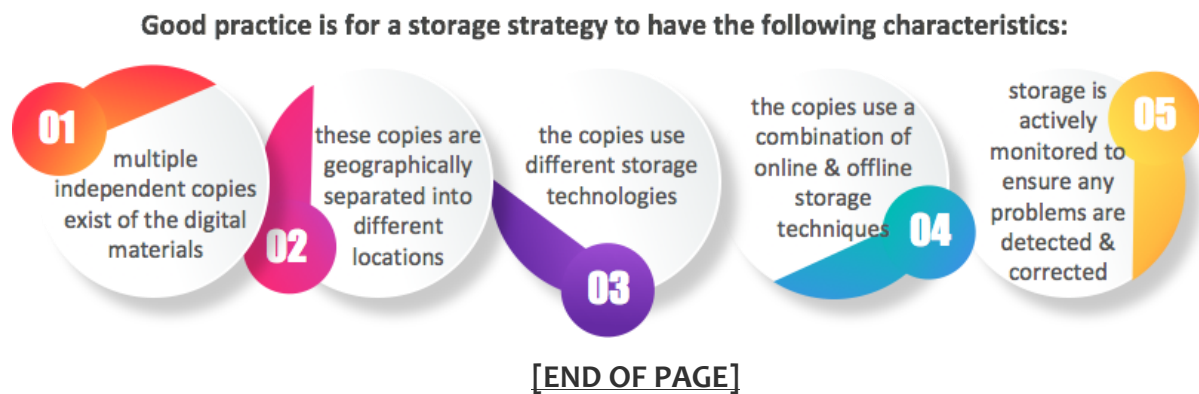
Today, it has become common practice to use IT storage systems for the increasingly large volumes of digital material that needs to be preserved and to be easily and quickly retrievable ([Digital Preservation Handbook](#)).

At this point it is important to clarify the difference between backup and digital preservation process. **Backup** refers to “short-term data recovery solutions following loss or corruption” ([Jisc, 2006](#)). **Preservation storage systems** “require a higher level of geographic redundancy, stronger disaster recovery, longer-term planning, and most importantly active monitoring of data integrity in order to detect unwanted changes such as file corruption or loss” ([Digital Preservation Handbook](#)).

The selected storage solution is of prime importance for digital preservation. When selecting the storage strategy there are several options we need to consider, such as Cost and Scalability, required Capacity, Security, Remote Access, Collaboration and Disaster Recovery. Legal provisions due to privacy or confidentiality may also influence our decision.

The above diagram summarizes the pros and cons of each of the two basic storage methods, On-premises servers (local infrastructure/data centers) and Cloud-based storage, as well as recommended actions to comply with the latest regulations.

Whichever is our choice, even a hybrid storage solution, we need to realize that storage technologies present several risks to long-term preservation of data. “Many cases of content loss are not necessarily due to technical faults but can come from human error, lack of budget, or a failure to regularly monitor the integrity of the stored data” ([Digital Preservation Handbook](#)).



(Learning Object #2.3.4.6 - video)

Storing Data on the Cloud



Public Cloud vs Private Cloud vs Hybrid Cloud

External Video: [Public Cloud vs Private Cloud vs Hybrid Cloud](#) [3:28]

“Organizations that do not have a high-level cloud strategy driven by their business strategy will significantly increase their risk of failure and wasted investment.” (David W. Cearley, Vice President and Gartner Fellow, [Gartner](#))

In their 2018 report, [Data Management Life Cycle Final report](#), Miller and his colleagues recognise the demand for cost-effective storage technologies. *“More and more organizations are considering outsourcing storage services or cloud storage options because the availability of cloud computing resources opens up possibilities for users to purchasing access to computing power and storage space as a service instead of maintaining it themselves. This way, providers are responsible for the performance, reliability, and scalability of the computing environment, while users can concentrate on data analysis and production”.*

Nevertheless, security and privacy are significant concerns holding back use of the cloud, particularly for confidential, sensitive, or personally identifiable information. Let’s not forget what happened at [Code Space](#), which led to data deletion and the eventual shutdown of the company.

The most common risks we need to consider include: Downtime and service outages since cloud computing systems are internet based, vulnerability to external cyber-security attacks, compliance and legal issues depending on the applied regulation, lifetime costs that could

end up being higher than you expected as well as limited control and flexibility since the cloud infrastructure is owned, managed and monitored by the service provider.

Despite these concerns, the potential of cloud storage seems to be more promising than the associated risks which are expected to diminish over time.

As per [Gartner](#) “through 2020, public cloud infrastructure workloads will suffer at least 60% fewer security incidents than those in *traditional data centers*, while through 2022, at least 95% of cloud security failures will be the customer’s fault”.

[END OF PAGE]

Storage Security



"The thing that kept me awake at night (as NATO military commander) was cybersecurity. Cybersecurity proceeds from the highest levels of our national interest ... through our medical, our educational, to our personal finance (systems)." (Admiral James Stavridis, Ret. Former-NATO Commander)

According to [Digital Preservation Handbook](#), **security issues** relate to:

- **system security** (e.g., protecting digital preservation and networked systems / services from exposure to external / internal threats),
- **collection security** (e.g., protecting content from loss or change, the authorisation and audit of repository processes), and
- **the legal and regulatory aspects** (e.g. personal or confidential information in the digital material, secure access, redaction).

When it comes to **cybersecurity**, protecting educational data requires both administrative and technological security measures, in order to prevent unauthorized parties from accessing it. You may explore top cyber threats in 2018 as specified by European Union Agency for Network and Information Security (ENISA) via their [interactive web application](#).

In the above graphic, you may review some of these countermeasures to create an effective defence against cyber attacks.

This graphic is based on the infographic “[Getting Started with Cybersecurity](#)” by the Consortium for School Networking (CoSN) outlining the importance of cybersecurity. The consortium provides [fundamental resources](#) to help school districts protect against cyberthreats and develop effective security programs, including:

- A planning rubric providing a comprehensive set of action areas required for a complete security plan, describing what those elements might look like at basic, developing, adequate and advanced levels
- A planning template—a structure for identifying the steps necessary to address each of the areas of the planning rubric.
- Self-assessment—a 100-point quiz for districts to assess where they are in implementing their security plan
- A [Report](#) about K-12 Security Risk Methodology.

[END OF PAGE]

(Learning Object #2.3.4.8 - video)

Real Life Case



How Toy Story 2 Almost Got Deleted: Stories From Pixar Animation: ENTV

External Video: [How Toy Story 2 Almost Got Deleted: Stories From Pixar Animation: ENTV](#)

[2:25]

The (mostly) true story of how 'Toy Story 2' was almost deleted from Pixar Animation's computers during the making of the film. And how the film was saved by one mom's home computer!

To this point we have provided an overview of the key issues of digital preservation and realized its importance to maintain usable our educational data over time.

Let us move forwards to identify good practices and appropriate actions to protect our data and safeguard their privacy, especially when it comes to sensitive educational data.

After all, *"Data protection is all about protecting people – not just files and computer systems"* ([Barlow Robbins Solicitors](#)).

[END OF PAGE]

(Learning Object #2.3.4.9 - Activity)

Poll, Short answer & Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

What is your preferred data storage format?

- On-premises storage
- Cloud-based storage

ACTIVITY/PRACTICE QUESTION (Short answer)

Name some types of educational data that need long term preservation

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response in the following discussion tasks, by posting your thoughts on the discussion board. You may:

1. *Identify and discuss storage issues for preserving educational data*
2. *Discuss good practices when preserving educational data*

[END OF PAGE]

References

REFERENCES

- Barlow Robbins. (2018, June 26). GDPR and safeguarding in schools: What you need to know. Retrieved from <https://www.barlowrobbins.com/resources/gdpr-and-safeguarding-in-school-what-you-need-to-know>
- Cloud Computing. (2019, May 7). Retrieved from <https://www.gartner.com>
- Consortium for School Networking (CoSN). (2017). Cybersecurity. Retrieved from <https://www.cosn.org/cybersecurity>.
- Digital Preservation Coalition. (2015). *Digital Preservation Handbook* (2nd ed.). Retrieved from <http://handbook.dpconline.org/>
- Interuniversity Consortium for Political and Social Research (ICPSR). (2009). *Principles and Good Practice for Preserving Data* (International Household Survey Network, IHSN Working Paper No 003). Retrieved from <http://ihsn.org/sites/default/files/resources/IHSN-WP003.pdf>
- Jisc (2006). Digital Preservation: Continued access to authentic digital assets. Retrieved from <https://www.webarchive.org.uk/wayback/archive/20140613220103/http://www.jisc.ac.uk/media/documents/publications/digitalpreservationbp.pdf>
- Miller, K., Miller, M., Moran, M., Dai, B. (2018). *Data Management Life Cycle: Final report*. PRC 17-84 F. Texas A&M Transportation Institute.
- Panetta, K. (2018, March 27). *Is the Cloud Secure?* Retrieved from <https://www.gartner.com/>
- Phillips, M., Bailey, J., Goethals, A., Owens, T. (2013). *The NDSA Levels of Digital Preservation: An Explanation and Uses*. National Digital Stewardship Alliance (NDSA). Retrieved from https://ndsa.org/documents/NDSA_Levels_Archiving_2013.pdf
- USGS. (2014). Guidelines for the Preservation of Digital Scientific Data. Retrieved from https://ndsa.org/documents/USGS_Guidelines_for_the_Preservation_of_Digital_Scientific_Data_Final.pdf

Woody, C. (2004). Risk Methodology K-12. Retrieved from <https://www.cosn.org/sites/default/files/pdf/K12RiskMethodology.pdf>

Venezia, P. (2014, June 23). [Murder in the Amazon cloud](#). Retrieved from <https://www.infoworld.com/>

FURTHER READINGS

Beagrie, N., Charlesworth, A., & Miller, P. (2015). [The National Archives Guidance on Cloud Storage and Digital Preservation](#) (2nd ed.). Crown copyright licensed under the Open Government Licence v2.0.

COMPARE THE CLOUD. (2018, February 21). [6 Pros and Cons of Cloud Storage for Business](#). Retrieved from <https://www.comparethecloud.net>

Hollidge, R. (2018, February 21). [Where are you storing your data and is your storage method GDPR compliant?](#) . Retrieved from <https://www.instantonit.com>

Larkin, A. (2018, June 26). [Disadvantages of Cloud Computing](#). Retrieved from <https://cloudacademy.com>

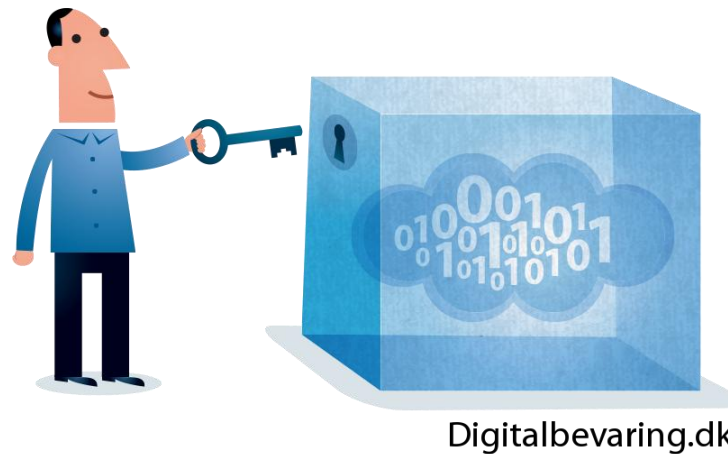
[END OF PAGE]

2.3.5 Educational Data Ethics: Sensitive educational data protection

(Learning Object #2.3.5.1 - Activity)

Poll

ACTIVITY/PRACTICE QUESTION (Poll)



Jørgen Stamp [CC BY 2.5 dk]

Source: https://commons.wikimedia.org/wiki/File:KeyToDP_DigitalPreservation.png

1. How important do you consider that the right to privacy is?
 - It's definitely very important and we need to ensure privacy by all means.
 - It is quite important, but in parallel, it's overestimated.
2. Are you aware of the types of data that are characterized as sensitive?
 - Yes
 - No

[END OF PAGE]

(Learning Object #2.3.5.2 - video)

The Right to Privacy



Privacy Overview for K12 Teachers and Administrators

External Video: [Privacy Overview for K12 Teachers and Administrators](#) [5:26]

“Balancing digital learning with privacy and security is essential to fostering a successful digital culture.”(ikeepsafe)

Privacy is a **fundamental human right** and a **core value** in the functioning of democratic societies. As already discussed in the previous topics, with the exponential progress in the field of information and communication technologies and in the light of **rapid development of Educational Data Analytics** on a global basis, **new challenges to privacy and data protection have emerged.**

The video we just watched provides us with an overview of the privacy issues that may arise and growing concerns about educational data privacy. Is educational data privacy over in the digital age?

In the [Quantified Student infographic](#) you may see what a day in the data-driven life of most measured and monitored student in the history of education, looks like.

“The data collection begins even before he steps into the school,” says Khaliah Barnes, director of the Student Privacy Project at the [Electronic Privacy Information Center](#). *“The issue is that this reveals specifically sensitive information,”* says Barnes ([Hill, 2014](#)).

Moreover, as Jose Ferreira CEO at Knewton (one of the biggest players in the field of educational technology software), points out in a [video](#) posted by the US Department of Education, “We literally know everything about what you know and how you learn best, everything.” Ferreira calls education “the world’s most data-mineable industry by far.” ([Hill, 2014](#)).

Do educational data analytics challenge the principles of data protection? Is privacy a show-stopper? How privacy is guaranteed/secured, especially if minors and/or sensitive data are involved?

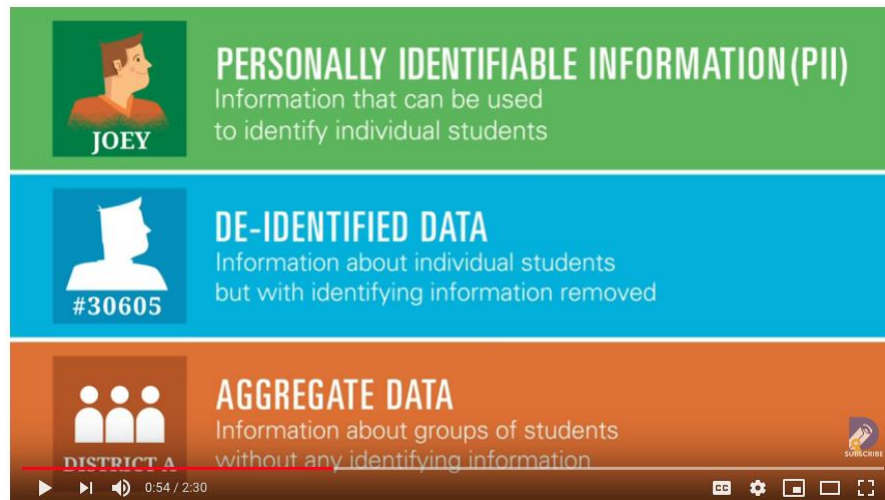
The European position has been expressed in the European Commission’s report: “[New Modes of Learning and Teaching in Higher Education](#)”. In recommendation 14, the Commission clearly stated: “**Member States should ensure that legal frameworks allow higher education institutions to collect and analyse learning data.** The full and informed consent of students must be a requirement and the data should only be used for educational purposes”, and in recommendation 15: “Online platforms should inform users about their privacy and data protection policy in a clear and understandable way. **Individuals should always have the choice to anonymise their data.**” This is a **widely accepted framework mirrored** in the laws of **multiple nations and international organisations** including many U.S. states ([Drachsler & Greller, 2016](#)).

Thus it is essential that all educators understand how learners’ personal information is used and adequately protect learners’ data in order to strengthen the trust of all parties involved and encourage their participation in digital learning.

[END OF PAGE]

(Learning Object #2.3.5.3 - video)

Personal Student Information



Who Uses Student Data?

External Video: [Who Uses Student Data?](#) [2:30]

In this video by the Data Quality Campaign, it is emphasized that most personal student information stays local. Districts, states, and the federal government all collect data about students for important purposes like informing instruction and providing information to the public. But the type of data collected, and who can access them, is different at each point.

As clearly stated in [Foundational Principles for Using and Safeguarding Students' Personal Information](#) developed by a coalition of US national education organisations “Everyone who uses student information has a responsibility to maintain the privacy and the security of students’ data, especially when these data are personally identifiable.”

The basic information security techniques, as specified by [Digital Preservation Handbook](#), include:

Encryption

- Encryption is a cryptographic technique which protects digital material by converting it into a scrambled form. The use of a key is required to unscramble the data and convert it back to its original form.

Access Control

- Access control enables an administrator to specify who is allowed to access digital material and the type of access that is permitted (for example read only, write).

Redaction

- Redaction refers to the process of identifying and removing or replacing confidential or sensitive information, using anonymisation or pseudonymisation.

Now that we have a better understanding of the different types of data as categorized in terms of privacy, in the next topic we will further review the levels of data as specified under GDPR.

[END OF PAGE]

Categorisation of Data under GDPR

PERSONAL DATA

ANY INFORMATION RELATING TO AN IDENTIFIED OR IDENTIFIABLE NATURAL PERSON ('DATA SUBJECT');

Identifiers

- Name;
- Identification Number;
- Location Data;
- Online Identifier;
- Physical,
- Physiological,
- Genetic,
- Mental,
- Economic,
- Cultural, or
- Social Identity

ANONYMOUS INFORMATION

Information

- which does not relate to an identified or identifiable natural person, or
- to personal data rendered anonymous in such a manner that the data subject is not or no longer identifiable.



SENSITIVE DATA

SPECIAL CATEGORY OF PERSONAL DATA

- Personal data revealing Racial or Ethnic Origin, Political Opinions, Religious or Philosophical Beliefs;
- Trade-Union membership;
- Genetic Data, Biometric Data processed solely to identify a human being;
- Health-Related data;
- Data concerning a person's Sex Life or Sexual Orientation

PSEUDONYMISED DATA

- Personal data processed in such a manner that the personal data can no longer be attributed to a specific data subject without the use of additional information,
- provided that such additional information is kept separately and is subject to technical and organisational measures to ensure that the personal data are not attributed to an identified or identifiable natural person.

The graphic above presents the main categories of personal data as defined by [GDPR](#).

We need to pay extra attention to [sensitive](#) (special category of personal data) since an organisation can only process this data under specific conditions (explicit consent may be needed).

Even [personal data](#), as [clarified under GDPR](#), “should only be processed where it isn’t reasonably feasible to carry out the processing in another manner. Where possible, it is preferable to use anonymous data. Where personal data is needed, it should be adequate, relevant, and limited to what is necessary for the purpose (‘data minimisation’). “

Once data is truly **anonymised** and does no longer contain any identifying elements, the anonymisation is irreversible and individuals are no longer identifiable, the data will not fall within the scope of the GDPR and it becomes easier to use.

Before anonymization, we should consider the purposes for which the data is to be used. Anonymisation may devalue the data, so that it is no longer useful for specific purposes.

The [ICO's Code of Conduct on Anonymisation](#) provides further guidance on anonymisation techniques ([UCL, 2018](#)).

Unlike anonymisation, in **pseudonymised data** personally identifiable material is replaced with artificial identifiers. Pseudonymised personal data can still fall within scope of the GDPR, depending on how difficult it is to attribute the pseudonym to a particular individual.

Whether 'de-identified' or pseudonymised data is in use, there is a residual risk of re-identification. For example, anonymisation is often seen as the “easy way out” of data protection obligations. However, experts around the world are adamant that 100% anonymisation is not possible. Anonymised data can rather easily be de-anonymised when they are merged with other information sources. ([Drachsler & Greller, 2016](#)).

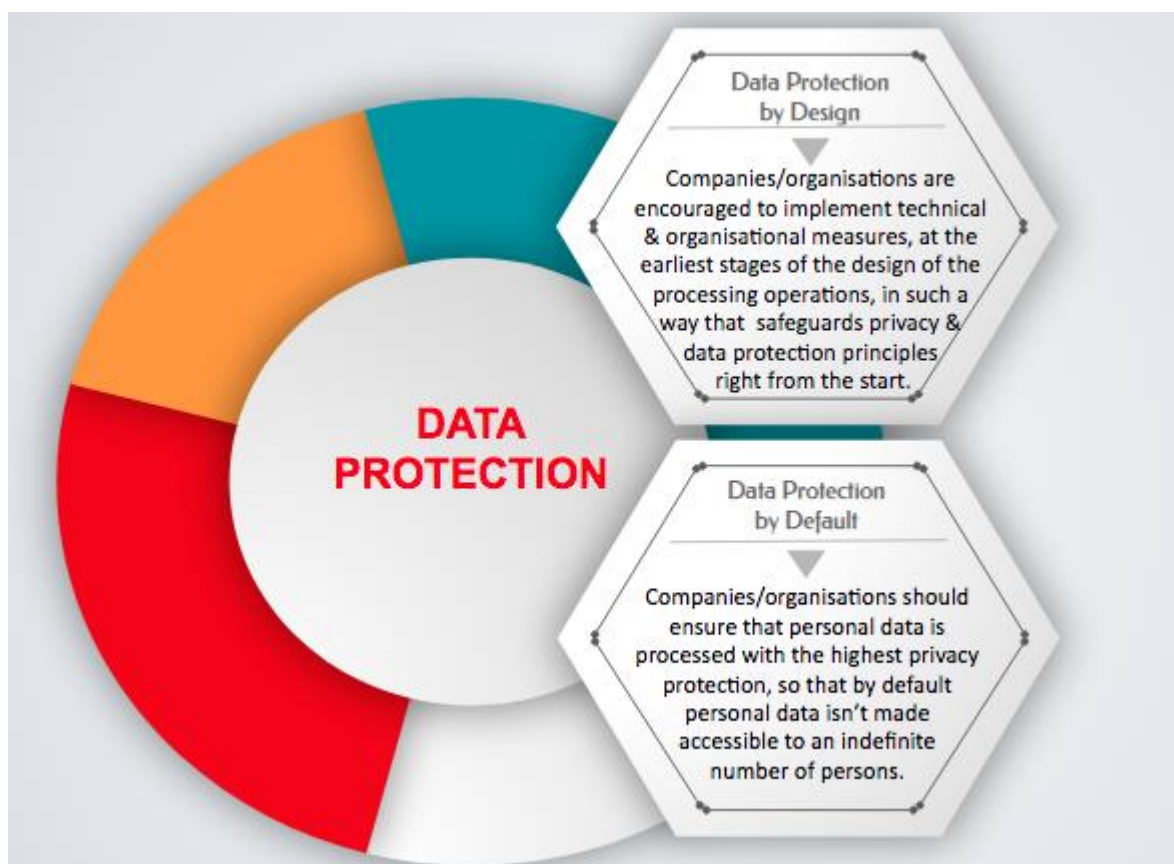
In 2000, [L. Sweeney](#) presented that it's possible to personally identify 87% of the U.S. population based on just three data points: five-digit ZIP code, gender and date-of-birth (Wes, 2018). Later on, in 2006, the [AOL release of users' search logs](#) and the case of the Searcher No. 4417749, as recorded in "[A Face Is Exposed for AOL Searcher No. 4417749](#)" by M. Barbaro and T. Zeller of New York times, was one of the first widely known cases of re-identification. In 2007, the [Netflix case](#) followed when researchers de-anonymized some of the Netflix data by matching rankings and timestamps with public information on the Internet Movie Database. As per [Forbes](#), in 2012 the retail company Target, using behavioural advertising techniques, managed to identify a pregnant teen girl from her web searches and sent her relevant vouchers at home. ([ENISA, 2015](#)).

Thus though de-identification techniques can reduce the risks to the data subjects concerned and help organisations to meet their data-protection obligations, we need to assess properly the adequacy of these methods so as to decide whether further steps to de-identify the data are necessary ([UCL, 2018](#)).

[END OF PAGE]

(Learning Object #2.3.5.5 - html page)

Data Protection by Design & by Default



The GDPR introduces two new principles: [data protection by design and data protection by default](#), whose definitions are presented in the above graphic.

As specified in [GDPR](#), the protection of the rights and freedoms of natural persons with regard to the processing of personal data require that appropriate technical and organisational measures be taken which meet in particular the principles of data protection by design and data protection by default.

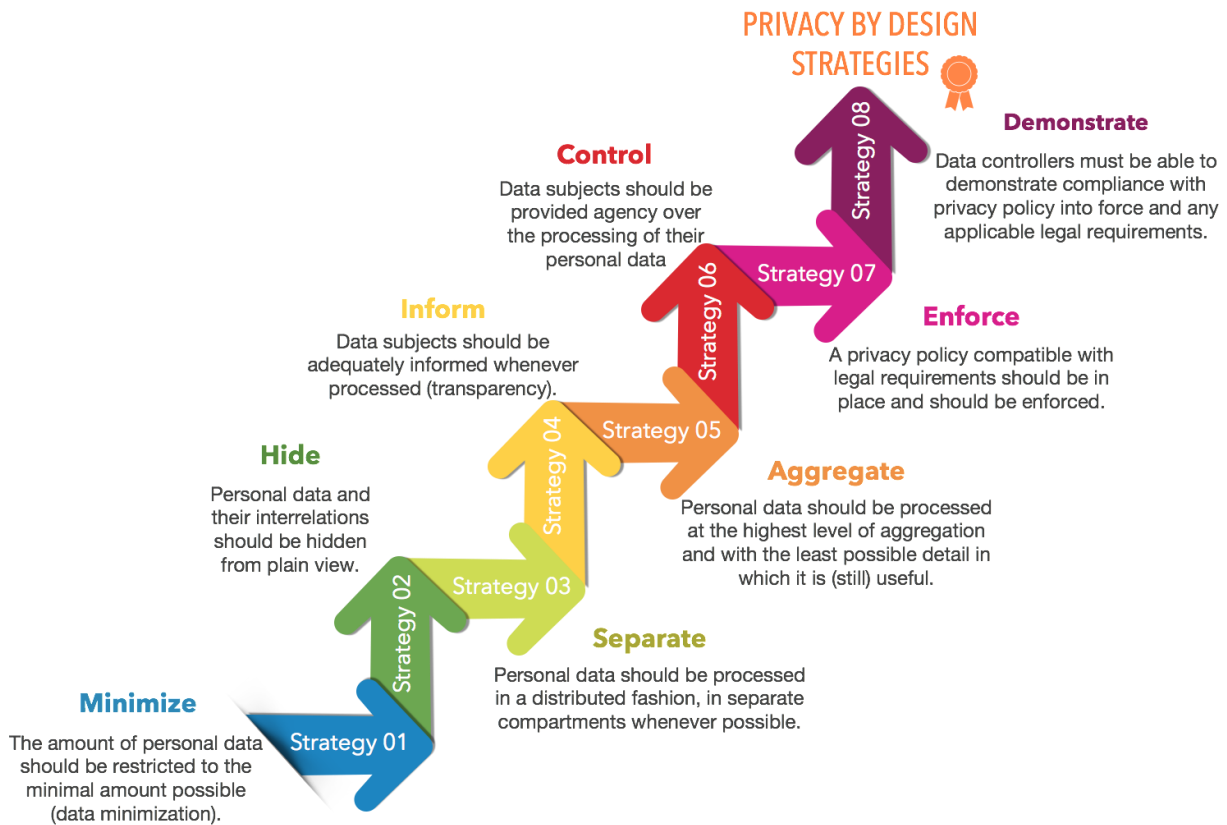
“Data protection by design minimises privacy risks and increases trust”, while “Data protection by default entails ensuring that your company always makes the most privacy friendly setting the default setting.” ([European Union, 2018](#))

An example of Data protection by design is the use of pseudonymisation & encryption and examples for Data protection by default include “data minimisation” (only the data necessary should be processed), the limited accessibility as well as the short storage period.

In the next two topics we will further discuss about privacy by design strategies and storage privacy (Data protection by design) and about Storage Limitation (Data protection by default).

[END OF PAGE]

Privacy by Design Strategies & Technologies



This graphic depicts eight Privacy By Design Strategies, as proposed by the [European Union Agency for Network and Information Security \(ENISA, 2015\)](#).

These strategies enable us to identify the data protection and privacy requirements early in the educational analytics value chain and subsequently to implement the necessary technical and organizational measures.

One of the most significant privacy enhancing technologies that can be used for implementing such strategies, is storage privacy.

ENISA, in its previous report “[Privacy and Data Protection by Design](#)”, defines **Storage Privacy** as “the ability to store data without anyone being able to read (let alone manipulate) them, except the party having stored the data (called here the data owner) and whoever the data owner authorises.”

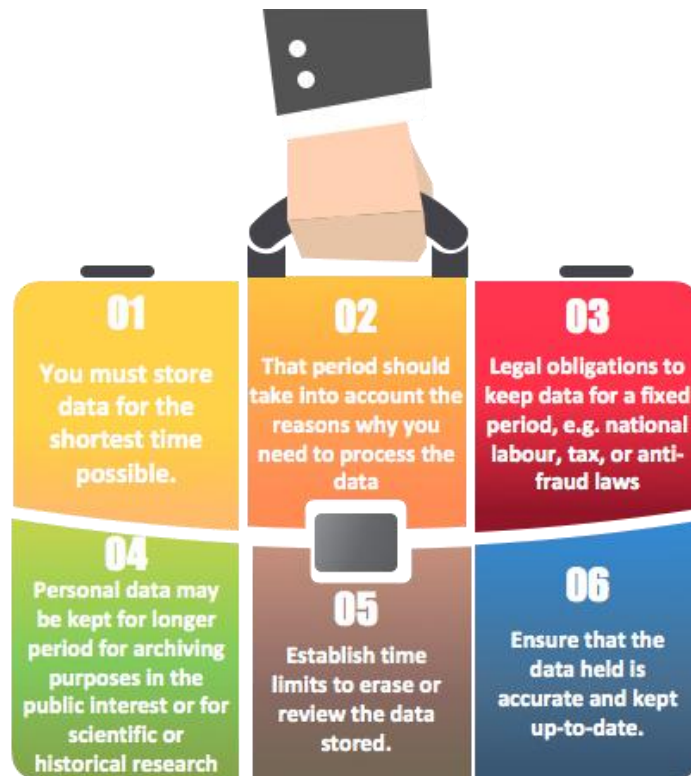
As specified further in this report, “a major challenge to implement private storage is to prevent non-authorised parties from accessing the stored data. If the data owner stores data locally, then physical access control might help, but it is not sufficient if the computer equipment is connected to a network: a hacker might succeed in remotely accessing the stored data. If the data owner stores data in the cloud, then physical access control is not even feasible.”

A straightforward option for storage privacy is storing the data, either locally or in cloud storage, in encrypted form. One can use full disk encryption (FDE) or file system-level encryption (FSE). As clarified in the report, “encryption and decryption operations must be carried out locally, not by remote service, because both keys and data must remain in the power of the data owner if any storage privacy is to be achieved. The report specifies that outsourced data storage on remote clouds is practical and relatively safe as long as only the data owner, not the cloud service, holds the decryption keys. Such storage may be distributed for added robustness to failures.”

“Privacy challenges should be, seen as opportunities that, if appropriately handled, can build trust in the big data ecosystem for the benefit of both users and big data industry.” ([ENISA, 2015](#)).

[END OF PAGE]

Storage Limitation



Storage limitation is one of the key conditions for processing personal data under GDPR. It replies to a simple question “For how long can data be kept and is it necessary to update it?”

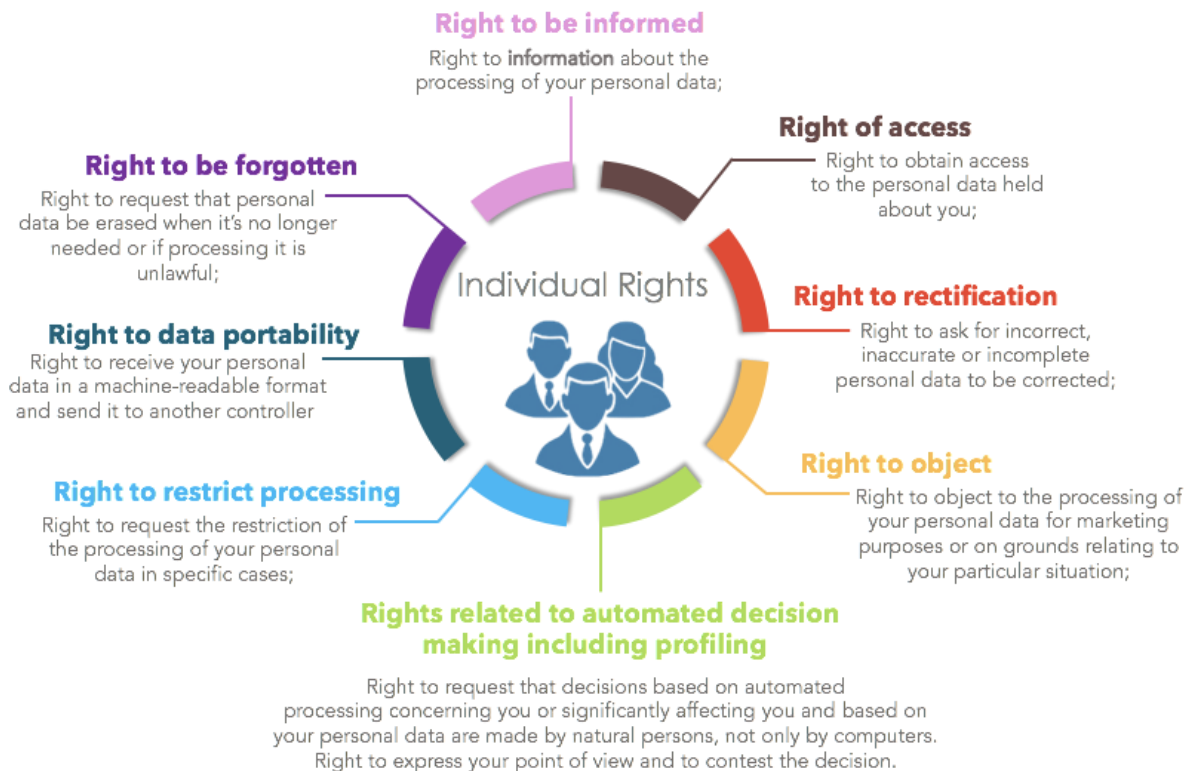
Regulation’s answer is straightforward “You must ensure that personal data is **stored for no longer than necessary** for the purposes for which it was collected”.

As presented in the above graphic there are 6 basic guidelines, [specified clearly by GDPR](#), which you need to take under consideration when storing personal data.

[END OF PAGE]

(Learning Object #2.3.5.8 - html page)

What are Individuals' Rights?



The main reason for the introduction of GDPR is to allow European Union citizens to [better control their personal data](#). More specifically is designed to:

- Harmonize data privacy laws across Europe,
- Protect and empower all EU citizens data privacy
- Reshape the way organisations across the region approach data privacy.

GDPR applies to “all companies operating in the EU, wherever they are based” ([European Commision, 2018](#)).The GDPR introduces stronger [rights for data subjects](#) and creates new obligations for data controllers (the person or body handling the personal data).

The above diagram presents [individuals' rights](#) so as to have control over their personal data, [under GDPR](#).

To exercise individuals' rights they should contact the company or organisation processing their personal data, also known as the controller. If the company/organisation has a [Data Protection Officer](#) ('DPO') they may address their request to the DPO. The

company/organisation must respond to their requests without undue delay and **at the latest within 1 month**.

When the personal data, for which a company/organisation is responsible, is disclosed, either accidentally or unlawfully, to unauthorised recipients or is made temporarily unavailable or altered, a data breach occurs.

In case a data breach occurs and the breach poses a risk to individual rights and freedoms, the company/organisation should notify its [Data Protection Authority](#) (DPA) within 72 hours after becoming aware of the breach. Depending on whether or not the data breach poses a high risk to those affected, a business may also be required to inform all individuals affected by the data breach ([European Union, 2018](#)).

[END OF PAGE]

(Learning Object #2.3.5.9 - html page)

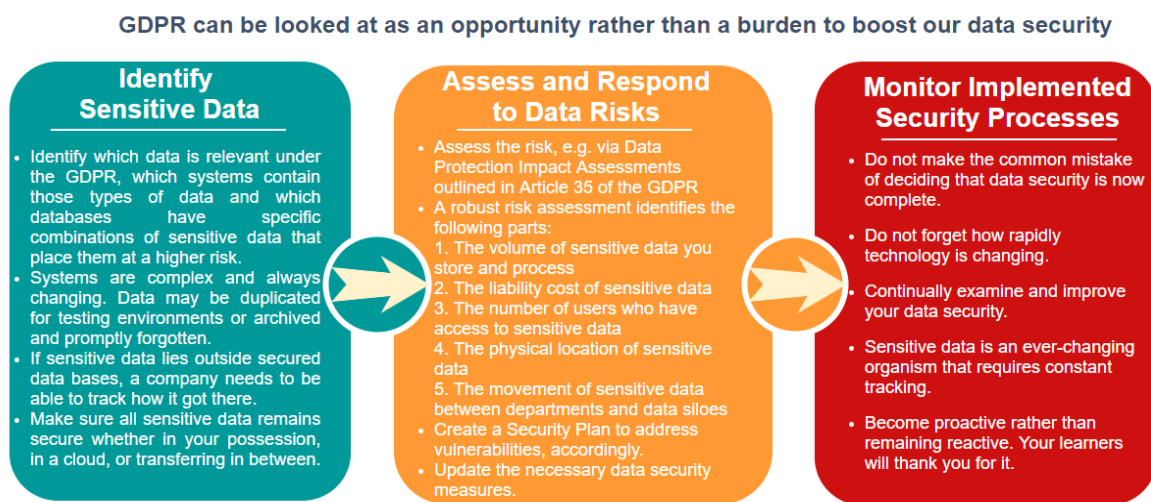
Data Protection Impact Assessment

As specified by GDPR, a [Data Protection Impact Assessment](#) (DPIA) is required whenever processing is likely to result in a high risk to the rights and freedoms of individuals. A DPIA is required at least in the following cases:

- a systematic and extensive evaluation of the personal aspects of an individual, including profiling;
- processing of sensitive data on a large scale;
- systematic monitoring of public areas on a large scale.

[National Data Protection Authorities](#), in collaboration with the [European Data Protection Board](#), may provide lists of cases where a DPIA would be required. As emphasized, “the DPIA should be conducted before the processing and should be considered as a living tool, not merely as a one-off exercise. Where there are residual risks that can’t be mitigated by the measures put in place, the DPA must be consulted prior to the start of the processing”.

In the diagram below, we can review the 3 Basic Steps to Identify and Protect Sensitive Data, as per [Pacific Data Integrators](#).



“A DPIA should be conducted as early as possible in the project lifecycle, so that its findings and recommendations can be incorporated into the design of the processing operation.”

(itgovernance)

[END OF PAGE]

(Learning Object #2.3.5.10 - video)

Expert View - Protecting Student Data Privacy



Protecting Student-Data Privacy: An Expert's View

External Video: [Protecting Student-Data Privacy: An Expert's View](#) [3:44]

Let's now watch Fordham University Law Professor Joel Reidenberg talking with Education Week Correspondent John Tulenko about student data and the best ways to keep it secure.

[END OF PAGE]

(Learning Object #2.3.5.11 - Activity)

Poll & Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

1. Do you believe that privacy may be a show-stopper for educational data analytics?
 - o No, if we follow the widely accepted ethics' guidelines and legal frameworks.
 - o Yes, it seems rather difficult to keep the right balance between individual privacy and the analytics of educational data.
2. Have you ever implemented measures/safeguards to secure privacy for the educational data you store and process?
 - o Yes
 - o No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response in the following discussion tasks, by posting your thoughts on the discussion board. You may:

1. Identify and discuss privacy issues for preserving educational data
2. Discuss about educational data protection

[END OF PAGE]

References

REFERENCES

- Barbaro, M., & Zeller, T. (2006, August 9). A Face Is Exposed for AOL Searcher No. 4417749. *The New York Times*. Retrieved from https://www.nytimes.com/2006/08/09/technology/09aol.html?pagewanted=all&_r=0
- D' Acquisto, G. D., Domingo-Ferrer, J., Kikiras, P., Torra, V., de Montjoye, Y. - A., & Bourka, A. (2015). *Privacy by design in big data: An overview of privacy enhancing technologies in the era of big data analytics* (European Union Agency for Network and Information Security (ENISA)). Heraklion: ENISA. doi: 10.2824/641480.
- Danezis, G., Domingo-Ferrer, J., Hansen, M., Hoepman, J.-H., Métayer, D. L., Tirtea, R., & Schiffner, S. (2014). *Privacy and data protection by design - from policy to engineering* (European Union Agency for Network and Information Security (ENISA)). Heraklion: ENISA. doi: 10.2824/38623.
- Digital Preservation Coalition. (2015). *Digital Preservation Handbook* (2nd ed.). Retrieved from <http://handbook.dpconline.org/>
- Drachsler, H., & Greller, W. (2016). *Privacy and Analytics – it's a DELICATE Issue. A Checklist for Trusted Learning Analytics*. In LAK '16 Conference Proceedings of the Sixth International Conference on Learning Analytics & Knowledge Conference. Edinburgh: ACM. doi:10.1145/2883851.2883893
- European Commission (2014). *Report to the European Commission on New modes of learning and teaching in higher education*. High Level Group on the Modernisation of Higher Education. Luxembourg: Publications Office of the European Union. doi:10.2766/81897.
- European Commission. (2018, January 4). 2018 reform of EU data protection rules. Retrieved from https://ec.europa.eu/commission/priorities/justice-and-fundamental-rights/data-protection/2018-reform-eu-data-protection-rules_en#abouttheregulationanddataprotection

European Commission. (2018, March 22). Data protection and online privacy. Retrieved from https://europa.eu/youreurope/citizens/consumers/internet-telecoms/data-protection-online-privacy/index_en.htm

European Commission. (2018, August 01). For how long can data be kept and is it necessary to update it? Retrieved from https://ec.europa.eu/info/law/law-topic/data-protection/reform/rules-business-and-organisations/principles-gdpr/how-long-can-data-be-kept-and-it-necessary-update-it_en

European Commission. (2018, August 01). How much data can be collected? Retrieved from https://ec.europa.eu/info/law/law-topic/data-protection/reform/rules-business-and-organisations/principles-gdpr/how-much-data-can-be-collected_en

European Commission. (2018). *The GDPR: New opportunities, new obligations: What every business needs to know about the EU's General Data Protection Regulation*. Luxembourg: Publications Office of the European Union.

European Commission. (2018, August 01). What are Data Protection Authorities (DPAs)? Retrieved from https://ec.europa.eu/info/law/law-topic/data-protection/reform/what-are-data-protection-authorities-dpas_en

European Commission. (2018, August 01). What are my rights? Retrieved from https://ec.europa.eu/info/law/law-topic/data-protection/reform/rights-citizens/my-rights/what-are-my-rights_en

European Commission. (2018, August 01). What are the responsibilities of a Data Protection Officer (DPO)? Retrieved from https://ec.europa.eu/info/law/law-topic/data-protection/reform/rules-business-and-organisations/obligations/data-protection-officers/what-are-responsibilities-data-protection-officer-dpo_en

European Commission. (2018, August 01). [What does data protection 'by design' and 'by default' mean?](https://ec.europa.eu/info/law/law-topic/data-protection/reform/what-are-responsibilities-data-protection-officer-dpo_en) Retrieved from https://ec.europa.eu/info/law/law-topic/data-protection/reform/what-are-responsibilities-data-protection-officer-dpo_en

European Commission. (2018, August 01). What is personal data? Retrieved from https://ec.europa.eu/info/law/law-topic/data-protection/reform/what-personal-data_en

European Commission. (2018, August 01). What personal data is considered sensitive? Retrieved from https://ec.europa.eu/info/law/law-topic/data-protection/reform/rules-business-and-organisations/legal-grounds-processing-data/sensitive-data/what-personal-data-considered-sensitive_en

European Commission. (2018, August 01). When is a Data Protection Impact Assessment (DPIA) required? Retrieved from https://ec.europa.eu/info/law/law-topic/data-protection/reform/rules-business-and-organisations/obligations/when-data-protection-impact-assessment-dpia-required_en

European Union. (2018). *It's your data – take control*. Luxembourg: Publications Office of the European Union,.

Hansell, S. (2006, August 8). AOL Removes Search Data on Group of Web Users. *The New York Times*. Retrieved from <https://www.nytimes.com/2006/08/08/business/media/08aol.html>

Hill, A. (2014, September 15). *A day in the life of a data mined kid* [Web log post]. Retrieved from <https://www.marketplace.org>

Hill, K. (2012, February 16). How Target Figured Out A Teen Girl Was Pregnant Before Her Father Did. *Forbes*. Retrieved from <https://www.forbes.com/sites/kashmirhill/2012/02/16/how-target-figured-out-a-teen-girl-was-pregnant-before-her-father-did/#4c6bc6066686>

iKeepSafe. (2017). Data Privacy in Education: An iKeepSafe Educator Training Course. Retrieved from <https://ikeepsafe.org/wp-content/uploads/2018/02/Data-Privacy-in-Education-Full-Curriculum-2017-2.pdf>

Intersoft Consulting. (2018, October 5). GENERAL DATA PROTECTION REGULATION (GDPR): Chapter 3 Rights of the data subject. Retrieved from <https://gdpr-info.eu/chapter-3/>

IT Governance UK (2016, October 3). Data Protection Impact Assessments under the GDPR. Retrieved from <https://www.itgovernance.co.uk/privacy-impact-assessment-pia>

Krueger, M. (2017, October, 13). 3 Steps to Identify and Protect Sensitive Data for the GDPR [Web log post]. Retrieved from <https://www.pacificdataintegrators.com/insights/3-Steps-to-Identify-and-Protect-Sensitive-Data-for-GDPR>

Narayanan, A., Shmatikov, V. (2008). *Robust Deanonimization of Large Datasets (How to Break Anonymity of the Netflix Prize Dataset)*. The University of Texas at Austin.

Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). Official Journal L 119. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32016R0679>

Student Data Principles. (2014). Retrieved from <https://studentdataprinciples.org/>

Sweeney, L. (2000). *Simple Demographics Often Identify People Uniquely* (Data Privacy Working Paper 3). Pittsburgh, PA: Carnegie Mellon University.

UCL. (2018, November, 15). GDPR - Anonymisation & Pseudonymisation. Retrieved from <https://www.ucl.ac.uk/legal-services/guidance/gdpr-anonymisation-pseudonymisation>

UK, Information Commissioner's Office (ICO). (2012, November). Anonymisation: Managing Data Protection Risk Code of Practice. Retrieved from <https://ico.org.uk/media/1061/anonymisation-code.pdf>

Wes, M. (2018). Looking to comply with GDPR? Here's a primer on anonymization and pseudonymization. Retrieved from <https://iapp.org/news/a/looking-to-comply-with-gdpr-heres-a-primer-on-anonymization-and-pseudonymization/>

FURTHER READINGS

Data Quality Campaign. (2013). Roadmap to Safeguarding Student Data Key Focus Areas for State Education Agencies. Retrieved from <https://2pido73em67o3eytaq1cp8au-wpengine.netdna-ssl.com/wp-content/uploads/2016/03/DQC-roadmap-safeguarding-data-June24.pdf>

Data Quality Campaign. (2018). Education Data Legislation Review: 2018 State Activity.

Retrieved from <https://2pido73em67o3eytaq1cp8au-wpengine.netdna-ssl.com/wp-content/uploads/2018/09/2018-DQC-Legislative-Summary.pdf>

Data Quality Campaign. (2018). TIME TO ACT 2018: Using Data to Meet ESSA Goals. Retrieved from <https://2pido73em67o3eytaq1cp8au-wpengine.netdna-ssl.com/wp-content/uploads/2018/12/DQC-Time-to-Act-2018.pdf>

Gartner. (2018). Plan your GDPR Journey. Retrieved from:

https://blogs.gartner.com/smarterwithgartner/files/2018/05/PR_435169_Beadle_Are_You_Ready_for_GDPR_Infographic_final.png

GDPR Report. (2017, November 07). Data masking: Anonymisation or pseudonymisation?

Retrieved from <https://gdpr.report/news/2017/11/07/data-masking-anonymisation-pseudonymisation/>

UK, Information Commissioner's Office (ICO). (2019, April 30). Individual rights. Retrieved

<https://ico.org.uk/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr/individual-rights/>

Webber, M. (2018). [The GDPR's impact on the cloud service provider as a processor](#). *Privacy & Data Protection Journal*, 16(4).

Whitelegg, D. (2018, May 25). A developer's guide to the GDPR. Understand how the GDPR impacts you. Retrieved from <https://developer.ibm.com/articles/s-gdpr1/>

[END OF PAGE]

2.3.6 Quiz

(Learning Object #2.3.6.1 - Activity)

Topic 3 Quiz

Question 1: Preservation storage systems require a higher level of geographic redundancy, stronger disaster recovery, longer-term planning, and most importantly active monitoring of data integrity in order to detect unwanted changes such as file corruption or loss

1. True

2. False

Question 2: Outliers occur when no value is stored for the variable in the current observation

1. True

2. False

Question 3: Metadata is structured information often in machine-readable format for purposes of search and retrieval

1. True

2. False

Module 2

MULTIPLE CHOICE QUIZ

This quiz contributes to the final assessment for receiving the Learn2Analyse MOOC **Certificate of Achievement**. Your grade in the course is calculated based on your replies to **100 multiple choice quizzes** distributed to the 6 core modules. In order to successfully complete this course and gain your Certificate of Achievement you must gain a mark of **60% or greater** overall to all 100 quizzes.

The quiz of Module 2 consists of **25 questions**, including:

- multiple choice with one correct answer;
- multiple choice with more than one correct answer; and
- true/false questions.

It is "open book" and there is no set time limit.

You will have **two attempts** to answer all quiz questions except for the "true/false" questions. When you click "Check", it will register as your first attempt. If your answer is incorrect, try again and then click "Final Check".

It should take less than **60 minutes** of your time to complete this quiz.

TOPIC 2.1

Question 2.1: Data-driven decision-making in schools is: (there are 2 correct answers, please select both)

5. a process solely assigned to the school leader for making decisions related to the governance of the school.
6. a process solely related to classroom teaching, where teachers self-reflect on their teaching practice.

7. a process to help support continuous school self-evaluation and improvement.

8. a process that crosses all levels of the educational system

Question 2.2: Data literacy refers to the capacity of teachers to exclusively use students' grades in tests in order to support their decision making and support learners in their learning.

1. True

2. False

Question 2.3: School self-evaluation and improvement:

5. Is a continuous process intended to improve the teaching, learning and assessment processes.

6. Is performed with a clear focus to attract more students to the school in the future.
7. Is performed only to assess students.
8. Is an one-off task related to end of year school inspections.

Question 2.4: Data literacy is

1. Not relevant to the teaching profession.
2. A specific skill of teachers related to analysing educational data for preparing annual school evaluation reports.
3. A set of competences used by teachers to identify, collect, combine, analyse, interpret and act upon educational data from different sources to improve the teaching, learning and assessment processes.
4. A set of competences for teachers required for collecting and acting on students' assessment data to identify students at risk and support their learning.

Question 2.5: Data literacy of teachers includes competences related to:

1. Finding and collecting relevant educational data
2. Understand how to use educational data beyond grades
3. Communicate insights from data analysis to diverse internal and external stakeholders
4. All the above

Question 2.6: Personalised learning is highlighted as a key global challenge in 21st Century education.

1. True
2. False

Question 2.7: According to IBM the 4vs related to Big Data refer to:

1. Volume - Velocity - Variety - Veracity
2. Volume - Velocity - Variety - Vanity
3. Volume - Vast - Variety - Veracity
4. Vast - Velocity - Variety - Veracity

Question 2.8: Educators can use data to plan their instruction as well as reflect on and enhance their teaching practice and assessment processes

1. True
2. False

Question 2.9: Educational data can enable learners to take control of their own learning

1. True

2. False

Question 2.10: Select 1-4 answers

The plethora of educational data,

1. helps instructional designers, online tutors and teachers to assess academic progress

2. predict future performance

3. spot potential issues

4. reduce dropout

Question 2.11: Educational data is collected strictly from activities that are directly assessed as part of the learner's educational progress

1. True

2. False

Question 2.12: Using the data we can evaluate curricula, programs and institutions, but not the learners' performance.

1. True

2. False

Question 2.13: According to Learn2Analyze ECD-CP Framework, eight kinds of competences comprise data literacy.

1. True

2. False

TOPIC 2.2

Question 2.14: Qualitative data can be reduced to a set of numbers

1. True

2. False

Question 2.15: Match the data from the left column to the appropriate type from the right column (static or dynamic)

2. Personnel qualifications	B. STATIC DATA
3. Summative assessment scores	
4. Financial Processes	

5. Level of participation in learning activities	C. DYNAMIC DATA
6. Demographics	
7. Past Academic Data	
8. Disciplinary incidents	
9. Formative assessment scores	

1-A, 2-B, 3-A, 4-B, 5-A, 6-A, 7-B, 8-B

Question 2.16: Simple random sampling is a commonly used type of non-probability sampling methods

1. True

2. False

Question 2.17: Match the types of biases from the left column to the appropriate definition from the right column

1. Confirmation bias	A. When collecting data similar to the last option
2. Anchoring bias	B. When collecting the data that are easier to obtain
3. Recency bias	C. When we stick to the first data we collect
4. Availability bias	D. Collecting data that supports our theory

1-D, 2-C, 3-A, 4-B

Question 2.18: As per European Commission's report regarding Ethics for researchers "Informed consent consists of: ...

1. adequate information

2. voluntariness

3. competence

4. all the above

Question 2.19: According to the National Data Protection Authority, the age threshold for obtaining parental consent is established by each EU Member State and can be between 10 and 13 years

1. True

2. False

Question 2.20: Which of the following ways of protecting student data is best for students?

1. Stop using digital technology in the classroom with students
2. Ensure that all digital tools have undergone a privacy assessment
3. Implement a comprehensive digital privacy and security program in school

4. Both B and C

TOPIC 2.3

Question 2.21: Match the error types from the left column to the appropriate definition from the right column.

1. Outliers	A. occur when no value is stored for the variable in the current observation
2. Inconsistent data	B. observations that have values which deviate from the expected
3. Double instances	C. appear when a data set or group of data is dramatically different from a similar data set (conflicting data set) for no apparent reason
4. Missing data	D. where the same piece of data has been entered more than once

1-B, 2-C, 3-D, 4-A

Question 2.22: The National Information Standards Organization distinguishes the three types of metadata:

1. Descriptive - Administrative - Structural

2. Descriptive - Personal - Sensitive
3. Administrative - Qualitative - Quantitative
4. Input - Process - Outcome

Question 2.23: According to The Digital Curation Centre (DCC) the stages required for successful curation and preservation of data from initial conceptualisation or receipt through the iterative curation cycle can be distinguished to full life actions and to sequential actions. Identify the four full life cycle actions:

- Conceptualise
- Description and Representation
- Dispose
- Preservation Planning
- Appraise and Select
- Community Watch and Participation
- Curate and Preserve
- Transform

Question 2.24: Once data is truly anonymised, the anonymisation is reversible

1. True

2. False

Question 2.25: Match the data protection types from the left column to the appropriate example from the right column

1. Data protection by design	A. is the use of pseudonymisation & encryption
2. Data protection by default	B. include that only the data necessary should be processed

1-A, 2-B

Learn2Analyze

Knowledge Alliances (Key Action 2)

AGREEMENT NUMBER: 2017 - 2733 / 001 – 001

PROJECT NUMBER: 588067-EPP-1-2017-1-EL-EPPKA2-KA

WP3. Learn2Analyse MOOC Design and Development

Result 6a Learn2Analyze MOOC version 1 Learning Materials

Module 3: Learning Analytics

Module 3

Learning Analytics

Estimated Effort to complete: 8 hours

Assessment Multiple Choice Questions: 15

3.0 Introduction		
3.0.1 Welcome	LO #3.0.1.1 HTML page: Welcome to Module 3 + Scope	
3.0.2 Learning Objectives	LO #3.0.2.1 HTML page: Module 3 Learning Objectives	
3.0.3 Poll: You and Learning Analytics	LO #3.0.3.1 ACTIVITY: Poll: You and Learning Analytics	
3.0.4 Introduction to learning analytics	LO #3.0.4.1 VIDEO: Learning analytics LO #3.0.4.2 HTML page: The objectives of learning analytics	
3.1 Using learner-generated data and learning context for extracting learning analytics		
3.1.1 Measurements as indicators of learners' current learning states	LO #3.1.1.1 ACTIVITY: Poll: What is the cycle of learning analytics? LO #3.1.1.2 HTML page: Learning analytics: where to start from? LO #3.1.1.3 VIDEO: Understand what learner and learning data you are collecting: data come before the metrics LO #3.1.1.4 HTML page: Why you are collecting data? Using learner and context data for common measurements as learning analytics metrics LO #3.1.1.5 HTML page: Making the right measurements for learning analytics LO #3.1.1.6 HTML page: Learning analytics types LO #3.1.1.7 ACTIVITY: Poll & Discussion LO #3.1.1.8 HTML page: References and Further Readings	
3.1.2 Limitations and data quality issues of learners' data measurements in open and blended courses	LO #3.1.2.1 ACTIVITY: Poll: The importance of data quality LO #3.1.2.2 VIDEO: Data Quality Matters LO #3.1.2.3 HTML page: What are the limitations in learning analytics metrics, and why quality issues are important? LO #3.1.2.4 HTML page: Quality indicators for learning analytics LO #3.1.2.5 ACTIVITY: Poll & Discussion LO #3.1.2.6 HTML page: References and Further Readings	
3.1.3 Ethical treatment of learner-generated data and measurements	LO #3.1.3.1 ACTIVITY: Poll: What are the policies and ethical considerations in learning analytics? LO #3.1.3.2 VIDEO: Learning Analytics: The need for a code of ethics LO #3.1.3.3 HTML page: Ethics and privacy considerations in Learning analytics: On learners' data protection and	

	<p>security</p> <p>LO #3.1.3.4 HTML page: Policies for handling learners' data analytics: the DELICATE instrument</p> <p>LO #3.1.3.5 HTML page: Policies for handling learners' data analytics: the SHEILA approach</p> <p>LO #3.1.3.6 HTML page: Policies for handling learners' data analytics: the ICDE framework</p> <p>LO #3.1.3.7 ACTIVITY: Poll & Discussion</p> <p>LO #3.1.3.8 HTML page: References and Further Readings</p>	
3.2 Analyzing data and presenting learning analytics		
3.2.1 Methods for analyzing the learner-generated data and the measurements over them	<p>LO #3.2.1.1 ACTIVITY: Poll: You and the Data Science</p> <p>LO #3.2.1.2 HTML page: It's time for data analysis... with a little help from the Data Science</p> <p>LO #3.2.1.3 HTML page: Common methods and approaches for data analysis in learning analytics</p> <p>LO #3.2.1.4 VIDEO: Statistics – An introduction</p> <p>LO #3.2.1.5 HTML page: Typical statistical methods used to analyze learners' data: an overview</p> <p>LO #3.2.1.6 HTML page: One size does not fit all! Other methods and techniques for analyzing learners' data</p> <p>LO #3.2.1.7 ACTIVITY: Poll & Discussion</p> <p>LO #3.2.1.8 HTML page: References and Further Readings</p>	
3.2.2 Presentation methods for reporting on learner data analytics	<p>LO #3.2.2.1 ACTIVITY: Poll: Reporting methods and data presentation</p> <p>LO #3.2.2.2 HTML page: What all those data tell us? Reporting about learners and their data: keep it clear!</p> <p>LO #3.2.2.3 HTML page: Ways to represent data</p> <p>LO #3.2.2.4 VIDEO: What is Data Visualization? Graphical display of learning analytics</p> <p>LO #3.2.2.5 HTML page: Visualization dashboard in learning analytics - Examples</p> <p>LO #3.2.2.6 VIDEO: The Signals and KlassData examples</p> <p>LO #3.2.2.7 ACTIVITY: Poll & Discussion</p> <p>LO #3.2.2.8 HTML page: References and Further Readings</p>	
3.3 Interpreting learning analytics and inferring learning changes		
3.3.1 Making sense of learners' data analytics and analysis results	<p>LO #3.3.1.1 ACTIVITY: Poll: Learning analytics in practice: Understanding the meaning in data</p> <p>LO #3.3.1.2 HTML page: Making sense of the learners' data and measurements: some examples</p> <p>LO #3.3.1.3 HTML page: Discovery of patterns and interpretation in educationally meaningful ways</p> <p>LO #3.3.1.4 HTML page: Associating the results to the objective and analytics type</p> <p>LO #3.3.1.5 ACTIVITY: Poll & Discussion</p> <p>LO #3.3.1.6 HTML page: References and Further Readings</p>	
3.3.2 Explaining the data analysis results in an educationally meaningful manner for understanding learners	<p>LO #3.3.2.1 ACTIVITY: Poll: Taking you from information to insight</p> <p>LO #3.3.2.2 VIDEO: Elaborating on the results from learners' data analysis: towards taking actions</p> <p>LO #3.3.2.3 VIDEO: Making data useful</p>	

and the environment they learn in	LO #3.3.2.4 ACTIVITY: Poll & Discussion LO #3.3.2.5 HTML page: References and Further Readings	,
Multiple choice quiz		

3.0 Introduction

3.0.1 Welcome and Scope

([Learning Object #3.0.1.1 HTML page](#))

Welcome to Module 3 & Scope of the Module

Welcome to Module 3 of the Learn2Analyze MOOC.

This module

- introduces the basics of **methods** and **tools** for **analyzing** and **interpreting** online learners' data to facilitate their personalized support,
- focuses on **organizing, analyzing, presenting** and **interpreting learner-generated data** within their learning context, and
- elaborates on **ethical concerns** and **policies** for protecting learner-generated data from mistreatment and misuse.

At the heart of this module is the so-called **Learning Analytics**. Learning analytics has been a hot topic for a while in educational communities, organizations and institutions.

There are four essential elements involved in all learning analytics processes: **data, analysis, report** and **action**.



1. Data, as the **primary analytics asset**, are the **raw material** that **gets transformed** into analytical insights; in the educational domain, they include information that is (usually) gathered as the learning processes are taking place, and is **about the learners, the learning environment, the learning interactions, and the learning outcomes**. You have gained a complete view of educational data in Module 2.

2. Analysis is the process of **transforming the collected data to obtain actionable information** from them, using, for this purpose, a set of **mathematical and statistical algorithms** and techniques; during data analysis, the data are **cleansed, transformed** and **modelled** with the goal of **discovering meaningful information** and supporting decision-making and action.
3. Report is used to **summarize what the analysis of the collected data can tell about learning** and to **present this information** in a meaningful manner; it is a set of processes for **organizing and presenting the results** of the analysis of learners' and learning data into charts and tables. Reporting learners' and learning data will provide **insights** about the learners' states during learning; interpreting those insights can guide data-driven decision making to action taken.
4. Action is the ultimate goal of any learning analytics process; it is the **set of the informed decisions and the practical interventions** that the **educational stakeholders will undertake**. The results of **follow-up actions** will determine the success or failure of the analytical efforts. Learning analytics is useful **only if there is "action"** as a result of its implementation.

The increased need to **inform decisions and take actions based on data**, points out the significance of understanding and **adopting learning analytics in everyday educational practice**. And in order to treat educational data in a respectful and protected manner, the **policies for learning analytics** play a major role and need to be explicitly clarified.

[end of page]

3.0.2 Learning Objectives

([Learning Object #3.0.2.1 HTML page](#))

Module 3 Learning Objectives

By completing this module, you will:

Module 3 Learning Objectives	Learn2Analyse Educational Data Literacy Competence Profile
Know what the common measurements of learner data and their contexts are, and understand the processes needed to collect both learner and context data in online and/or blended learning settings	1.1
Be able to identify and describe the limitations and quality measures on collecting learners' data in online and/or blended learning settings	1.2
Know methods for learners' data analysis and modelling as part of learning analytics methods	3.1
Know and understand learner-generated data presentation methods	3.2
Know and understand learners' data properties in learning analytics	4.1
Be able to identify and discriminate statistics commonly used for the interpretation of educational data in learning analytics	4.2
Be able to elaborate on the insights from learners' data analysis	4.3
Know and understand the methods that can be used to protect individuals' data privacy, confidentiality, integrity and security in learning analytics	6.2

[end of page]

3.0.3 Poll: You and Learning Analytics

(Learning Object #3.0.3.1 - Activity)

Poll: You and Learning Analytics



Source: <http://www.project-vital.eu/en/sidebar-right/learning-analytics/>

Poll: You and Learning Analytics

To start with, let's learn a bit more about your experience with learning analytics so far. Please answer the poll questions below.

1. Have you ever been involved in **learning analytics** processes before?
 - ☐ Yes
 - ☐ No
2. Have you taken any **courses in learning analytics**, as part of your professional development as instructional designer, e-tutor or school teacher?
 - ☐ Yes
 - ☐ No
3. Do you consider that learning analytics can enable you to **develop new ways of intervening** during instructional design or online teaching?
 - ☐ Yes
 - ☐ No

Thank you for answering these questions. You may wish to check the results again after more people have completed the poll to review the responses of other learners of this course.

[end of page]

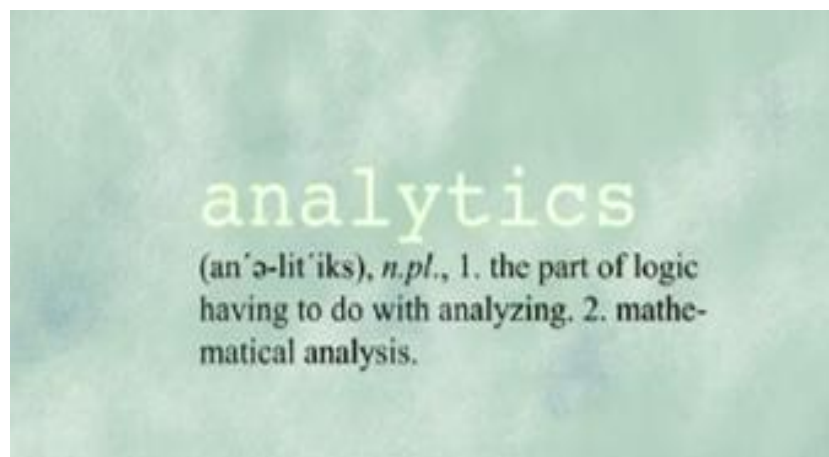
3.0.4 Introduction to learning analytics

(Learning Object #3.0.4.1 VIDEO)

Learning Analytics

Learning analytics is defined by SOLAR as “*the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs*” (SOLAR, 2011). In other words, it is an **ecosystem of methods and techniques** (in general procedures) that successively **gather, process, report and act** on machine-readable data **on an ongoing basis** in order to **improve the learning environments and experience**.

Now, let’s watch a video that explains what learning analytics is about.



External Video: [Learning Analytics](#) [4:02]

Summarizing the above, like any other context-aware process, learning analytics procedures **track** and **record data** about learners and their contexts, **organize** and **monitor** them, and **interpret** and **map** the real current state of those data, **to use them** for providing “**actionable intelligence**”, i.e., insights to act upon.

[end of page]

(Learning Object #3.0.4.2 HTML page)

The objectives of learning analytics

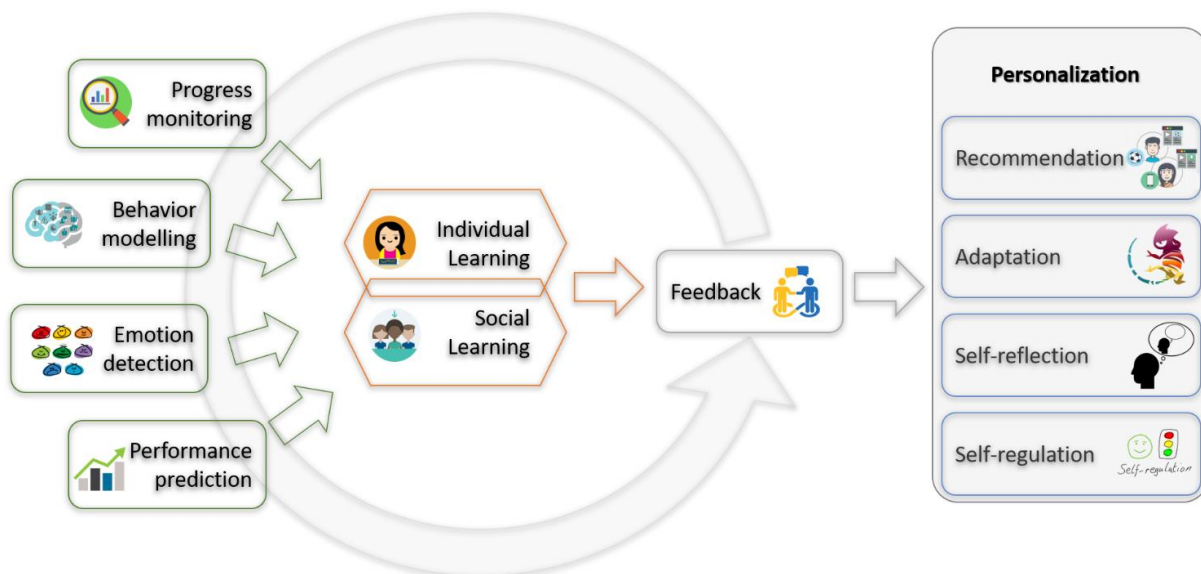
Now that a common understanding of learning analytics is shared, let's go a step further and discuss **what learning analytics can do** and **what they can be used for**.

Why one needs to use learning analytics, or in other words, what are the **objectives** of learning analytics?

Let's start with some simple examples from everyday experience.

- In *traditional classroom settings*, it's often hard to identify each student's individual strengths and weaknesses, learning disabilities and prior subject knowledge, and subsequently **tailor and personalize instruction** accordingly. It's also hard to **recommend** personalized learning resources to the individuals.
- In *online learning settings*, it's common that the students **drop-out** early. It's also hard to detect students' **emotions** or enhance students' **social learning skills**.
- In *blended learning settings*, the students might not know how to **self-regulate their learning**, and they often **procrastinate**. It's also hard to **monitor each student's progress** and provide **feedback** accordingly.

With learning analytics **these deficiencies are identified immediately**.



More specifically, learning analytics aim to (Chatti et al., 2012; Papamitsiou & Economides, 2014):

- **Monitor** learners' progress
- **Model** learners/learners' behavior
- **Detect** affects/emotions of learners
- **Predict** learning performance/dropout/retention
- **Generate** feedback
- **Provide** recommendations
- **Guide** adaptation
- **Increase** self-reflection/ self-awareness
- **Facilitate** self-regulation

In other words, **learning analytics are important** because **every “trace”** within an electronic learning environment may be valuable information that can be **tracked, analyzed and combined with external learner data**; every simple or more complex action within such environments can be **isolated, identified** and **classified** through computational methods **into meaningful patterns**; every type of interaction can be **coded into behavioral schemes** and **decoded into interpretable guidance** for decision making.

Are you ready to learn more about how to use learning analytics?

[end of page]

3.1 Using learner-generated data and learning context for extracting learning analytics

3.1.1 Measurements as indicators of learners' current learning states

(Learning Object #3.1.1.1 - Activity)

Poll: What is the cycle of learning analytics?

Poll: What is the cycle of learning analytics?



Source: <https://www.blackboard.com/education-analytics/index.HTML>

Based on the previous introduction to learning analytics, let's try to open the learning analytics cycle. Please, answer the poll questions below.

1. Have you ever heard/read about the **learning analytics cycle** before?
 - ☐ Yes
 - ☐ No
2. Have you ever thought of the **learners as the initiators of the learning analytics cycle**?
 - ☐ Yes
 - ☐ No
3. Do you know what is the **difference between learner data and learner metrics**?
 - ☐ Yes
 - ☐ No

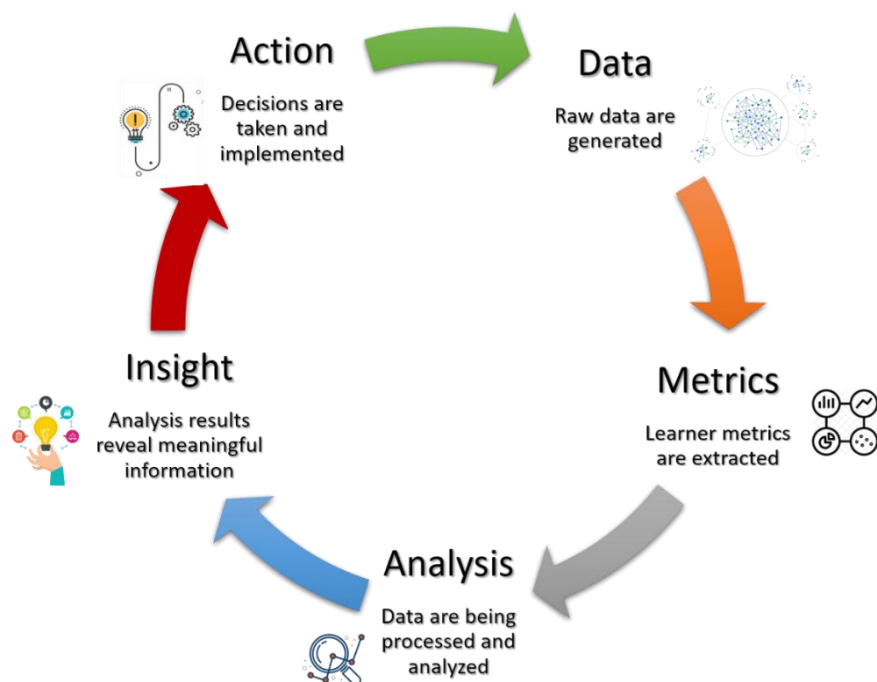
Now, let's find out what the learning analytics cycle is and where one can start from.

[end of page]

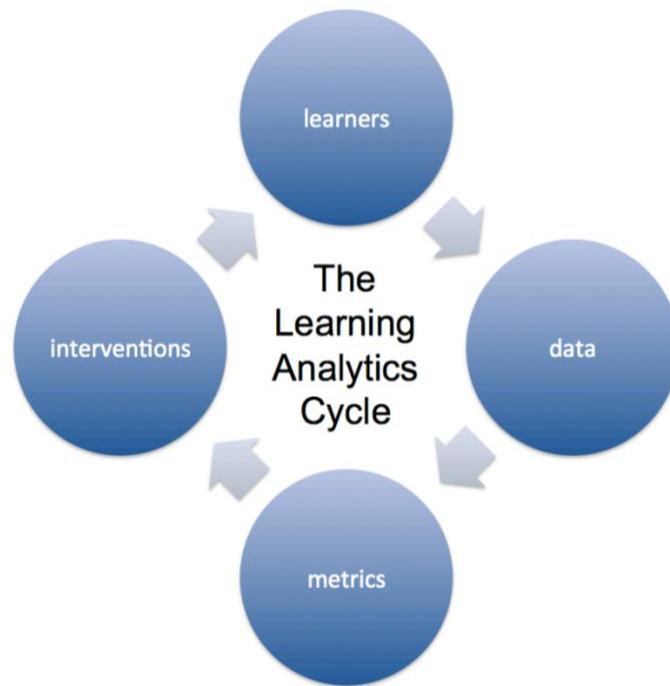
(Learning Object #3.1.1.2 HTML page)

Learning analytics: where to start from?

As discussed in the previous topic, learning analytics seeks to produce “**actionable intelligence**”; the key is the action that is taken. Campbell and Oblinger (2007) have pointed out **five steps** in learning analytics: **Capture, Report, Predict, Act, Refine**. From (a) capturing and gathering the raw data, to (b) introducing metrics for sharing a common understanding of the data in educationally meaningful ways, to (c) analyzing the metrics for predicting the future states of the learners and gaining insights into the learning processes, and to (d) acting upon the data-based evidence for delivering personalized learning to each individual, the **cyclical process of learning analytics is fed with the continuously generated learner data**.



Learning analytics are about learners and their learning. As such, Clow (2012) proposed a cycle for learning analytics that starts with **learners**. The next step is the generation and capture of **data** about or by the learners. The third step is the **processing of this data into metrics** or analytics, which provide some insight into the learning process. The cycle is not complete until these metrics are used to drive one or more **interventions** (actions) that have some effect on learners.



Source: <http://oro.open.ac.uk/34330/1/LAK12-DougClow-personalcopy.pdf>

This learning analytics cycle can provide **a data-perspective to strong learning theories**. For instance, the cycle can be viewed as a data-driven aspect of Kolb's Experiential Learning Cycle (1984): taking the system as a whole, there is a direct correspondence: actions by or about learners (*concrete experience*) generate data (*observation*) from which metrics are derived (*abstract conceptualization*), which are used to guide an intervention (*active experimentation*).

The role of the learner is fundamental in this process. And, since learning analytics are extracted from the learners' and learning data, two steps need to be clarified: a) **what is the learner's data that will be used in learning analytics**, and b) **what types of learning analytics can be formed from the learner's data**. Next, we will explain what the learning analytics data (metrics) are about.

[end of page]

(Learning Object #3.1.1.3 VIDEO)

Understand what learner and learning data you are collecting: data come before the metrics

Learning analytics is a cyclical process. Learners generate data that can be processed into metrics and analyzed for patterns such as success, weakness, overall personal or comparable performance, and learning habits. Educators can administer “interventions” based on the data analyzed, and the process then repeats itself.

Before you begin analyzing data, you should **understand what data you are collecting**, and **why you need to collect them**: data collection should have **specific objectives and outcomes**. The collected data on their own cannot give meaningful insights, unless they are associated with specific measurements, **depending on what you want to measure**: learning outcomes, goal attainment, performance, behavioral changes, engagement, motivation, cognition, abilities, emotions, etc. **Metrics are what you measure, the measurements**.

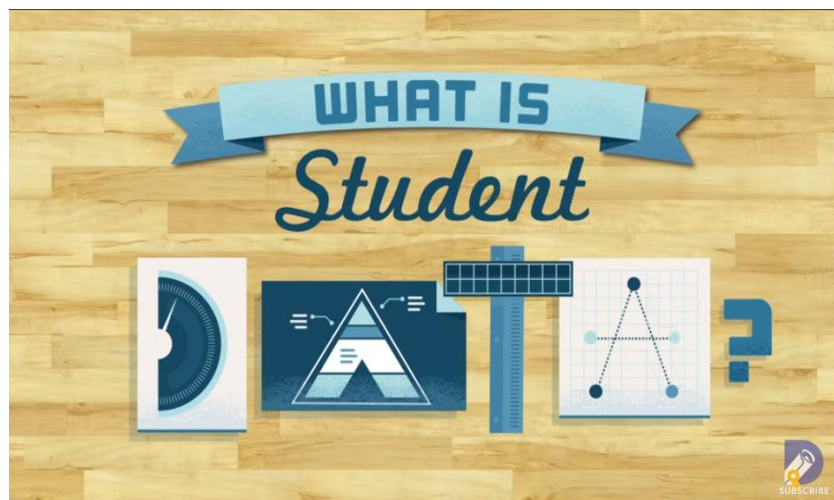


Source: <https://www.talentlms.com/ebook/effective-courses/what-metrics-to-track>

You should **understand what data you are collecting**. There are many types of data that support student learning – and they are so much more than test scores. The type of information the educational data often include, and the sources the data can be collected from, usually are linked with a straightforward relation. For instance, **student characteristic data and/or contextual information** are usually collected from enrolment records, student profiles, or attendance rolls; **student perception data** can be found in surveys and interviews; **student activity data** are available in logs from the LMS and interaction records; **student achievement data** lay within various kinds of assessment

data such as rubrics, scores or observation notes; **student wellbeing data** capture students' social and emotional development, or school climate, and can be found in sources such as biosignals or social networks. **You have learned about educational data and the respective data sources in Module 2.**

But **individual data points don't give the full picture** needed to support the incredibly important education goals of parents, students, educators, and policymakers. The next video explains in simple terms what student data is about and when they can be used effectively.



External Video: [What Is Student Data?](#) [2:59]

As you have already seen in this video and in Module 2, there are learner and context data that can be captured **within the learning environment** (e.g., log-files, quiz scores, login data, content access, file downloads, discussion participation, etc.), and there are also other types of data that are **external to the learning environment** (e.g., survey-demographic data, biosensor data, online discussion forums, social network data, etc.). You have also seen the value and the need to **aggregate/integrate different data sources to increase validity and relevance, and to reduce biases (improve reliability).**

Once you understand what data you need to collect, you will be able to **locate and select the most appropriate data sources to extract them from.** Those data will **feed the learning analytics cycle.**

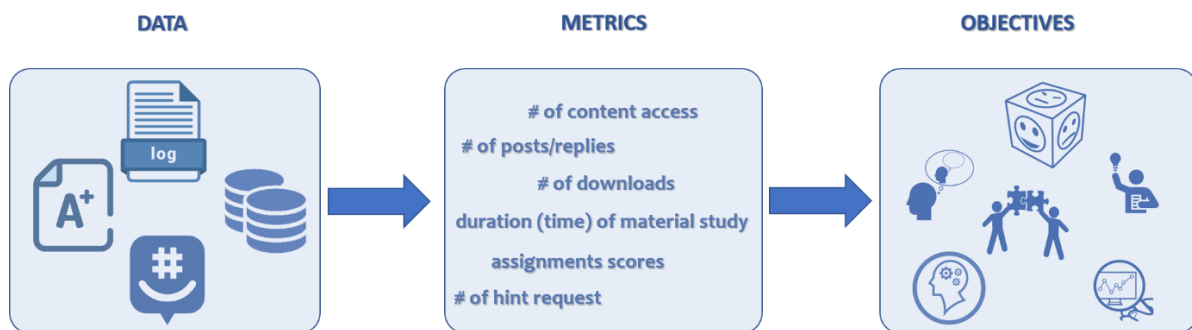
However, **is that enough?**

[end of page]

Why are you collecting data? Using learner and context data for common measurements as learning analytics metrics

You have already been introduced to what student data are about and how they can be combined together to show the whole picture of student learning, which is deeply related to the context itself. Learning analytics is a context-aware process. **Both learner and context data are necessary** in this process. Different types of **data can come together** – under different objectives – **to form a full picture of student learning**. When used effectively, data empowers everyone.

The first step is to **understand why you are collecting data** and **associate the data with metrics** according to the learning concept you **aim to measure and shed light on**. Each of **these measurements** referred to as **learning analytics metrics**, can be associated with **one or more learning analytics objectives**, presented in #3.0.4.2.



To understand that, let's take the following simple and generic example.

How many views make an educational YouTube video a success? How about 300K? That's how many views a video you posted got. It featured some well-known and successful professionals, who prompted young people to enroll in a Data Science course. It was twice as popular as any video you had posted to date. Success! Then came the data report: only eight viewers had signed up to take the course, and zero actually completed it.

Zero completions. From 300K views. Suddenly, it was clear that views did not equal success. In terms of completion rates, the video was a complete failure. **What happened?**

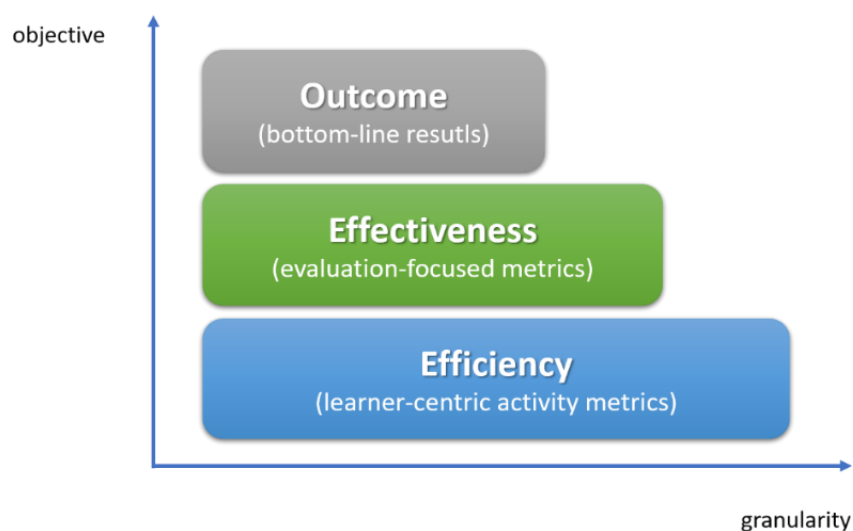
[end of page]

Making the right measurements for learning analytics

Well, not all important things in life can be measured and not everything that can be measured is important. **If you are measuring something, but not necessarily all the right things**, your end result could still not be right, or you are relying on the wrong data to make your case. How do you select ones without being overwhelmed; **which measurements are the “right” ones?** There is a difference between numbers and numbers that matter. This is **what separates data from metrics**. You can’t control the educational data you are collecting, but you can control what you measure.

When we talk about learning analytics metrics and measurements, we’re typically referring to gathering data on three areas: *efficiency*, *effectiveness*, and *outcome* (Robbins, 2017).

- **Efficiency** is generally thought of as *learning-centric* activity metrics—number of learners, time on task, frequencies of resources downloads, quiz scores, attempts, hint usage, etc.
- **Effectiveness** metrics are *evaluation-focused* and include aspects like learner engagement, quality of deliverables, knowledge acquisition, collaboration, progress, performance, etc.
- **Outcome** looks at *bottom-line results*. To the extent that efficiency and effectiveness metrics matter, they provide validation and explanation for the outcome.

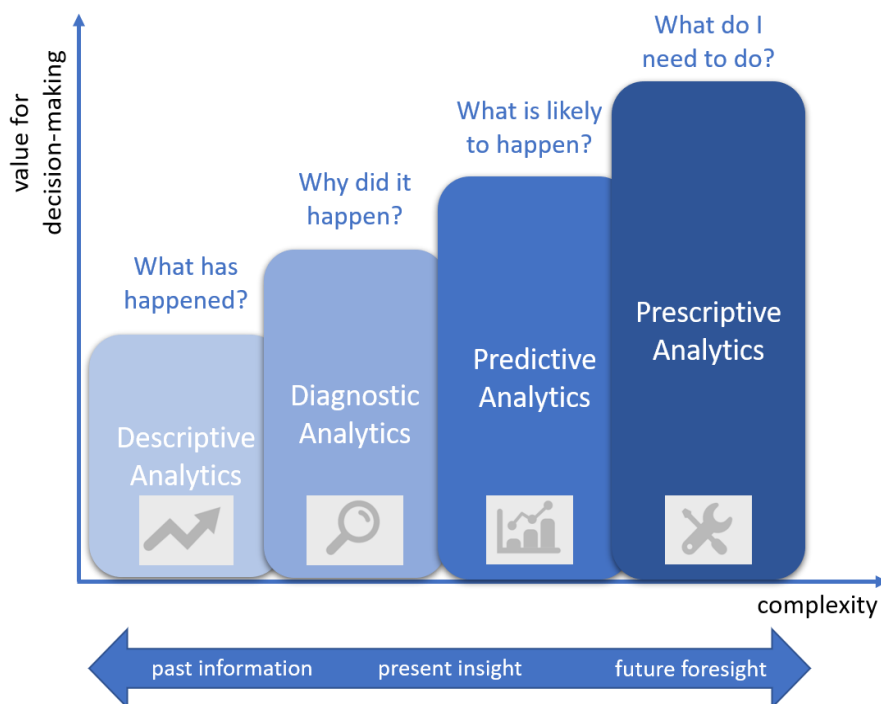


Learning efficiency refers to more granular metrics, closer to raw data; their objective is to describe learners' actions at the task or activity level (**micro-level**), and they cannot sufficiently reveal a lot about learning (as a more general objective) on their own. Combining these metrics can contribute to understanding more complex learning constructs, such as engagement and collaboration. The metrics used to refer to this **meso-level** (activity or course) of more abstract and complex concepts are synopsized under the *learning effectiveness* metrics, and their objective is to quantify less fine-grained constructs. Finally, *learning outcome* can be described with metrics from previous categories that are combined to give insight and explain the results of the learning processes (**macro-level**).

[end of page]

Learning analytics types

Depending on your goals (i.e., the learning analytics objective), your learning analytics metrics will be **obtained from the same or different learner and context data**. The types/levels of the metrics will be decided according to their sophistication, the complexity of the analysis method employed, and the value they add for human decision-making (Lang, Siemens, Wise & Gasevic, 2017; Soltanpoor & Sellis, 2016; Scapin, 2015):



- **Descriptive analytics:** use data aggregation and data mining to provide insight into the past and answer: “What has happened?” (e.g., reports and descriptions).
- **Diagnostic analytics:** dissect the data with methods like data discovery, data mining and correlations to answer the question “Why did it happen?” (e.g., interactive visualizations).
- **Predictive analytics:** utilize a variety of data to make the prediction and apply sophisticated analysis techniques (such as machine learning) to answer the question “What is likely to happen?” (e.g., trends and predictions).
- **Prescriptive analytics:** utilize an understanding of what has happened, why it has happened and a variety of “what-might-happen” analysis to help the user determine

the best action to take and answer the question “What do I need to do?” (e.g., alerts, notifications, recommendations).

Of course, there are some limitations. The next section elaborates on the **different types of limitations**.

[end of page]

(Learning Object #3.1.1.7 - Activity)

Poll/Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

1. Can you describe the **phases of the learning analytics cycle**?
 - ☐ Yes
 - ☐ No
2. Have you understood the **differences between efficiency, effectiveness and outcome**?
 - ☐ Yes
 - ☐ No
3. Do you believe that you can correctly **discriminate descriptive, diagnostic, predictive and prescriptive analytics**?
 - ☐ Yes
 - ☐ No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about data collection, in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

1. Can you associate the educational data with the learning analytics objectives? Please provide specific examples of how educational data can be used to address specific learning analytics objectives.
2. Can you explain how the same or different educational data can be used as different types of learning analytics? Please provide specific examples of data used as learning analytics metrics for descriptive, diagnostic, predictive and prescriptive analytics.

[end of page]

References

REFERENCES

- Bienkowski, M., Feng, M., & Means, B. (2012). Enhancing teaching and learning through educational data mining and learning analytics: An issue brief. US Department of Education, Office of Educational Technology, 1, 1–57.
- Campbell, J.P. & Oblinger, D.G. (2007). Academic Analytics. EDUCAUSE Quarterly. October (2007).
- Chatti, M. A., Dyckhoff, A. L., Schroeder, U., and Thüs, H. (2012). A reference model for learning analytics. International Journal of Technology Enhanced Learning (IJTEL), 4(5/6), pp. 318-331
- Clow, D. (2012). The learning analytics cycle: closing the loop effectively. In Proceedings of the 2nd International Conference on Learning Analytics and Knowledge (LAK '12), Simon Buckingham Shum, Dragan Gasevic, and Rebecca Ferguson (Eds.). ACM, New York, NY, USA, 134-138. DOI=<http://dx.doi.org/10.1145/2330601.2330636>
- Khalil, M., & Ebner, M. (2016). What is Learning Analytics about? A Survey of Different Methods Used in 2013-2015. CoRR, abs/1606.02878.
- Kolb, D.A. (1984). Experiential Learning: Experience as the source of learning and development. Prentice Hall.
- Lang, Ch., Siemens, G., Wise, A., & Gasevic, D. (Eds.) (2017). Handbook of Learning Analytics – First edition. SOLAR.
- Papamitsiou, Z., & Economides, A. A. (2014). Learning Analytics and Educational Data Mining in Practice: A Systematic Literature Review of Empirical Evidence. Educational Technology & Society, 17(4), 49–64.
- Robbins, S. (2017). [Learning Analytics and the Value of Understanding L&D Metrics](#)
- Scapin, R. (2015). Learning Analytics in Education: Using Student’s Big Data to Improve Teaching. <https://www.slideshare.net/rscapin/learning-analytics-47463622>

SOLAR (2011). "Call for Papers of the 1st International Conference on Learning Analytics & Knowledge (LAK 2011)". Retrieved from: <https://tekri.athabascau.ca/analytics/>

Soltanpoor R., Sellis T. (2016). Prescriptive Analytics for Big Data. In: Cheema M., Zhang W., Chang L. (eds) Databases Theory and Applications. ADC 2016. Lecture Notes in Computer Science, vol 9877. Springer, Cham

FURTHER READINGS

"Blackboard Analytics for Learn | Blackboard" <https://www.blackboard.com/education-analytics/analytics-for-learn.html>

"What are Learning Analytics?" <https://sites.google.com/a/umail.iu.edu/iuncc/whatis>

"Learning Analytics Specification – MoodleDocs". (2017). https://docs.moodle.org/dev/Learning_Analytics_Specification

Bekker, A. (2017). "4 types of data analytics to improve decision-making". <https://www.scnsoft.com/blog/4-types-of-data-analytics>

Maydon, T. (2017). "The 4 Types Of Data Analytics". <https://insights.principa.co.za/4-types-of-data-analytics-descriptive-diagnostic-predictive-prescriptive>

Sampson, D. (2016). "Learning Analytics: Analyze Your Lesson To Discover More About Your Students - eLearning Industry". <https://elearningindustry.com/learning-analytics-analyze-lesson>

Ruggiero, D., (2016). "What metrics don't tell us about the way students learn". <https://theconversation.com/what-metrics-dont-tell-us-about-the-way-students-learn-59271>

VIDEOS

[Learning Analytics](#)

[What Is Student Data?](#)

[end of page]

3.1.2 Limitations and data quality issues of learners' data measurements in open and blended courses

(Learning Object #3.1.2.1 - Activity)

Poll: The importance of data quality



Source: <https://www.royalmail.com/corporate/marketing-data/data-services/data-quality>

Poll: The importance of data quality

In module 2 you learned about limitations in data. Let's learn a bit more about your understanding of data quality issues and their importance. Please answer the poll questions below.

1. Can you **name** the most common **criteria for assessing data quality**?
 - Yes
 - No
2. Can you give **practical examples** for each of the data quality criteria?
 - Yes
 - No
3. Do you know why it is important to **satisfy the quality criteria for learning analytics metrics**?
 - Yes
 - No

Thank you for answering these questions. You may wish to check the results again after more people have completed the poll to review the responses of other learners of this course.

[end of page]

(Learning Object #3.1.2.2 - VIDEO)

Data Quality Matters

As already **explained in Module 2**, data often suffer from inaccuracies, biases or even manipulations; the educational data, apart from being **relevant** to be used for decision making (fit-for-purpose), should also be **reliable** and **valid**. According to [Wikipedia](#), **data is generally considered high quality** if it is “*fit for [its] intended uses in operations, decision making and planning and data is deemed of high quality if correctly represents the real-world construct to which it refers.*”

Like in all kinds of organizations, data quality is critical for educational institutes, as well. In online and blended learning settings, many factors are additive to the existing difficulty in **handling educational data quality**. For example, such factors often are heterogeneous educational data sources, high volumes of learner and learning data, and a myriad of unstructured data types extracted.

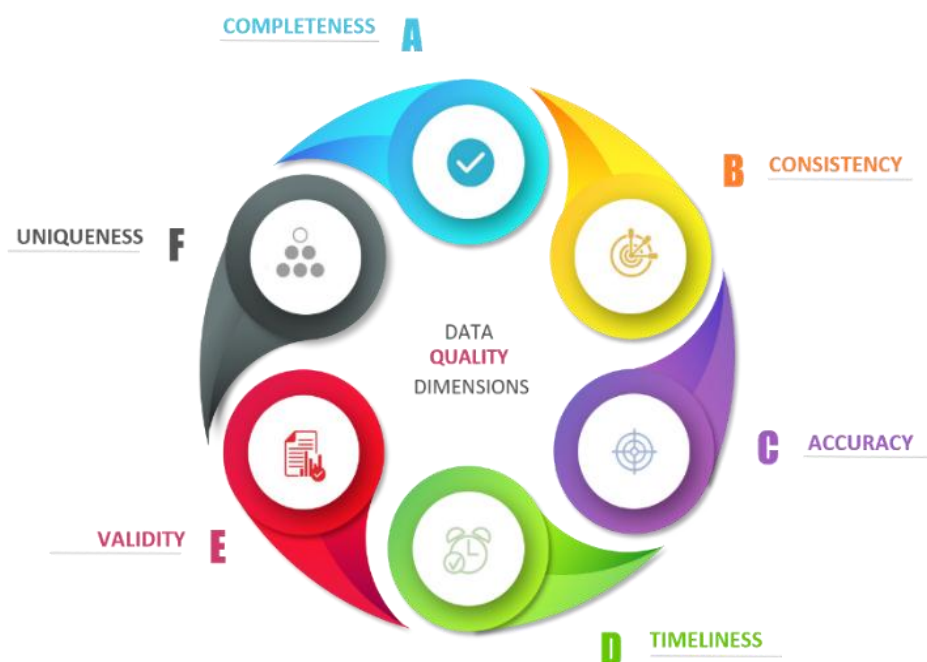
Watch the next video that explains the critical issues of data quality from a more general perspective, and next, we will focus on how these principles/limitations apply in learning analytics.



External Video: [Data Quality Matters - Tech Vision 2018 Trend](#) [7:31]

As discussed in this video, there are many aspects to data quality, including **completeness, consistency, accuracy, timeliness, validity, and uniqueness**, synopsized as follows (Mihăiloaie, 2015; Pipino et al., 2002):

- **Completeness:** there are no gaps in the data from what was *expected to be collected* and what was *actually collected*, i.e., there are no missing data - the collected dataset is complete.
- **Consistency:** the data types must align and be compatible with the expected versions of the data being collected, i.e., there are *no contradictions in the data types* and the data are *usable*.
- **Accuracy:** collected data are correct, relevant and *accurately represent what they should*.
- **Timeliness:** the data should be *received at the expected time* for the information to be utilized efficiently.
- **Validity:** a measurement is *well-founded* and likely corresponds accurately to the real world.
- **Uniqueness:** there should be *no data duplicates* reported.



Among the 6 dimensions, completeness and validity usually are easy to assess, followed by timeliness and uniqueness. Accuracy and consistency are the most difficult to assess.

But, **how do those data limitations relate to learning analytics and why does quality matters?**

[end of page]

(Learning Object #3.1.2.3 HTML page)

What are the limitations in learning analytics metrics, and why are quality issues important?



Source: <https://www.talend.com/products/data-quality-3/>

In the learning analytics cycle, learner and contextual data are collected and transformed into metrics (analytics), according to the learning objective that needs to be addressed; the different types of metrics shall next guide human decision-making and interventions. Yet, *the higher the need for data-driven decision-making is, the more the integrity and quality of data become critical* ([National Forum for the Enhancement of Teaching and Learning in Higher Education, 2017](#)). The following example demonstrates in simple terms the impact of data limitations and quality for learning analytics.

Let's examine the case of an educator who wants to understand learners' engagement with an activity. To measure engagement on the activity level, it is common practice to use learners' participation data (e.g., frequency of logins, session duration, posts on the activity forum, etc.). If the learners' ID is missing from the data that are available via the LMS (the data are **incomplete**), then the educator shall not be able to identify each learner's participation. Similarly, if each learner's data would be stored in different formats (e.g., dates: MM/DD/YY vs. DD/MM/YY) this would result in confusion about the validity of the data and their interpretation (the data are **not valid**). In the same example, this **inconsistency** in the data format would also result to **inaccurate** data– *when did the learner really log in to the activity?* – i.e., it would be unclear *what the correct values* of the stored data *are*. Furthermore, if the learners' data during the activity would not become timely available, the educator would not gain insight to what the learners are doing

during that activity (violation of **timeliness**), making it impossible to intervene in a timely manner. Similarly, if the same learners' data are stored multiple times (e.g., each time a learner logs in the activity, the login is duplicated) and all the information is considered for analysis, the results would be misleading (violation of **uniqueness**).

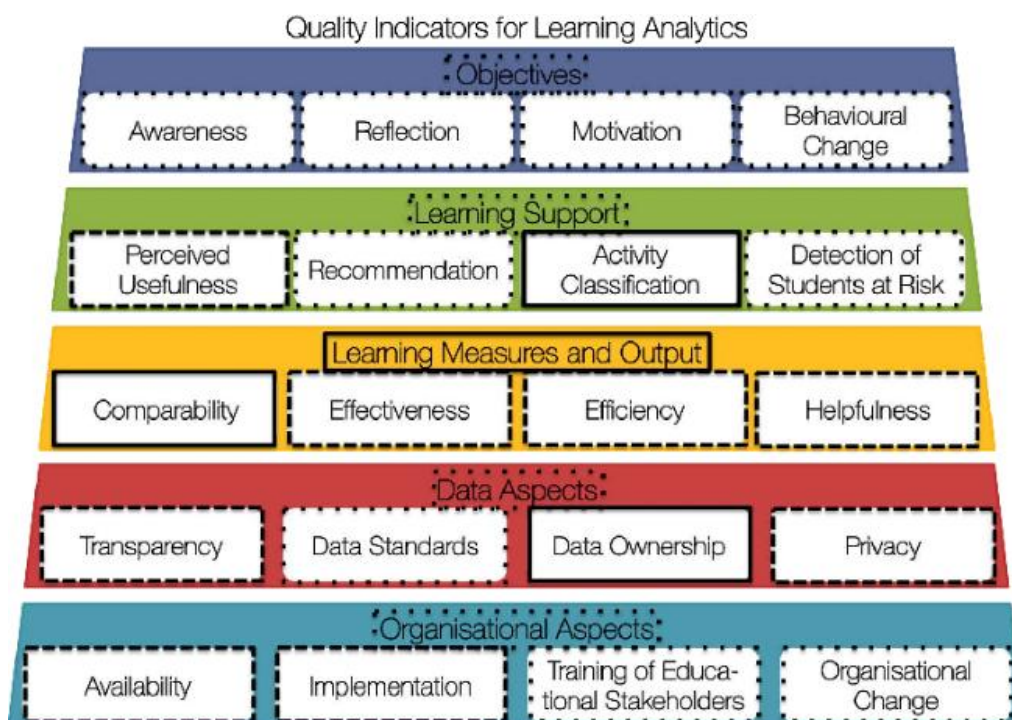
It is important to clarify that raw data quality strongly affects the analytics quality; learning analytics metrics are **transformations of** the raw learner and learning **data** collected, according to the objectives set. These metrics will next be **treated as “data”** themselves, and they will be subjected to further processing. Just like with any kind of data, **quality also matters for learning analytics metrics**: what the specific metrics **can reveal** is strongly dependent on their quality. In most cases, limited quality will have the direct result of **lack of trust** in the metrics, and consequently, **poor decisions** and **gradual abandonment** of the data-driven educational decision-support system. [Poor quality data is troublesome](#) (The data quality benchmark report, 2015). Educators **cannot and will not trust insights** that are acquired by processing corrupted, duplicate, inconsistent, missing, broken, or incomplete data. Learning analytics metrics quality is expected to **increase the value of the learner and learning data** and the opportunities to use them properly.

Next you will learn what the exact concerns of **quality issues** in **learning analytics metrics** are.

[\[end of page\]](#)

(Learning Object #3.1.2.4 HTML page)
Quality indicators for learning analytics

The LACE project developed a proposal for a framework of quality indicators for learning analytics that contributes towards a standardized and holistic approach for the evaluation of learning analytics tools (Scheffel, Drachsler & Specht, 2015). It potentially can act as a means for providing evidence on the impact of learning analytics on educational practices. The suggested framework is **generic** and considers **multiple learning analytics aspects**, ranging from their objectives to organizational issues. For the measures and data aspects, the framework highlights *comparability, effectiveness, efficiency, and helpfulness, as well as transparency, data standards, data ownership, and privacy, respectively*.



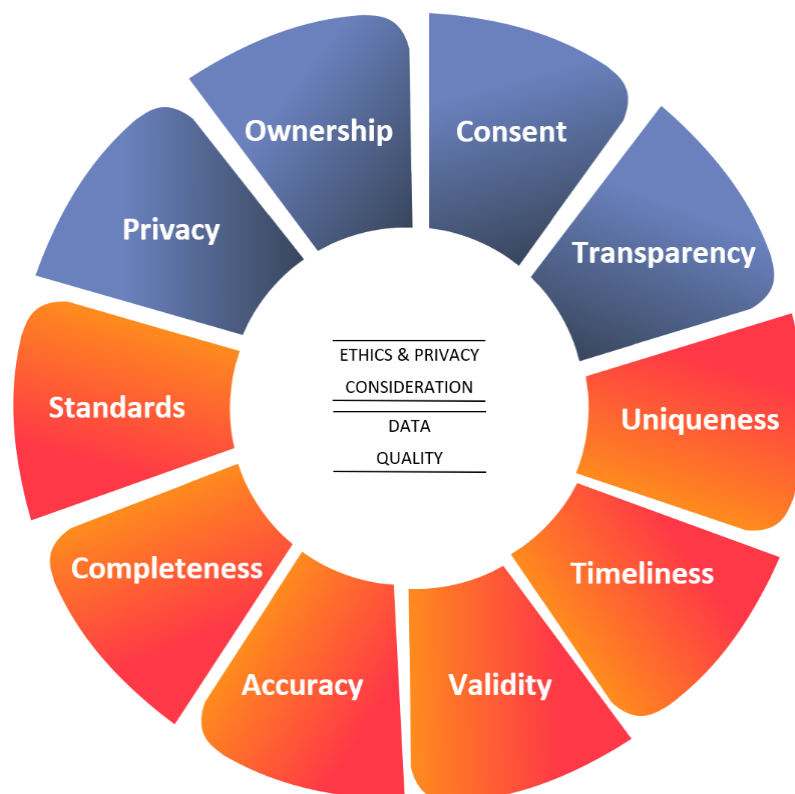
Adopted from: Scheffel, Drachsler & Specht (2015).

From a **more “data-oriented” approach to “quality”** aspects for **learning analytics metrics**, the above indicators can be combined and merged with those identified before (#3.1.2.1), as follows:

- **Learning analytics metrics quality indicators:** Standards (comparability, consistency), Completeness, Accuracy (effectiveness, efficiency), Validity, Timeliness, Uniqueness.
- **Learning analytics metrics ethics considerations:** Privacy, Ownership, Transparency, Consent.

The “**quality indicators**” refer to how appropriate the learning analytics metrics are, how fit-for-purpose they are as data that will be used in the decision-making process in turn; the “**condition**” of the data themselves - the degree to which a set of characteristics of data fulfills requirements.

The “**ethics considerations**” refer to systemising, defending, and recommending concepts of right and wrong conduct in relation to data; they are considerations that tackle the potential for data misuse, and issues about the right, legitimate, and proper ways to use data. Ethics considerations are placed on top of quality indicators, since the latter are relevant to the data, whilst the former are relevant to the usage of the data.



Like any kind of data, learning analytics metrics should be protected from misuse, mistreatment, or violations. The **quality of learning analytics** as (data) metrics

themselves matters in terms of impacting the quality of the outcome as a data-driven decision. **Mostly it is important to control** who has access to those metrics, what can and cannot be done with the metrics, and for how long access is granted after the collection and analysis of the raw learning and context data occurs. Therefore, along with the learning analytics metrics quality indicators, the ethical limitations should be considered, as well.

[end of page]

(Learning Object #3.1.2.5 - Activity)

Poll/Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

1. Can you briefly **describe the data quality measures**?
 - ☐ Yes
 - ☐ No
2. Can you explain the **difference between quality measures and ethics considerations** for learning analytics?
 - ☐ Yes
 - ☐ No
3. Did you understand **why quality is important for learning analytics metrics**?
 - ☐ Yes
 - ☐ No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about learning analytics metrics limitations and quality, in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

1. Can you provide examples of how the limitations of analytics quality apply when addressing learning objectives using specific learning analytics metrics? You can use the example in #3.1.2.3 as guidance.
2. Do you understand the difference between limitations as quality measures for learning analytics and the ethical limitations for learning analytics? Please, provide specific examples of each category of data quality.

[end of page]

(Learning Object #3.1.2.6 HTML page)

References

REFERENCES

“Data quality – Wikipedia”, https://en.wikipedia.org/wiki/Data_quality

Mihăiloaie, C., (2015). “Data quality dimensions – from Accuracy to Uniqueness”, <https://www.performancemagazine.org/data-quality-dimensions-from-accuracy-to-uniqueness/>

National Forum for the Enhancement of Teaching and Learning in Higher Education, "Guide to Data Quality," in teachingandlearning.ie, Published August 15, 2017, Last Accessed May 5, 2019, <https://www.teachingandlearning.ie/resource/guide-to-data-quality-2/>

Pipino, L., Lee, Y. W., & Wang, R. Y. (2002). Data quality assessment. Commun. ACM 45, 4 (April 2002), 211-218. DOI=<http://dx.doi.org/10.1145/505248.506010>

Scheffel, M., Drachsler, H., & Specht, M., 2015. Developing an evaluation framework of quality indicators for learning analytics. In Proceedings of the Fifth International Conference on Learning Analytics and Knowledge – LAK '15. New York, New York, USA: ACM Press, pp. 16-20.

Experian Data Quality. (2015). “The data quality benchmark report”, <http://cdn.qas.com/us-marketing/whitepapers/data-quality-benchmark-report-2015.pdf>

FURTHER READINGS

Cai, L. and Zhu, Y. (2015). The Challenges of Data Quality and Data Quality Assessment in the Big Data Era. Data Science Journal, 14, p.2. DOI: <http://doi.org/10.5334/dsj-2015-002>

Scheffel, M., Drachsler, H., Stoyanov S., & Specht, M. (2014). Quality Indicators for Learning Analytics. Educational. Technology & Society, 17 (4), 117–132. 117.

Gosh, P. (2018). “The Impact of Data Quality in the Machine Learning Era – DATAVERSITY”, <https://www.dataversity.net/impact-data-quality-machine-learning-era/#>

“5 Myths about the ‘Data Quality’ that could derail your analytics project” (2018) - <https://www.cloudmoyo.com/5-myths-about-the-data-quality-that-could-derail-your-analytics-project/>

VIDEO

[Data Quality Matters - Tech Vision 2018 Trend](#)

[end of page]

3.1.3 Ethical treatment of learner-generated data and measurements

(Learning Object #3.1.3.1 - Activity)

Poll: What are the policies and ethical considerations in learning analytics?



Source: <https://www.baesystems.com/en/cybersecurity/blog/data-and-ethics-a-powerful-partnership>

Poll: What are the policies and ethical considerations in learning analytics?

Let's learn a bit more about your understanding of the ethical and legal limitations in learning analytics. Please answer the poll questions below.

1. Do you understand the **difference between ethical and legal rights** on the collection and usage of learners and learning data?
 - ☐ Yes
 - ☐ No
2. Do you know the basic **ethical consideration in educational data collection and analysis**?
 - ☐ Yes
 - ☐ No
3. Are you aware of any **framework for ethics or policies for learning analytics** in particular?
 - ☐ Yes
 - ☐ No

Thank you for answering these questions. You may wish to check the results again after more people have completed the poll to review the responses of other learners of this course.

[end of page]

(Learning Object #3.1.3.2 - VIDEO)

Learning Analytics: The need for a code of ethics

Learning analytics provides tremendous opportunities to assist learners - but they also pose ethical implications that shouldn't be ignored. The practical challenge of learning analytics metrics is the question of privacy of the learner and how to protect the learner from potential harm due to data misuse. Questions abound:

- Who has **access** to the learner's data? Who **owns** individuals' data?
- To what degree do you need to **inform** users that their data are being collected?
- Do you need learners' **permission** to use their data?
- Where should the data be **stored**? How **secure** does it need to be?
- Is **identification** of individuals possible from metadata?
- What about **misinterpretation** of data, or other data errors?

Before addressing these issues, watch the following video that elaborates on the need to establish a code of ethics for learning analytics. This code of practice aims to set out the responsibilities of educational institutions to ensure that learning analytics is carried out responsibly, appropriately and effectively, addressing the key legal, ethical and logistical issues which are likely to arise.



External Video: [Learning Analytics: The need for a code of ethics](#) [9:59]

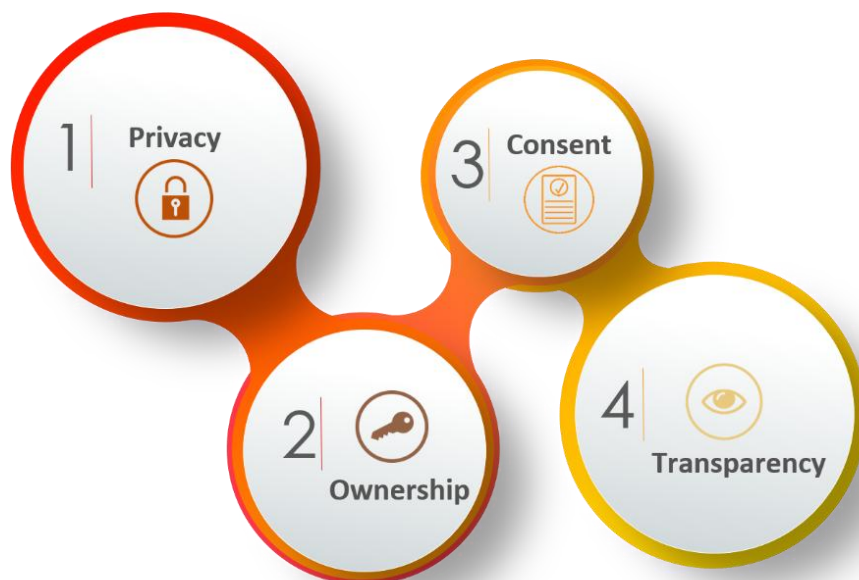
Slade and Prinsloo (2013) identified three broad classes of ethical issues: the location and interpretation of data; informed consent, privacy, and the de-identification of data; and the management, classification, and storage of data. Follow up for a more detailed discussion on ethical aspects.

[end of page]

Ethics and privacy considerations in Learning analytics: On learners' data protection and security

As we have explicitly explained, in the learning analytics cycle, data are collected about individuals and their learning activities, and metrics are constructed; the data will be analysed and interventions (might) take place. This entails opportunities for positive impacts on learning, as well as risks for misunderstandings, misuse of data and adverse impacts on students.

When learners perform learning tasks within a learning environment to increase their knowledge and develop skills and competences, they expect to receive support to overcome gaps in knowledge/competences. They also expect **to be in a “safe” environment** where their mistakes will be treated with respect, without serious consequences or unfair and unjustified discrimination against them, as individuals. Two critical issues are hidden in the implied “safety” of the learning environments: (a) the learners should feel “**secure**” and maintain the “**privacy**” of their data (integrity of the self), and (b) the learners' data should be treated in an “**ethical**” manner. Drachsler and Greller (2016) provided a clear differentiation between ethics and privacy: “*Ethics is the philosophy of morality that involves systematizing, defending, and recommending concepts of right and wrong conduct [...] privacy is a living concept made out of continuous personal negotiations with the surrounding ethical environment*”.



The main ethics considerations identified are outlined as follows:

- **Privacy:** the regulation of how personal digital information is being observed by the self or distributed to other observers – protection from unauthorized intrusion. Anonymize and de-identify individuals.
- **Ownership:** the act of having legal rights and complete control over a single piece or set of data – information about the rightful owner of data assets and the acquisition, use and distribution policy implemented by the data owner.
- **Consent:** documentation that clearly describes the processes involved in data collection and analysis. Explain how the data will be used, and why - and how it won't be used – and get consent from each individual before any data are collected.
- **Transparency:** the regulation about the purposes for which data will be collected and used, under which conditions, who will have access to data, the measures through which individuals' identity will be protected, and how sensitive data will be handled.

Ethics provides us with guides on what is the right thing to do in all aspects of life, while the law generally provides more specific rules so that societies and their institutions can be maintained (Tsachuridou, 2015).

Next, we will further discuss what policies have been established for handling learners' data.

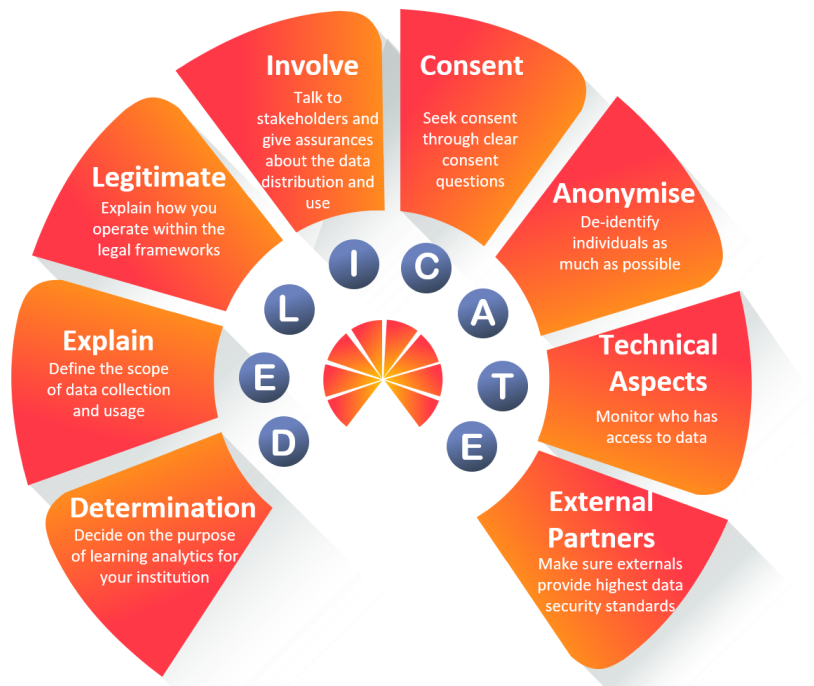
[end of page]

Policies for handling learners' data analytics: the DELICATE instrument

Over the past 5 years or so, a number of guidelines, codes of practice and policies have been developed in response to this. Slade and Prinsloo (2013) established one of the earliest frameworks with a focus on ethics in learning analytics. Others have followed, including JISC's code of practice in 2015, the [Learning Analytics Community Exchange \(LACE\)](#) framework in 2016 (Drachsler & Greller, 2016) and a learning analytics policy development framework for the EU by the [SHEILA project](#) (Tsai and Gasevic, 2017). More recently and in the light of the rapid development of Learning Analytics on a global basis, [International Council for Open and Distant Education \(ICDE\)](#) has taken the initiative to produce a set of guidelines for ethically-informed practice that would be valuable to all regions of the world (March 2019).

To address the issues raised (#3.1.3.1) and **demystify the ethics and privacy limitations** around learning analytics, the LACE project published the **DELICATE instrument** to be used by any educational institution. The instrument includes **policies and guidelines** regarding privacy, legal protection rights or other ethical implications that address learning analytics.

The DELICATE checklist helps to investigate the obstacles that could impede the rollout of learning analytics and the implementation of trusted learning analytics for higher education.



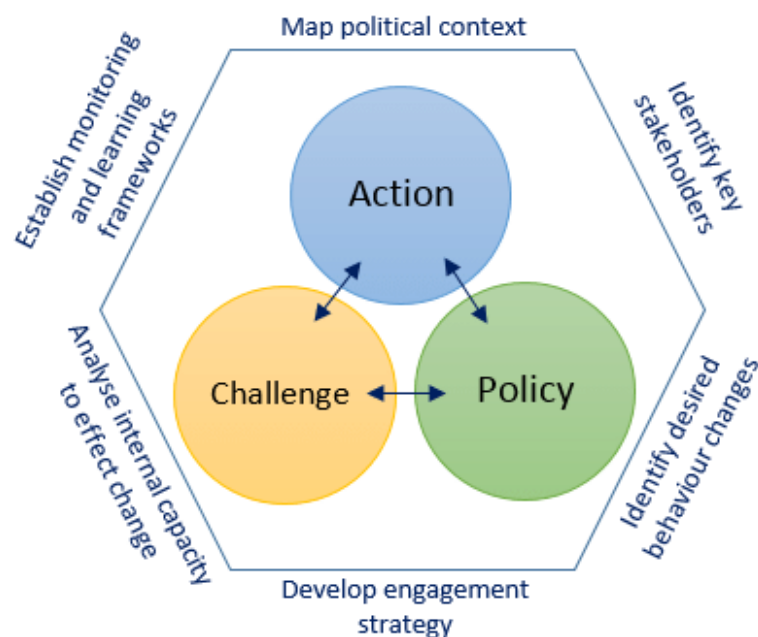
The eight points are:

1. **D-etermination:** Decide on the purpose of learning analytics for your institution.
2. **E-xplain:** Define the scope of data collection and usage.
3. **L-egitimate:** Explain how you operate within the legal frameworks, refer to essential legislation.
4. **I-nvolve:** Talk to stakeholders and give assurances about the data distribution and use.
5. **C-onsent:** Seek consent through clear consent questions.
6. **A-nonymise:** De-identify individuals as much as possible.
7. **T-echnical aspects:** Monitor who has access to data, especially in areas with high staff turn-over.
8. **E-xternal partners:** Make sure externals provide highest data security standards.

[end of page]

Policies for handling learners' data analytics: the SHEILA approach

The EU SHEILA project focused on developing a learning analytics policy development framework for the EU under the 6 dimensions of the Rapid Outcome Mapping Approach (ROMA) (Ferguson et al., 2014; Macfadyen et al., 2014), and consisting of 49 **action points**, 69 **challenges**, and 63 **policy questions**. The ROMA dimensions, as considered by the SHEILA framework, include: (1) The political context of an institution, i.e., identifying the 'purposes' for adopting learning analytics in a specific context; (2) The involvement of stakeholders, i.e., the implementation of learning analytics in a social environment involves collective efforts; (3) A vision of behavioural change and potential impacts; (4) Strategic planning, including resources, ethics & privacy, and stakeholder engagement and buy-in; (5) Institutional capacity to affect change, i.e., assessing the availability of existing resources; (6) A framework to monitor and evaluate the efficacy and continue learning.



Source: <https://sheilaproject.eu/wp-content/uploads/2018/11/SHEILA-research-report.pdf>

[end of page]

Policies for handling learners' data analytics: the ICDE framework

The ICDE report on Ethics in Learning Analytics identified several core issues that are important on a global basis for the use and development of Learning Analytics in ethics-informed ways. Those issues include:



- **Transparency:** how learners' data are collected, analysed and used to shape learners' paths.
- **Data ownership and control:** the presumption is often that data collected are owned by the institution. However, *"data are not considered as something a student owns but rather is. Students do not own their data but are constituted by their data"* (Prinsloo & Slade, 2017). Therefore, institutions do not own the student data that they hold but have temporary *stewardship*.
- **Accessibility of data:** can relate to both the determination of who has access to raw and analysed data, and to the ability of students to access and correct their own data. Within a learning analytics context, we might expect that data are accessed on a 'need-to-know' basis to facilitate the provision of academic and other support services.
- **Validity and reliability of data:** Datasets should be kept valid, reliable, accurate, representative of the issue being measured, current, complete and sufficient.
- **Institutional responsibility and obligation to act:** how access to knowing and understanding more about how students learn brings with it a moral obligation to act.
- **Communications:** care should be taken when communicating directly with students on the basis of their analytics.

- **Cultural values:** measures established as being correlated with successful or unsuccessful outcomes are likely to differ in different geographies and cultures.
- **Inclusion:** Learning Analytics should be primarily used to support students, in student-centred ways that minimize the risk to legitimise exclusion.
- **Consent:** In line with GDPR, consent is not required for the use of non-sensitive data for analytics, is required for use of sensitive data, and would be required to take interventions directly with students on the basis of the analytics.
- **Student agency and responsibility:** it is recommended that institutions seek to engage students in applications of learning analytics so as students can be more actively involved in helping the institution to design and shape interventions that will support them.

[end of page]

(Learning Object #3.1.3.7 - Activity)

Poll/Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

1. Can you describe the **ethics considerations for learning analytics**?
 - ☐ Yes
 - ☐ No
2. Can you explain **why a code of ethics for learning analytics is needed**?
 - ☐ Yes
 - ☐ No
3. Did you understand the **policies for learning analytics** according to the **DELICATE** framework?
 - ☐ Yes
 - ☐ No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about learning analytics ethical considerations and policies, in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

1. Read the SHEILA-research-report and choose 2 action points, 2 challenges and 2 policy questions that you find most interesting. Please, elaborate on your choices.
2. Study the DELICATE framework and the ICDE framework and discuss the overlap between them.

[end of page]

References

REFERENCES

- Drachsler, H. & Greller, W. (2016). Privacy and Analytics – it's a DELICATE issue. A Checklist to establish trusted Learning Analytics. 6th Learning Analytics and Knowledge Conference 2016, April 25-29, 2016, Edinburgh, UK.
- Slade, S. & Tait, A. (2019). Global guidelines: Ethics in Learning Analytics, International Council for Open and Distant Education (ICDE)
- Slade, S. & Prinsloo, P. (2013). Learning analytics: ethical issues and dilemmas. *American Behavioral Scientist*, 57(10) pp. 1509–1528.
- Ferguson, R., Macfadyen, L.P., Clow, D., Tynan, B., Alexander, S. and Dawson, S. (2014). Setting Learning Analytics in Context: Overcoming the Barriers to Large-Scale Adoption. *Journal of Learning Analytics*. 1, 3 (Sep. 2014), 120–144
- Macfadyen, L.P., Dawson, S., Pardo, A. and Gašević, D. (2014). Embracing Big Data in Complex Educational Systems: The Learning Analytics Imperative and the Policy Challenge. *Research & Practice in Assessment*. 9, (2014), 17–28.
- Tsachuridou, E. (2015). “Why ethics and law are not the same thing | INTHEBLACK”, <https://www.intheblack.com/articles/2015/04/01/why-ethics-and-law-are-not-the-same-thing>
- Prinsloo, P. and Slade, S. (2017). Ethics and Learning Analytics: Charting the (Un)Charted. In: Lang, Charles; Siemens, George; Wise, Alyssa and Gašević, Dragan eds. *Handbook of Learning Analytics*. SOLAR, pp. 49–57.
- Tsai, Y. S., & Gasevic, D. (2017, March). Learning analytics in higher education—challenges and policies: a review of eight learning analytics policies. In *Proceedings of the Seventh International Learning Analytics & Knowledge Conference* (pp. 233-242). ACM.
- Tsai et al. (2018). “Supporting Higher education to integrate learning analytics”, Research report. <https://sheilaproject.eu/wp-content/uploads/2018/11/SHEILA-research-report.pdf>

FURTHER READINGS

- Johnson, A. (2017). “Ethics and Data - A Powerful Partnership”, <https://www.baesystems.com/en/cybersecurity/blog/data-and-ethics-a-powerful-partnership>
- Kay, D., Korn, N., & Oppenheim, C. (2012, November). Legal, risk and ethical aspects of analytics in higher education, JISC CETIS Analytics Series, 1(6). <http://publications.cetis.ac.uk/2012/500>

Pardo, A., & Siemens, G. (2014). Ethical and privacy principles for learning analytics. British Journal of Educational Technology, 45(3), 438–450. <http://dx.doi.org/10.1111/bjet.12152>

Open University. (2014). Policy on ethical use of student data for learning analytics. <http://www.open.ac.uk/students/charter/sites/www.open.ac.uk/students/charter/files/files/ecms/web-content/ethical-use-of-student-data-policy.pdf>

VIDEO

[Learning Analytics: The need for a code of ethics](#)

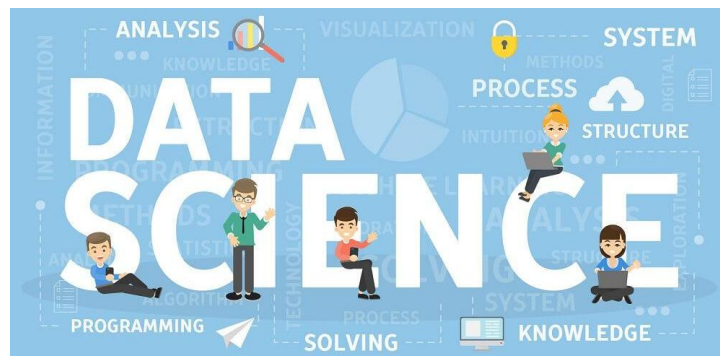
[end of page]

3.2 Analyzing data and presenting learning analytics

3.2.1 Methods for analyzing the learner-generated data and the measurements over them

(Learning Object #3.2.1.1 - Activity)

Poll: You and Data Science



Source: <https://www.techopedia.com/12-key-tips-for-learning-data-science/2/33735>

Poll: You and Data Science

Let's learn a bit more about your previous knowledge and experience with data analysis
Please answer the poll questions below.

1. Have you **analyzed educational data before**?
 - ☐ Yes
 - ☐ No
2. Are you aware of the **statistical analysis methods and techniques**?
 - ☐ Yes
 - ☐ No
3. Do you know the **most common data analysis methods**?
 - ☐ Yes
 - ☐ No

Thank you for answering these questions. You may wish to check the results again after more people have completed the poll to review the responses of other learners of this course.

[end of page]

(Learning Object #3.2.1.2 - HTML page)

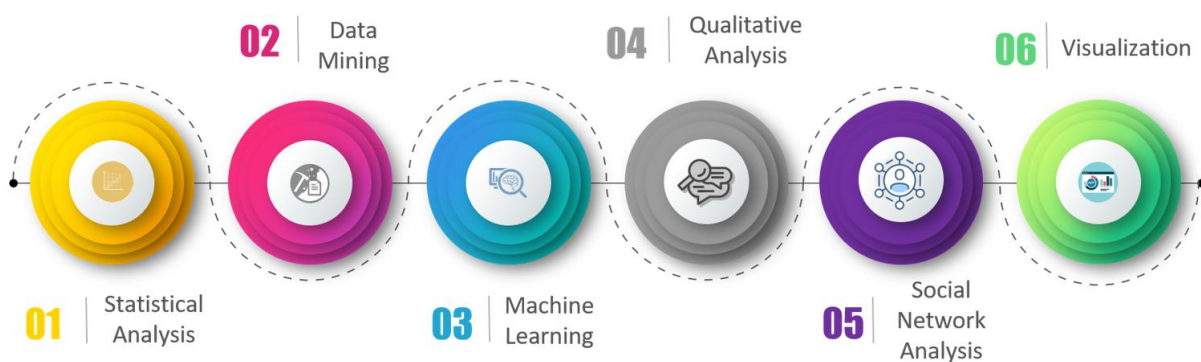
It's time for data analysis... with a little help from the Data Science

As we have mentioned many times, the learning analytics cycle describes the whole process from collecting the learner and context data to taking data-driven actions and interventions. The raw learner and context data do not tell a lot on their own, but when converted to metrics, they have the potential to reveal what we don't know about our learners.

Good metrics have three key attributes: their data are consistent, clean, and valid to use (#3.1.2). Data cleaning and management is a demanding task, **presented in Module 2**. Given that you have good and clean data, next you have to select the data analysis method.

Let's find out **what methods** can be used for **analysing** the educational data and learning analytics.

This step is the main “game” of Data Science; it requires the procedures under the umbrella of Data Science. Data Science is a blend of various tools, algorithms, and machine learning principles with the goal to discover hidden patterns from the raw data (Sharma, 2019). The main generic categories of methods of this step include (but are not limited to):



- **Statistical methods**
- **Data mining**
- **Machine learning**
- **Qualitative methods**
- **Social Network Analysis**

- **Visualization** – This step is related to the output procurement and will be extensively presented in the next section.

However, not all data analysis methods can yield the results you are seeking. To achieve that, you need to **specify a number of criteria**, e.g., the learning analytics objective you want to address (modelling learners, prediction of performance, adaptation, recommendation, etc., see #3.0.4.2), the metrics you have to compute (effective, efficient, outcome, see #3.1.1.5), and the type of analytics you want to use (descriptive, diagnostic, predictive, etc., see #3.1.1.6). The analysis methods will be utilized to form a better understanding of the educational settings and learners: learning analytics focus on the **application of known methods and models** to address issues affecting student learning and the environments in which it occurs.

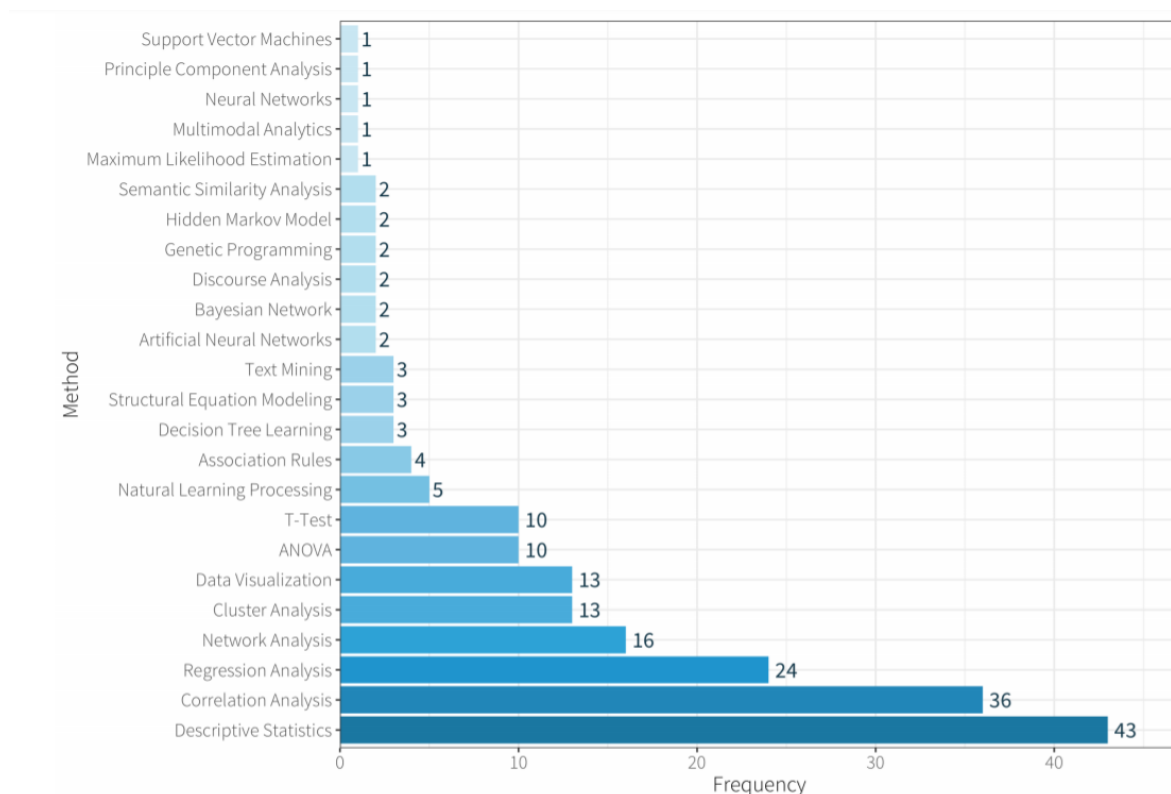
Before we explain how you can choose the appropriate analysis method for your needs, let's take a short introduction (in simple terms) to the approaches commonly used in learning analytics.

[end of page]

Common methods and approaches for data analysis in learning analytics

The learning analytics metrics come from data related to learners' interactions with course content, other learners, and instructors. Different techniques are applied to **detect interesting patterns hidden** in the educational data sets.

Among the analysis techniques, some have received increased attention in the last couple of years, namely **statistics**, **data mining**, **machine learning**, **qualitative analysis**, **social network analysis**, and **visualizations** (Chatti et al., 2012; Papamitsiou & Economides, 2014; Khalil & Ebner, 2016). In a recent report on the current state-of-the-art in learning analytics, a corpus of 100 studies was considered (Misiejuk & Wasson, 2017). The next figure shows the frequency of the data analysis methods used in the corpus.



Source: <http://bora.uib.no/handle/1956/17740>

By far, **statistics** is the most commonly used method, including **descriptive statistics** (43%), **correlation analysis** (36%), **ANOVA** (10%) and **T-Test** (10%). Data mining methods like **regression analysis** (24%) and **cluster analysis** (13%) are also common techniques, followed by **network analysis** (16%) and **data visualisations** (13%). The remainder of the methods

were reported 1-5 times. Some of these less used approaches are **machine learning methods** such as neural networks and support vector machines. More recently, **multimodal analysis** uses more sophisticated data such as video, gaze, gestures, and combines various methods such as computer vision, machine learning, etc.

Although the different analysis methods are **inherently technical**, they can **provide pedagogical insights** if properly used. For example, *descriptive statistics* (such as the mean, median and standard deviation) can be used to showcase the students' interaction with a learning system (the usage), as it is coded with *efficiency metrics* (see #3.1.1.5) like the time online, total number of visits, distribution of visits over time, frequency of students' postings/replies, percentage of material read, etc. Statistical methods can also be used to signify the importance of the analysis results (e.g., analysis of variance – ANOVA, and t-tests), or to explain more complex constructs of learning (*effectiveness metrics*), such as engagement (e.g., Principal Component Analysis – PCA). *Data mining* methods like classification and clustering can be used to model and explain learner performance (*outcome metric*), and *machine learning* techniques can be successfully applied to detect learners' affective states (*effectiveness metrics*) during the learning activities.

Now, let's see how the most commonly used **statistical methods** can **tell the story** in the data.

[end of page]

(Learning Object #3.2.1.4 - VIDEO)

Statistics – An introduction

Statistics are used for measuring, controlling, communicating and understanding the data (Davidian & Louis, 2012). It is a mathematical science including methods of collecting, organizing and analyzing data in such a way that meaningful conclusions can be drawn from them. In general, statistics begin with data collection using a **sampling method** (you have learned about that in **Module 2**), and next, for understanding the collected data, its investigations and analyses fall into two broad categories called **descriptive** and **inferential statistics**.

Descriptive statistics deals with the processing of data **without attempting to draw any inferences** from it (Kenton, 2018). **Inferential statistics** is a scientific discipline that uses mathematical tools to **make forecasts** and make generalizations about the larger population of subjects by analyzing the given data (Kuhar, 2010).

Watch the next video for a brief introduction to statistics and follow up for a discussion about how statistics can be applied with learning analytics.



External Video: [Statistics - Introduction to Statistics \[3:45\]](#)

Now, before advancing to more sophisticated techniques, let's find out what the fundamentals of statistical analysis are and how they can tell the story in learning data analytics.

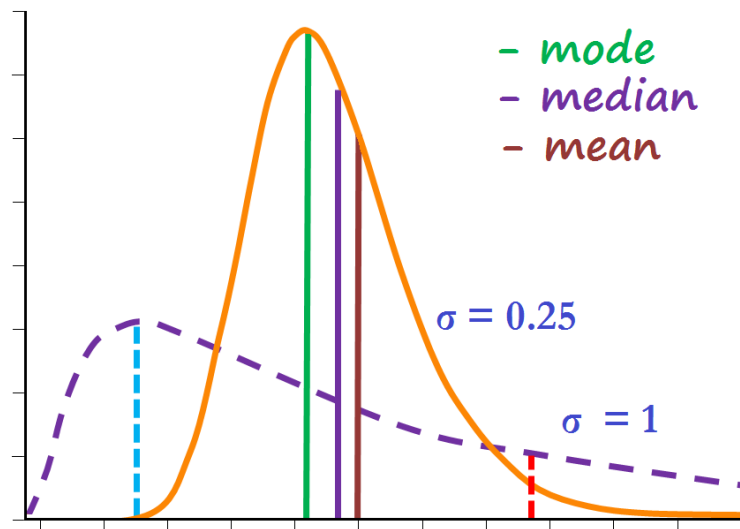
[end of page]

Typical statistical methods used to analyze learners' data: an overview

As already explained, descriptive statistics are used to summarize data in a way that makes sense. Descriptive statistics are, as their name suggests, descriptive: they illustrate what the data shows but do not generalize beyond the data considered. Here is a list of commonly used descriptive statistics (Dillard, 2017):

- **Frequencies** – a count of the number of times a particular score or value is found in the data set. For example, how many students (within all participants) have scored 5 out of 10 on a test.
- **Percentages** – used to express a set of scores or values as a percentage of the whole.
- **Mean** – numerical average of the scores or values for a particular variable, e.g., the average score that the students achieved on a test. Taken alone, the mean is a dangerous tool. In some data sets, the mean is also closely related to the mode and the median (two other measurements near the average). However, in a data set with a high number of outliers or a skewed distribution, the mean simply doesn't provide the accuracy you need for a nuanced decision.
- **Median** – the numerical midpoint of the scores or values that is at the center of the distribution of the scores.
- **Mode** – the most common score or value for a particular variable, e.g., the most common score that was achieved among all students.
- **Minimum and maximum values (range)** – the highest and lowest values or scores for any variable.
- **Standard deviation (σ)** – quantifies the amount of variation or dispersion of a set of data values, or otherwise, how close the data points are to the mean - the measure of a spread of data around the mean. A low standard deviation indicates that the data points tend to be close to the mean of the set, while a high standard deviation indicates that the data points are spread out over a wider range of values.

Mean, median and mode are measures of central tendency, while range and standard deviation are measures of dispersion.



Source: <https://www.datavedas.com/descriptive-statistics/>

Descriptive statistics may be sufficient if you do not need to generalize the results to a larger population, e.g., outside the specific assignment; if you are comparing the percentage of your students that have solved an assignment correctly versus wrongly, descriptive statistics may be sufficient. Most analytics fall into the basic data evaluation category, and that's OK. There's tremendous value here, and opportunities for some huge wins.

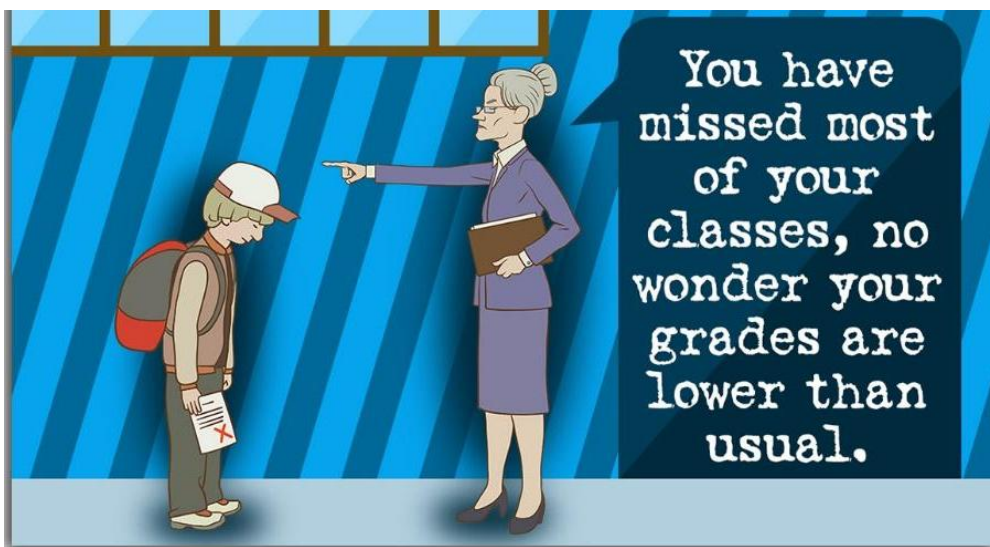
[end of page]

One size does not fit all! Other methods and techniques for analyzing learners' data

However, using only this kind of statistics entails the risk of '*picking the low hanging fruit*' of learning analytics – descriptive information or **simple statistics** that **values what you can easily measure rather than measures what you value**. If you want to understand, not only what happened, but also why it happened, you need to utilize the data to make inferences or predictions about your learners, and you will need to go another step farther and use inferential statistics.

Inferential statistics can be used to generalize the findings from sample data to a broader population, and examine the differences and relationships between two or more samples of the population (Kuhar, 2010). These are more complex analyses and are looking for significant differences between variables and the sample groups of the population. Inferential statistics allow you test hypotheses and generalize results to the population as a whole. Following is a list of basic inferential statistical tests (Rathi, 2018):

- **Correlation** – seeks to describe the nature of a relationship between two variables, such as strong, negative positive, weak, or statistically significant. If a correlation is found, it indicates a relationship or pattern, but keep in mind that **it does not indicate or imply causation**.



Source: <https://psychologenie.com/explanation-of-negative-correlation-in-psychology-examples>

- **Analysis of Variance (ANOVA)** – tries to determine whether or not the difference in the means of two sampled groups is statistically significant or due to random chance. For example, the test scores of two groups of students are examined and proven to be significantly different. The ANOVA will tell you if the difference is significant, but it does not speculate regarding “why”.
- **Regression** – used to determine whether one variable is a predictor of another variable. For example, a regression analysis may indicate to you whether or not participating in a test preparation program results in higher ACT scores for high school students. It is important to note that regression analysis are like correlations in that **causation cannot be inferred** from it.



Source: <http://www.thegraphicrecorder.com/2012/01/18/freakonomics-correlation-%E2%89%A0-causation-money-cant-buy-elections/>

[end of page]

(Learning Object #3.2.1.7 - Activity)

Poll/Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

1. Can you name the **basic analysis techniques commonly used in learning analytics**?
 - ☐ Yes
 - ☐ No
2. Are you aware of **the statistical measures** that are extensively used for **descriptive** purposes?
 - ☐ Yes
 - ☐ No
3. Have you understood why all the **different statistical measures** are needed to describe the dataset?
 - ☐ Yes
 - ☐ No
4. Can you explain what **inferential statistics** refer to and how they are **different** from **descriptive statistics**?
 - ☐ Yes
 - ☐ No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about the analysis methods employed in learning analytics, in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

1. Provide 2 examples of learning analytics metrics and explain why you would use the mean and standard deviation to describe their values. Please, elaborate on your choices.
2. Provide examples of learning analytics metrics that could be used to explain a learning outcome, and elaborate on the statistical method you would use to explore the relationship.

[end of page]

(Learning Object #3.2.1.8 HTML page)

References

REFERENCES

- Chatti, M. A., Dyckhoff, A. L., Schroeder, U., and Thüs, H. (2012). A reference model for learning analytics. *International Journal of Technology Enhanced Learning (IJTEL)*, 4(5/6), pp. 318-331.
- Davidian, M., & Louis, T. (2012). Why Statistics? *Science*, 335(6077), 12. <https://doi.org/10.1126/science.1218685>
- Dillard, J. (2017). “5 Most Important Methods For Statistical Data Analysis”, <https://www.bigskyassociates.com/blog/bid/356764/5-Most-Important-Methods-For-Statistical-Data-Analysis>
- Kenton, W. (2018). “Descriptive Statistics”, https://www.investopedia.com/terms/d/descriptive_statistics.asp
- Khalil, M., & Ebner, M. (2016). What is Learning Analytics about? A Survey of Different Methods Used in 2013-2015. *CoRR*, abs/1606.02878.
- Kuhar, C.W. (2010). Experimental Design: Basic Concepts, *Encyclopedia of Animal Behavior*, <https://www.sciencedirect.com/topics/medicine-and-dentistry/inferential-statistics>
- Misiejuk, K. & Wasson, B. (2017). State of the Field report on Learning Analytics. SLATE Report 2017-2. Bergen.
- Papamitsiou, Z., & Economides, A. A. (2014). Learning Analytics and Educational Data Mining in Practice: A Systematic Literature Review of Empirical Evidence. *Educational Technology & Society*, 17(4), 49–64.
- Sharma, H. (2019). “What Is Data Science? A Beginner’s Guide To Data Science”, <https://www.edureka.co/blog/what-is-data-science/>
- “Descriptive and Inferential Statistics” (2018). <https://statistics.laerd.com/statistical-guides/descriptive-inferential-statistics.php>

FURTHER READINGS

- Klašnja-Milićević, A, Ivanović, M, Budimac, Z. Data science in education: Big data and learning analytics. *Comput Appl Eng Educ*. 2017; 25: 1066– 1078. <https://doi.org/10.1002/cae.21844>
- “Quantitative data: definition, types, analysis and examples”, <https://www.questionpro.com/blog/quantitative-data/>

Rathi, A. (2018). “Inferential Statistics for Data Science”, <https://towardsdatascience.com/inferential-statistics-for-data-science-b0075670fc8a>

VIDEO

[Statistics - Introduction to Statistics](#)

[end of page]

3.2.2 Presentation methods for reporting on learner data analytics

(Learning Object #3.2.2.1 - Activity)

Poll: Reporting methods and data presentation



Source: <https://www.eidesign.net/learner-analytics-and-reporting/>

Poll: Reporting methods and data presentation

Let's learn a bit more about your previous experience with visualization of information. Please answer the poll questions below.

1. Do you know what the term **data presentation** refers to?
 - ☐ Yes
 - ☐ No
2. Have you **used** any kind of **data visualizations** in the past?
 - ☐ Yes
 - ☐ No
3. Have you used **Google Analytics** in the past?
 - ☐ Yes
 - ☐ No

Thank you for answering these questions. You may wish to check the results again after more people have completed the poll to review the responses of other learners of this course.

[end of page]

(Learning Object #3.2.2.2 – HTML page)

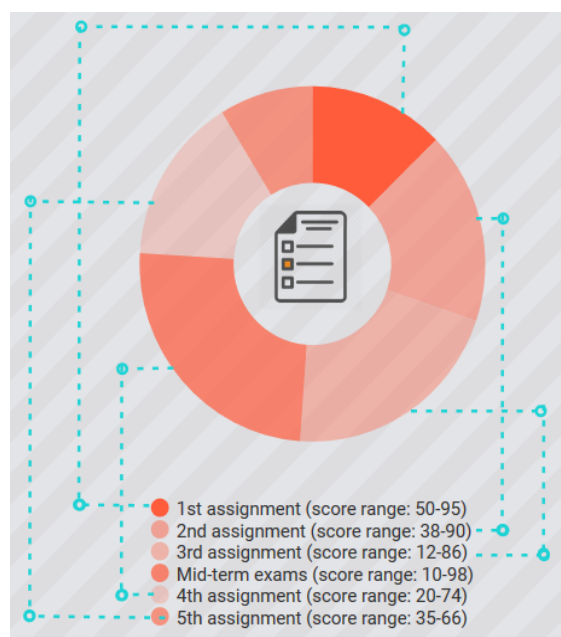
What all those data tell us? Reporting about learners and their data: keep it clear!

Now you have analysed the educational data that you collected. *How did your students perform in an assignment? How did they perform compared to the previous assignment? How many of them downloaded the material you had made available online? How much time did the students spent on studying the online material compared to the score they achieved on the assignments?*

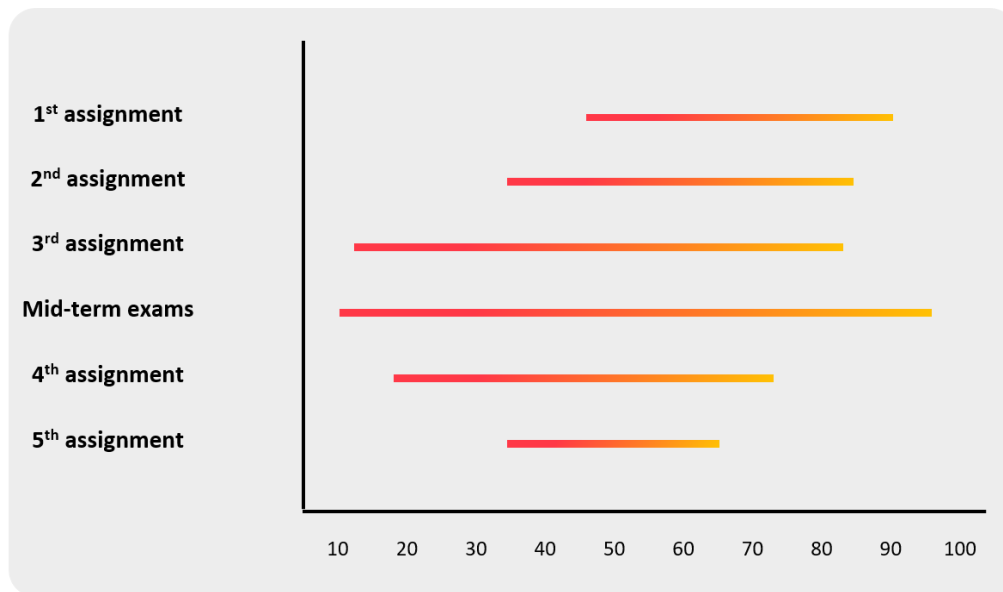
These are common questions you can answer when you analyse the educational data you have collected, using the respective metrics. The collected learner and context data and learning can be presented in many different ways to help make it **easier to understand** and **more interesting to read**. After collecting and organizing data, the next step is to **display them in an easy to read manner** – highlighting similarities, disparities, trends, and other relationships, or the lack of, in the dataset.

You are eager to use data to make data-driven and informed educational decisions, but all the data in the world **won't help if you can't understand what the insightful analysis can present to you**. The first step to presenting data is to understand that **how you present data matters** (Kiss, 2018).

Take these two visuals. They display the results of the scores that 250 students achieved on the five assignments and the mid-term exams during one semester, on a scale 0-100. The first one (infographic style) is “prettier.” However, the visual is difficult to understand unless you actually read the information on it. Pretty, but not helpful...



On the other hand, the second one uses simple bars to display the same information.



Helpful, and still pretty...

Follow up to learn about the different ways you can represent educational data and learning analytics metrics in a meaningful manner.

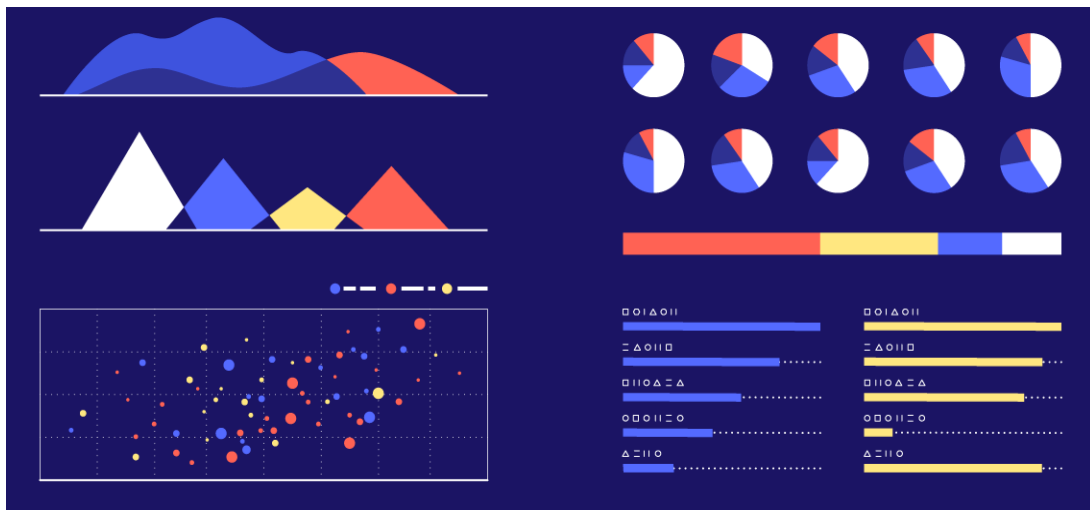
[end of page]

(Learning Object #3.2.2.3 - HTML page)

Ways to represent data

As already explained, displaying the analysis results and what is within the educational dataset in a clear way, is helpful in telling the story and making sense of the data you have collected. Data reports present the data, analyses, conclusions and recommendations in an easy to decipher and digest format (Lebied, 2016).

The methods commonly used to display data include **tables, charts, bar graphs, pie graphs, and line plots**. Other commonly used ways to present data are **histograms, box-plots, scatterplots, and stem-and-leaf plots**. Sometimes, a combination of the graphical representations is used as a **dashboard**: presenting data results together should tell a story or reveal insights together, that isn't possible if left apart.



Source: <https://www.columnfivemedia.com/how-to-data-visualization-report-design>

Why do we use tables, diagrams or charts to display the learner/learning information?

- Displaying data visually (with pictures) can make it **easier to understand**.
- It makes the information **stand out on a page**.
- It is easier to **display using pictures, rather than lots of words**. For example, it is easier to show someone the layout of a town using a map, rather than describing it in words.

Data can be presented in various forms **depending on the type of data collected**.

For example, a **frequency distribution table** shows **how often** each value (or set of values) of the variable occurs in a dataset. A **frequency table** is used to summarize categorical or numerical data. Frequencies are also presented as **relative frequencies**, that is, the **percentage** of the total number in the sample.

Except from the tables, there are other, **graphical ways** to present data. Analytics presented visually make it easier for decision makers to grasp difficult concepts or identify new patterns.

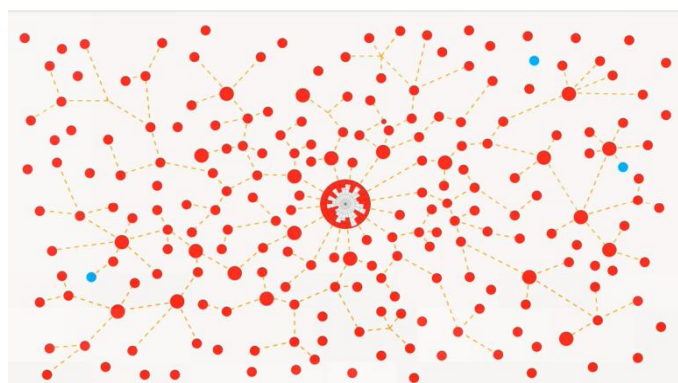
Watch the next video for a quick introduction to the value of data visualization and follow up for a discussion about the most common ways to visualize educational data.

[end of page]

(Learning Object #3.2.2.4 - VIDEO)

What is Data Visualization? Graphical display of learning analytics

Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, **data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data.**

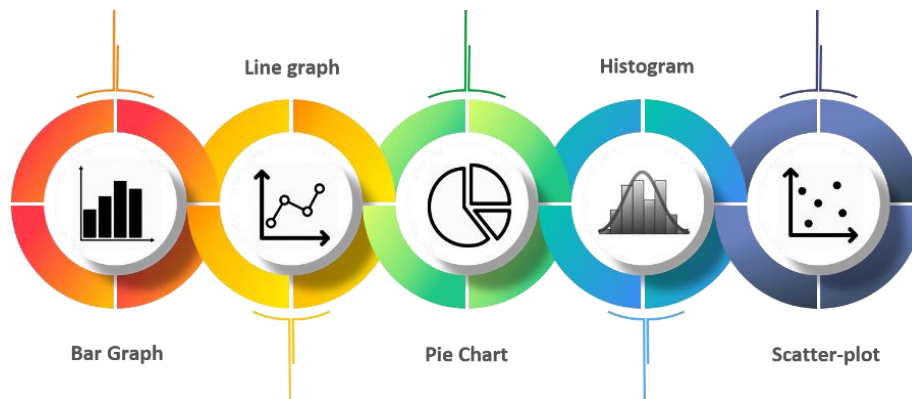


External Video: [The Value of Data Visualization \[1:42\]](#)

Data visualization is a powerful tool, especially in a world desperate for hard facts. When it comes to making sense of learning analytics and understanding learning patterns in the educational data, you can start from simple graphs that can demonstrate this information. For example, you have gathered and analysed quiz submission data, discussion interaction data (e.g., participation in the forum), data from the access to the learning management system, assignment completion data. What's next is to answer questions like the following:

- How well an individual student did in comparison to the entire class?
- What was the overall performance on a quiz?
- Is there a relationship between quiz performance and content access?

To address these questions, you will need **graphic representations that are easy to interpret** (Blitz, 2017).

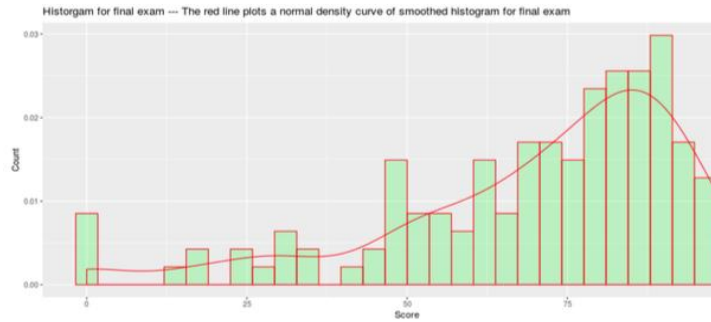


A **bar graph** is a way of summarizing a set of **categorical data**. It displays the data using a number of rectangles, of the same width, each of which represents a particular category. Bar graphs can be displayed horizontally or vertically, and they are usually drawn with a gap between the bars (rectangles). For example, to answer to how well an individual student did in comparison to the entire class, you can use a bar graph where each student in the classroom is represented by a bar.

A **line graph** is particularly useful when we want to show the **trend of a variable over time**. Time is displayed on the horizontal axis (x-axis) and the variable is displayed on the vertical axis (y- axis). In the above example, you can use a line graph to showcase the overall performance on a quiz.

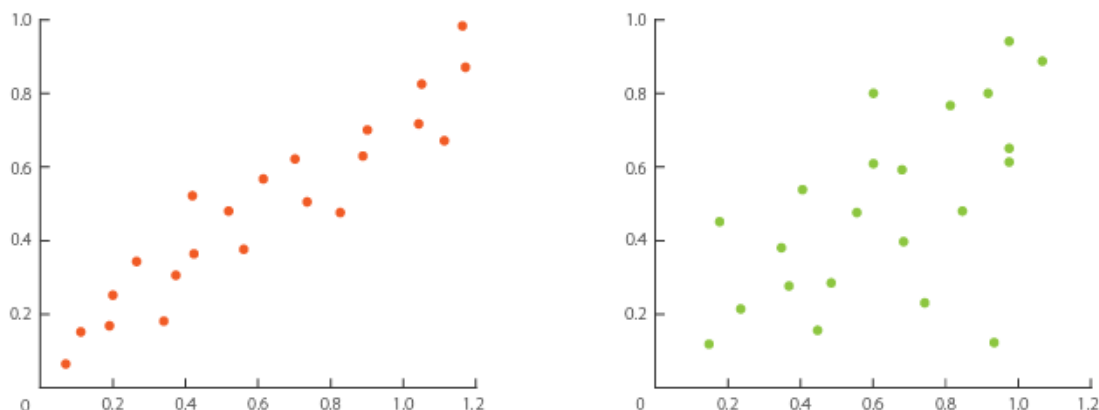
A **pie chart** is used to display a set of categorical data. It is a **circle**, which is divided into **segments**. Each segment represents a particular category. The area of each segment is **proportional** to the number of cases in that category. For example, a pie chart can be used to display the successful completion of an assignment.

A **histogram** is a way of summarizing data that are **measured on an interval scale** (either discrete or continuous). It is often used in **Exploratory Data Analysis (EDA)** to illustrate the features of the distribution of the data in a convenient form. In the above example, you can use a histogram to see the distribution of scores of your students on the final exams, as shown in the figure below.



Source: <https://sites.dartmouth.edu/learninganalytics/category/datavisualization/>

A **scatter-plot** displays values for typically two variables for a set of data. The data are a collection of points, each having the value of one variable determining the position on the horizontal axis and the value of the other variable determining the position on the vertical axis. The scatter-plot is usually used to determine if a correlation exists between the data, and how strong it is. For example, a scatter-plot can show if there is a relationship between quiz performance and content access, or if there is a relationship between assignment completion and quiz performance.



Source: <https://datavizcatalogue.com/methods/scatterplot.html>

It needs to be clarified that, in statistics, exploratory data analysis (EDA) is a preliminary data analysis approach to summarize the main characteristics of a given dataset, often with visual methods. EDA refers to a critical process of performing initial investigations on data to discover patterns, to spot anomalies, to test hypothesis and to check assumptions with the help of summary statistics and graphical representations. It is a good practice to understand the data first and try to gather as many insights from it. EDA is all about making sense of data in hand before getting them dirty with it.

[end of page]

Visualization dashboards in learning analytics – Examples

In most cases, a single graph does not contain all the information that is hidden in the data, cannot provide all the insights that you might need to understand your students' learning behaviour or outcomes, and is not sufficient for informed decision-making. The solution is to use combined graphs of the learning analytics metrics that all together can tell the story in the data. These combined graphs are called **dashboards**. *“A dashboard is a visual display of the most important information needed to achieve one or more objectives; consolidated and arranged on a single screen so the information can be monitored at a glance”* (Few, 2004). Here are five examples of learning analytics dashboard implementations, in relation to the educational objective they aim to address.

1. LAPA - Learning Analytics for Prediction & Action

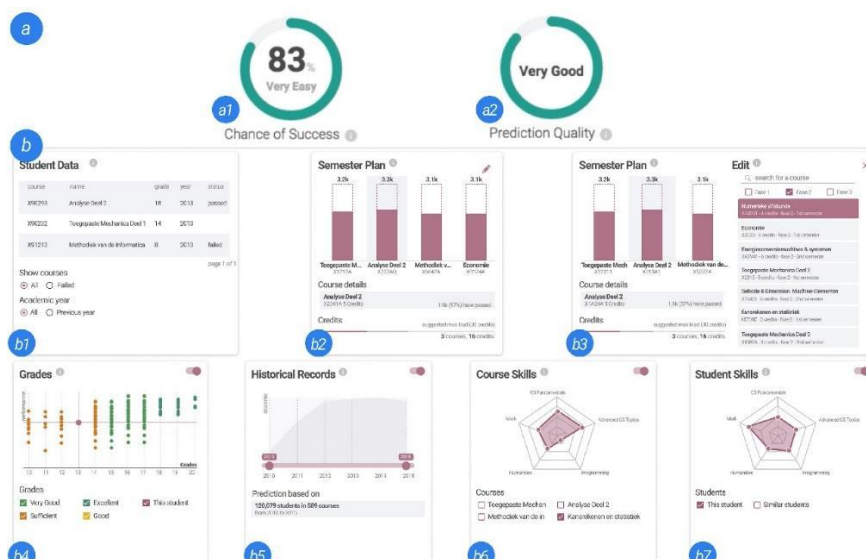
The goal of LAPA dashboard is to inform learners' online learning behavior to learners themselves and the instructor and to guide their learning in a smart and personalized way. The first version of LAPA, (see figure), consists of 7 graphs. The graph chosen for the online activity summary is the scatterplot, where individual learners can choose the X-axis and Y-axis to locate their position in class. The other 6 graphs are provided with a trend line of their activity every week along with the average activity information of other learners in the class. All of the graphs in the LAPA are updated every week until the end of the semester (Park & Jo, 2015).



Source: Park & Jo (2015)

2. LADA - Learning Analytics Dashboard for Advisers

LADA is a learning analytics dashboard that supports academic advisers in compiling a semester plan for students based on their academic history. LADA also includes a prediction of the academic risk of the student (Gutiérrez et al., 2018). LADA visualizes two categories of information: a) The chance of success and prediction quality components b) The various information card components designed to support the adviser (see figure).



Source: Gutiérrez et al. (2018)

3. LISSA - Learning dashboard for Insights and Support during Study Advice

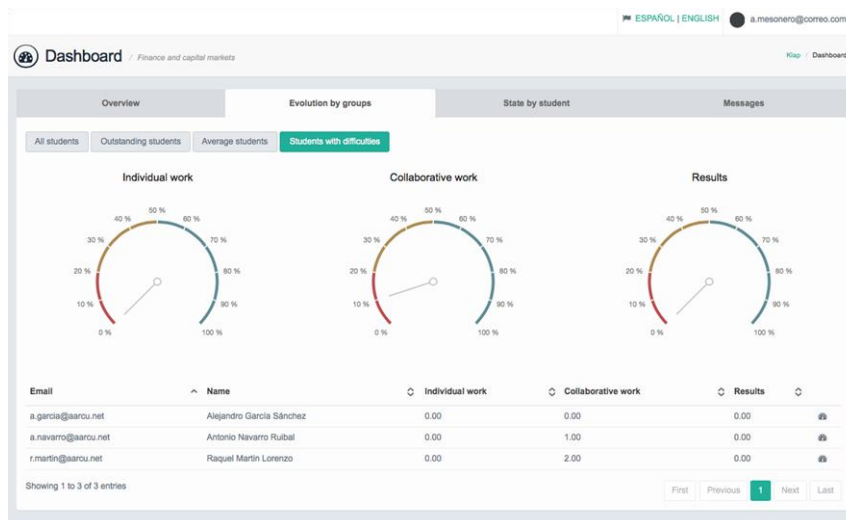
LISSA provides an overview of every key moment in chronological order up until the period in which the advising sessions are held: the grades of the positioning test (a type of entry-exam without consequence), mid-term tests, January exams, and June exams. A general trend of performance is visualised at the top: the student path consists of histograms showing the position of the student among their peers per key moment (Charleer et al., 2018).



Source: Charleer et al. (2018)

4. SmartKlass (moodle)

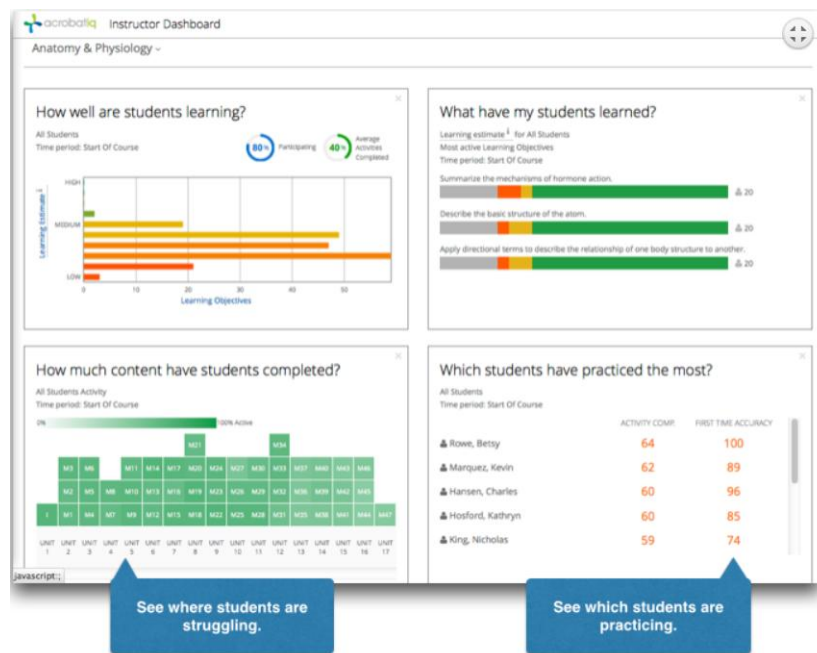
[SmartKlass™](#) is a Learning Analytics dashboard for Institutions, Teachers and Students. By analyzing student's behavioral data SmartKlass™ creates a rich picture of the evolution of the students in an online course: it can help teachers to identify the students lagging behind, help teachers to identify the students that content is not challenging enough for them, help teachers to compare participation and results to other courses, so the teachers can take action. Students can also learn about their performance, individually and compared with the group.



Source: https://moodle.org/plugins/local_smart_klass

5. Acrobatiq

The [Learning Dashboard](#) generates summary graphs, tables and reports and dynamically displays student learning estimates, engagement data and activity data in real time. It enables faculty, students, and other stakeholders to visualize and act on student learning performance. It can be used for revealing what students did/not learn, quantifying how well students have learned each skill, identifying consequential patterns in students' learning behaviors, and measuring effectiveness of instructional and design choices.



Source: <http://acrobatiq.com/products/the-learning-dasboard/#>

[end of page]

(Learning Object #3.2.2.6 - VIDEO)
The Signals and KlassData examples

Course Signals was developed to allow instructors the opportunity to employ the power of learner analytics to provide real-time feedback to a student. Course Signals relies not only on grades to predict students' performance, but also demographic characteristics, past academic history, and students' effort as measured by interaction with Blackboard Vista, Purdue's learning management system (Arnold & Pistilli, 2012).



External Video: [Course Signals Explanation](#) [2:15]

The learning process in virtual environments is more complex to analyze, but the generated data unlocks the power of learning analytics and opens the door to personalized paths in education. The KlassData application shows you how.



External Video: [KlassData: Learning Analytics for Education](#) [2:23]

What comes next is to understand what the visualizations tell about your learning analytics objectives. As we have already explained, if there is no action upon learning analytics, they are useless. Next, we will discuss the interpretation of learning analytics and how you can infer the changes in learning that will lead you to intervention.

[end of page]

(Learning Object #3.2.2.7 - Activity)

Poll/Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

1. Can you **describe the most common data representation techniques** used in learning analytics?
 - ☐ Yes
 - ☐ No
2. Can you explain **why different representation ways are needed** to display the data analysis results?
 - ☐ Yes
 - ☐ No
3. Have you understood what the **benefits from visualization dashboards in learning analytics** are?
 - ☐ Yes
 - ☐ No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about the data representation techniques in learning analytics, in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

1. Provide 2 examples of learning analytics metrics and explain what type of representation method you would employ to demonstrate their role. Please, elaborate on your choices.
2. Assume that you want to get insight about learners' engagement in an online activity. What learning analytics metrics you would consider and what visualizations would you provide on a dashboard to monitor how these metrics change? Please, elaborate on your decisions/suggestions.

[end of page]

(Learning Object #3.2.2.8 HTML page)

References

REFERENCES

- Arnold, K. E., Pistilli, M. D. (2012). Course signals at Purdue: using learning analytics to increase student success. In Proceedings of the 2nd International Conference on Learning Analytics and Knowledge (LAK '12), Simon Buckingham Shum, Dragan Gasevic, and Rebecca Ferguson (Eds.). ACM, New York, NY, USA, 267-270. DOI=<http://dx.doi.org/10.1145/2330601.2330666>
- Blits, S. (2017). “10 useful ways to visualize your data with examples”, <https://www.sisense.com/blog/10-useful-ways-visualize-data-examples/>
- Charleer, S., Moere, A. V, Klerkx, J., Verbert, K., & De Laet, T. (2018). Learning Analytics Dashboards to Support Adviser-Student Dialogue. IEEE Transactions on Learning Technologies, 11(3), 389–399. <https://doi.org/10.1109/TLT.2017.2720670>
- Gutiérrez, F., Seipp, K., Ochoa, X., Chiluita, K., De Laet, T., Verbert, K. (2018) LADA: A learning analytics dashboard for academic advising, Computers in Human Behavior, <https://doi.org/10.1016/j.chb.2018.12.004>
- Park, Y., & Jo, I. (2015). Development of the Learning Analytics Dashboard to Support Students' Learning Performance. J. UCS, 21, 110-133.
- Few, S. (2004). Dashboard Confusion, Perceptual Edge.
- Kiss, M. (2018). “10 Tips for presenting data”, <https://resources.observepoint.com/blog/10-tips-for-presenting-data>
- Lebied, M. (2016). “How to Build Interesting Data Reports People Love to Read”, <https://www.datapine.com/blog/data-reports-people-love-to-read/>
- “General plugins (Local): SmartKlass™ Learning Analytics Moodle”, https://moodle.org/plugins/local_smart_klass
- “Adaptive courses with learning analytics | Acrobatiq”, <http://acrobatiq.com/products/the-learning-dasboard/>

FURTHER READINGS

- Bodily, R., Ikahihifo, T.K., Mackley, B. et al. (2018). The design, development, and implementation of student-facing learning analytics dashboards, Journal of Computing in Higher Education, 30(3), 572-598. <https://doi.org/10.1007/s12528-018-9186-0>

Volaric, T., & Ljubic, H. (2017). Learner and course dashboards for intelligent learning management systems. 25th International Conference on Software, Telecommunications and Computer Networks (SoftCOM), 1-6.

“Data Presentation”, <http://academic.sun.ac.za/emergencymedicine/trrm/module5/BS1-3.htm>

“Learning Analytics Examples”, <https://isit.arts.ubc.ca/learning-analytics-examples/>

VIDEO

[The Value of Data Visualization](#)

[Course Signals Explanation](#)

[KlassData: Learning Analytics for Education](#)

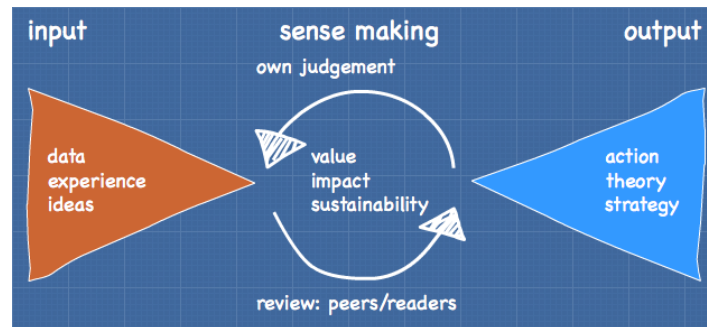
[end of page]

3.3 Interpreting learning analytics and inferring learning changes

3.3.1 Making sense of learners' data analytics and analysis results

(Learning Object #3.3.1.1 - Activity)

Poll: Learning analytics in practice: Understanding the meaning in data



Source: <https://innerventur.es/2016/05/31/making-sense-of-sensemaking/>

Poll: Learning analytics in practice: Understanding the meaning in data

Let's learn a bit more about your understanding of how learning analytics can give insight to learning processes and how they can be used to inform instructional decisions. Please answer the poll questions below.

1. Have you ever used learning analytics to **monitor** your students?
 - ☐ Yes
 - ☐ No
2. Do you believe that **learning analytics visualizations and reports can be associated with learning objectives?**
 - ☐ Yes
 - ☐ No
3. Would you **base your instructional decisions on the representation on learning analytics metrics?**
 - ☐ Yes
 - ☐ No

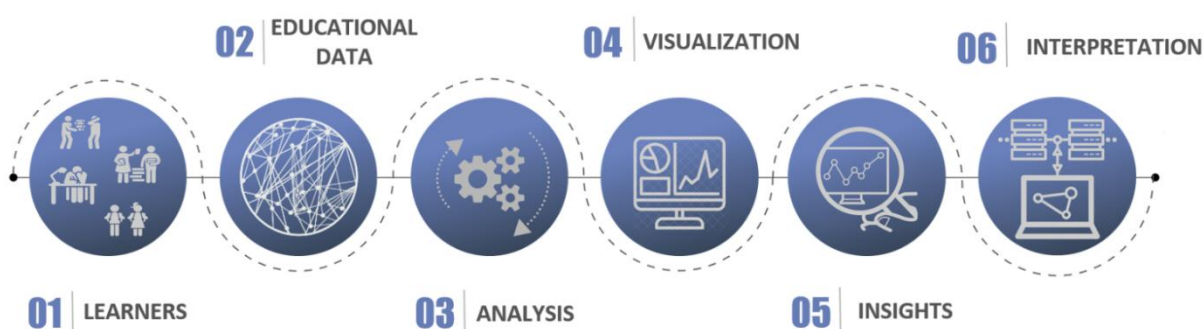
Thank you for answering these questions. You may wish to check the results again after more people have completed the poll to review the responses of other learners of this course.

[end of page]

Making sense of the learners' data and measurements: some examples

The **intersection of learning science with data and analytics** enables more sophisticated ways of **making meaning** to support student learning. All these available learner and context data “carry” so much knowledge about the learners and the learning processes, that remains hidden and waits to be revealed.

But, data from tracking systems are not inherently intelligent. *Hit counts* and *access patterns* do not really explain anything. **The intelligence is in the interpretation of the data**; what all those statistics about the learner's data and measurements can inform us about. For example, *login frequencies*, *time-spent on tasks* or *numbers of forum posts* do **not measure the impact** on students' learning. However, the data analysis techniques can reveal **potential relationships between metrics** that otherwise, in a human-analysis perspective, would be **undiscoverable** or even ignored. In the above example, learning analytics metrics such as *time-spent* or *frequencies of attempts* can be used to identify *specific units of study or assignments* in a course that are difficult (or trivial) for most of the students, and reveal *the correlation between task-difficulty and student behaviour*. Ideally, data analysis techniques enable the visualization of interesting data that in turn sparks the investigation of this data.



The statistical analysis uses a *combination of potentially actionable metrics* to predict an outcome that needs attention and improvement. For example, to predict the successful completion of an assignment, metrics can include *measurable events*, such as time-spent on-task, on-task mental effort, number of attempts to solve a task, frequency of question posing, frequency of help-seeking, etc. *Less obvious data* can also be used, such as non-cognitive variables, like stress levels, emotional intensity, attention, etc. Analyses provide

a score for each student, so students can be grouped objectively into categories needing high-, medium- or no-intervention to successfully complete the assignment. **The analysis cannot say that the learning analytics metrics caused the outcome, but it can show what combination of indicators is related to the outcome.** Your data reports and visualizations will help you to *identify historical trends and correlations*, which you can use to understand *what happened and (probably) why*.

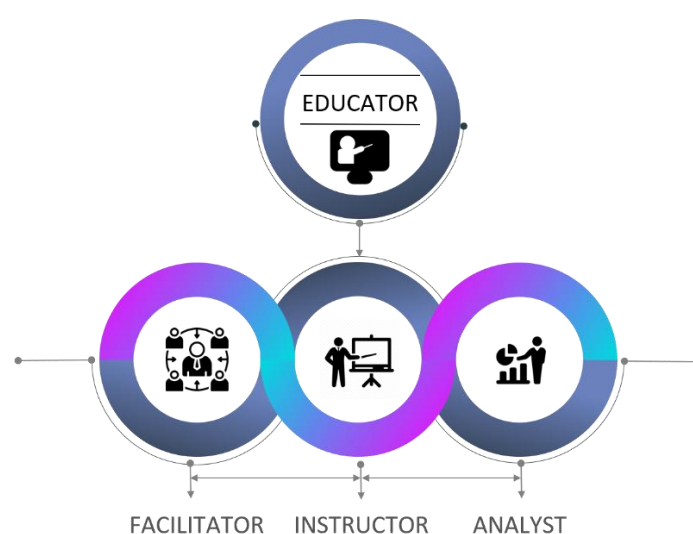
Behavioural data can also be used to track *students' approaches to study*. For example, *frequency and sequence of interactions* can be tracked, as students engage with learning tasks. While this may **not directly measure student learning**, it can provide insights on the student's on-task activity and help to **identify strategies** that could improve *how they plan and regulate their study*.

[end of page]

(Learning Object #3.3.1.3 - HTML page)

Discovery of patterns and interpretation in educationally meaningful ways

Data science is promising to have a substantial influence on the understanding of learning in online and blended learning environments. This, of course, implies a shift on the typical role of educators, from being instructors and facilitators to performing some of the tasks data analysts usually hold. They need to be able to discover the patterns in the data and convey the meaning in educational terms, that is to interpret the analysis results into meaningful learning schemas.



The more you will use the learning analytics metrics, tools and visualization dashboards, the more you will understand what the story that the data can tell is, and what the most important patterns in the data are in explaining your students' engagement, progress and outcomes. The analysis might reveal correlations between metrics that you had never thought of before, and behavioural patterns that are repeated from student to student and from class to class.

As you move from efficiency metrics to effectiveness metrics to outcomes (#3.1.1.5), keep in mind that all **metrics are proxies for what ultimately matters**. The different types of analytics facilitate the selection of the most appropriate metrics and guide their interpretation. The next section elaborates on how you can associate the analysis outcomes with the learning analytics objectives and the analytics types.

[end of page]

(Learning Object #3.3.1.4 - HTML page)

Associating the results to the objective and analytics type

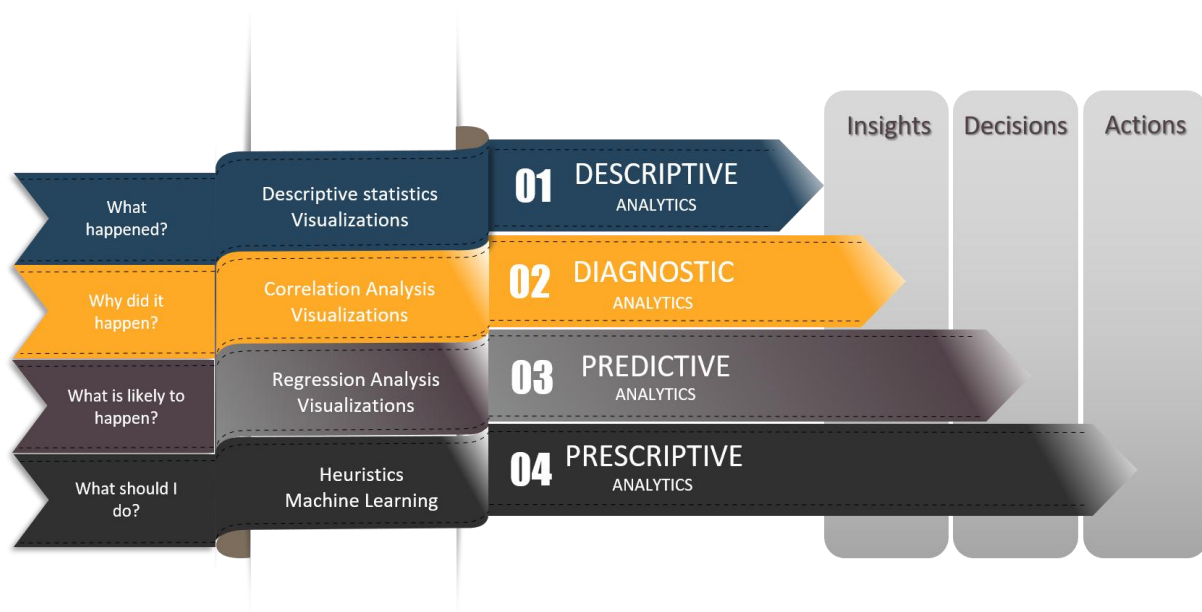
As you already know, the common objectives of learning analytics include monitoring learners' progress, modelling learners/learners' behaviour, detecting learner's emotions, predicting learning performance/dropout/retention, generating feedback, providing recommendations, guiding adaptation, increasing self-reflection/self-awareness, and facilitating self-regulation.

To address these objectives, four types of learning analytics can be used, namely descriptive, diagnostic, predictive and prescriptive analytics.

[Tata Interactive Systems' report](#) gives a comprehensive overview of different levels of learning analytics and of how bases of and approaches to using analytics have changed over time.

Each analytics type can be supported and facilitated by specific data analysis methods that are appropriate for that type of data transformations. For example, descriptive statistics and simple visualizations (using bar graphs, histograms, etc.) are the suitable analysis technique to provide descriptive analytics. Similarly, correlation analysis better facilitates diagnostic analytics, whereas regression analysis is commonly used for prediction purposes, and as such it is an indicative analysis technique for predictive analytics. When it comes to prescriptive analytics, more sophisticated analysis techniques can be employed (e.g., heuristics, machine learning), which, however, require strong background in data science and are beyond the scope of this module.

Now, depending on the objectives and the types of analytics used, the interpretation of the analysis results can vary from gaining insights, to making decisions, to taking actions.



For example, let's assume that, in anticipation, you want to early predict your students' success in the final exams in order to provide them proactive feedback, recommendations, support their self-regulated learning strategies, and prevent failure or drop-out. Let's also assume that you have available all the data from the students' activity during the semester (online participation, assignments' completion, quizzes' scores, etc.). The learning management system you are using can provide you with all the *descriptive statistics* about your students' progress, engagement, achievement, misconceptions, etc., and deliver this information using multiple visualizations of the different learning analytics metrics, demonstrating some critical interrelationships between them and facilitating some *diagnostic* operations. The dashboard can also provide the result from a regression analysis in graphical formats that considers the most critical metrics and forecasts the evolution of the *prediction* variable (e.g., success in final exams) and displays the tendencies in the metrics. If you combine all this graphical information, that is the result of the analytics processing, you will be able to *associate the numerical facts with each student's progress and learning needs*.

[end of page]

(Learning Object #3.3.1.5 - Activity)

Poll/Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

1. Can you **associate the types of learning analytics metrics with the type of learning objective?**
 - ☐ Yes
 - ☐ No
2. Did you understand **why different types of learning analytics objectives are related to different data analysis techniques?**
 - ☐ Yes
 - ☐ No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your response about the learning analytics interpretations, in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

1. Provide 2 examples of learning analytics objectives and explain what learning analytics type you would employ to achieve those objectives. Please, elaborate on your choices.

[end of page]

References

REFERENCES

- Rienties, B., Cross, S., Marsh, V. & Ullmann, T. (2017) Making sense of learner and learning Big Data: reviewing five years of Data Wrangling at the Open University UK, Open Learning: The Journal of Open, Distance and e-Learning, 32:3, 279-293, DOI: 10.1080/02680513.2017.1348291
- “3 Tips To Turn Learning Analytics Into Actionable Outcomes”, <https://elearningindustry.com/turn-learning-analytics-into-actionable-outcomes-3-tips>
- Danelutti, S. (2016). “Making sense of sensemaking”, <https://innerventur.es/2016/05/31/making-sense-of-sensemaking/>
- Merceron, A., Blikstein, P., and Siemens, G. (2015). Learning Analytics: From Big Data to Meaningful Data, Journal of Learning Analytics, 2(3), 4-8.
- MPS Interactive Systems Limited, “Learning Analytics in Enterprise Performance Management”, http://www.tatainteractive.com/pdf/White%20paper_Learning_Analytics_in_EPM.pdf
- “Digital Learning and Analytics – How to Make Organizational Training Profitable”, <https://www.valamis.com/blog/digital-learning-and-analytics-how-to-make-organization-training-profitable>

[end of page]

3.3.2 Explaining the data analysis results in an educationally meaningful manner to understand learners and the environment they learn in

(Learning Object #3.3.2.1 - Activity)

Poll: Taking you from information to insight



Source: <http://www.biftechnologies.com/making-data-meaningful-recovered-05-3>

Poll: Taking you from information to insight

Now that you have better understanding of learning analytics and how they can be used to inform educational decisions, let's find out how they can be connected with teaching. Please answer the poll questions below.

1. Do you believe that learning analytics on their own can **improve instruction**?
 - ☐ Yes
 - ☐ No
2. Would you use **all the metrics that you are collecting** to inform instructional decisions?
 - ☐ Yes
 - ☐ No

Thank you for answering these questions. You may wish to check the results again after more people have completed the poll to review the responses of other learners of this course.

(Learning Object #3.3.2.2 - VIDEO)

Elaborating on the results from learners' data analysis: towards taking actions

What analytics cannot do by themselves is improve instruction. While they can point to areas in need of improvement and they can identify engaging practices, the numbers cannot make suggestion for improvements. This requires a human intervention.

Intervention should be personalized to the learner – based on their engagement and/or performance data and any personal information you may have. For example, if you notice that a student stopped participating in online forums just before their performance began to drop, it would be proper to encourage the student to resume their involvement in the forums. At the same time, it could be helpful to get feedback from the student to find out why they stopped participating. There may have been an event in the course or some other obstacle that you should address in order to facilitate the student's involvement in the online forums.

Effective intervention may involve adapting teaching styles. If your students tend to do better with certain kinds of media, interactivity, or assessments, the course design should be adapted to enable better learning.

However, some learning professionals are hesitant to initiate a learning analytics practice for two reasons: the perception that they must address everything at once, and the concern that leadership will use the insights in a penalizing way.

Watch the next video on how learning analytics can be used to inform teaching practise.



External Video: [Learning Analytics to inform teaching practice \[7:44\]](#)

[end of page]

(Learning Object #3.3.2.3 - VIDEO)

Making data useful

If a metric is not informing a decision, there's no need to keep gathering it. If it is, optimize the specific data and learn how to turn it into insights that inform decisions that matter. Over time, add more metrics, always keeping in mind the decisions they inform. The data you collect should be a combination of engagement and performance data – but be sure you're not collecting information that you won't use.

The next video demonstrates an example of how data can be effectively used and how you can give meaning to data.



External Video: [Jisc Learning Analytics: Making data useful](#) [9:22]

[end of page]

(Learning Object #3.3.2.4 - Activity)

Poll/Discussion

ACTIVITY/PRACTICE QUESTION (Poll)

1. Did you understand how learning analytics can be used to inform teaching practice?
 - Yes
 - No
2. Can you discriminate between metrics that can inform instructional decisions from those that simply measure something you cannot act upon?
 - Yes
 - No
3. Do you understand where human intervention and data-awareness intersect?
 - Yes
 - No

[end of page]

References

REFERENCES

- Corrin, L., Kennedy, G., de Barba, P.G., Lockyer, L., Gašević, D., Williams, D., Dawson, S., Mulder, R., Copeland, S., & Bakharia, A. (2016). Completing the Loop: Returning Meaningful Learning Analytic Data to Teachers. Sydney: Office for Learning and Teaching.
- Gašević, D., Dawson, S., Rogers, T., & Gasevic, D. (2016). Learning analytics should not promote one size fits all: The effects of instructional conditions in predicting academic success. *The Internet and Higher Education*, 28, 68–84.
<https://doi.org/https://doi.org/10.1016/j.iheduc.2015.10.002>
- Reimann, P. (2016) Connecting learning analytics with learning research: the role of design-based research, *Learning: Research and Practice*, 2:2, 130-142, DOI: 10.1080/23735082.2016.1210198
- Sampson, D. (2016). “Teaching Analytics: Analyze Your Lesson Plans To Improve Them”,
<https://elearningindustry.com/teaching-analytics-analyze-lesson>
- Prieto, L. P., Sharma, K., Dillenbourg, P., and Rodríguez-Triana, M. J. (2016). Teaching analytics: towards automatic extraction of orchestration graphs using wearable sensors. In *Proceedings of the Sixth International Conference on Learning Analytics & Knowledge (LAK '16)*. ACM, New York, NY, USA, 148-157. DOI: <https://doi.org/10.1145/2883851.2883927>
- Rienties, B. (2018). “The power of learning analytics to impact learning and teaching: a critical perspective”, <https://iet.open.ac.uk/presentations/265>

VIDEO

[Learning Analytics to inform teaching practice](#)

[Jisc Learning Analytics: Making data useful](#)

[end of page]

Module 3

MULTIPLE CHOICE QUIZ

This quiz contributes to the final assessment for receiving the Learn2Analyse MOOC **Certificate of Achievement**. Your grade in the course is calculated based on your replies to **100 multiple choice quizzes** distributed to the 6 core modules. In order to successfully complete this course and gain your Certificate of Achievement you must gain a mark of **60% or greater** overall to all 100 quizzes.

The quiz of Module 3 consists of **15 questions**, including:

- multiple choice with one correct answer;
- multiple choice with more than one correct answer; and
- true/false questions.

It is "open book" and there is no set time limit.

You will have **two attempts** to answer all quiz questions except for the "true/false" questions. When you click "Check", it will register as your first attempt. If your answer is incorrect, try again and then click "Final Check".

It should take less than **45 minutes** of your time to complete this quiz.

TOPIC 3.1:

Using learner-generated data and learning context for extracting learning analytics

Question 3.1: The four essential elements involved in all learning analytics processes include:

1. data, analysis, report and prediction
2. monitoring, analysis, report and action
3. data, analysis, report and action
4. monitoring, analysis, prediction and action

Question 3.2: The learning analytics metrics can be obtained from:

1. the same learner and context data
2. the same or different learner and context data
3. different learner and context data
4. none of the above

Question 3.3: The types/levels of the metrics according to their sophistication from the simplest to the most complex are:

1. Descriptive, diagnostic, predictive, prescriptive
2. Diagnostic, descriptive, predictive, prescriptive

3. Descriptive, diagnostic, prescriptive, predictive
4. Diagnostic, descriptive, prescriptive, predictive

Question 3.4: What factors are additive to the existing difficulty in handling educational data quality?

1. Heterogeneity of educational data sources
2. High volumes of learner and learning data
3. Unstructured data types extracted
4. All the above

Question 3.5: The “ethics considerations” in learning analytics refer to (there are 2 correct answers. Please, select both):

1. how appropriate the learning analytics metrics are, how fit-for-purpose they are as data that will be used in the decision-making process in turn
2. tackling the potential for data misuse, and issues about the right, legitimate, and proper ways to use data
3. systemising, defending, and recommending concepts of right and wrong conduct in relation to data
4. the “condition” of the data themselves - the degree to which a set of characteristics of data fulfills requirements

Question 3.6: The DELICATE instrument includes policies and guidelines regarding privacy, legal protection rights or other ethical implications that address learning analytics.

1. True
2. False

TOPIC 3.2: Analyzing data and presenting learning analytics

Question 3.7: Statistical methods can also be used to (select all correct answers):

1. signify the importance of the analysis results
2. explain more complex constructs of learning, e.g., engagement
3. model learner performance
4. detect learners’ affective states

Question 3.8: The statistic measure that quantifies the amount of variation or dispersion of a set of data values, or otherwise, how close the data points are to the mean is:

1. Median
2. Mode
3. Range
4. Standard deviation

Question 3.9: To determine if a correlation exists between the data, and how strong it is, you would use:

1. Scatter-plot
2. Histogram
3. Box-plot
4. Exploratory data analysis

Question 3.10: The test scores of two groups of students are examined and proven to be different. The ANOVA will tell you:

1. why they are different, but not if the difference is significant
2. if the difference is significant, but it does not speculate regarding “why”
3. the nature of the relationship between the two test scores (positive, negative, strong, weak)
4. the causation of the significant difference

Question 3.11: Data visualization tools provide an accessible way to (there are 2 correct answers. Please, select both):

1. see and understand trends, outliers, and patterns in data
2. highlight similarities, disparities and other relationships, or the lack of, in the dataset
3. determine whether one variable is a predictor of another variable
4. determine whether or not the difference in the means of two sampled groups is statistically significant or due to random chance
5. generalize the results to a larger population

Question 3.12: Learning analytics dashboards can be used to:

1. determine if there is a relationship between quiz performance and content access
2. answer to how well an individual student did in comparison to the entire class
3. display student learning estimates, engagement data and activity data in real time
4. showcase the overall performance on a quiz

TOPIC 3.3: Interpreting learning analytics and inferring learning changes

Question 3.13: In what way the analysis of educational data is meaningful?

1. can tell that the learning analytics metrics caused the outcome
2. can directly measure student learning
3. can measure the impact of learning analytics metrics on students’ learning
4. can show what combination of indicators is related to the outcome

Question 3.14: Why learning professionals are hesitant to initiate a learning analytics practice (there are 2 correct answers. Please, select both)?

1. the perception that they must address everything at once

2. the concern that leadership will use the insights in a penalizing way
3. they are not familiar with data analysis techniques and data science in general
4. they are worried about meaningfully interpreting learning analytics to actionable insights

Question 3.15: What should you do if a metric is not informing a decision?

1. keep gathering it in case it will be useful in the future
2. combine it with other metrics that inform a decision
3. there's no need to keep gathering it
4. change it so it can give meaning to data

Learn2Analyze

Knowledge Alliances (Key Action 2)

AGREEMENT NUMBER: 2017 - 2733 / 001 – 001

PROJECT NUMBER: 588067-EPP-1-2017-1-EL-EPPKA2-KA

WP3. Learn2Analyse MOOC Design and Development

Result 6a Learn2Analyze MOOC version 1 Learning Materials

Module 4: Teaching Analytics

Module 4

Teaching Analytics

Estimated Effort to complete: 8 hours

Assessment Multiple Choice Questions: 15

4.0 Introduction		
4.0.1 Introduction & Scope	LO#4.0.1.1 HTML page: Module 4 scope	
4.0.2 Learning outcomes	LO#4.0.2.1 HTML page: Module 4 learning outcomes	
4.0.3 Poll: Your teaching philosophy	LO#4.0.3.1 ACTIVITY: Poll: Your teaching philosophy	
4.1 Data sources for supporting teaching analytics		
4.1.1 Designing for teaching and learning	LO#4.1.1.1 ACTIVITY: Poll: You and teaching with data support LO#4.1.1.2 HTML page: Learning LO#4.1.1.3 HTML page: Teaching LO#4.1.1.4 HTML page: Design of learning environments LO#4.1.1.5 VIDEO: Instructional design LO#4.1.1.6 HTML page: Learning design LO#4.1.1.7 HTML page: TPACK model LO#4.1.1.8 ACTIVITY: Poll & Discussion LO#4.1.1.9 HTML page: References and further readings	
4.1.2 Data sources within the instructional design process	LO#4.1.2.1 ACTIVITY: Poll: Know your data sources for teaching LO#4.1.2.2 HTML page: Broadening the perspective for data-driven education LO#4.1.2.3 HTML page: Data sources within a holistic analytics framework LO#4.1.2.4 HTML page: Sources of learner data LO#4.1.2.5 HTML page: Sources of online learning data LO#4.1.2.6 ACTIVITY: Transfer & Discussion LO#4.1.2.7 HTML page: References and further readings	
4.1.3 Key concepts of data quality and limitations of data meaningfulness	LO#4.1.3.1 ACTIVITY: Poll: Is your data meaningful? LO#4.1.3.2 HTML page: Data quality in educational contexts LO#4.1.3.3 HTML page: Core dimensions of data quality LO#4.1.3.4 HTML page: Dimensions of educational data quality LO#4.1.3.5 HTML page: Data quality problems LO#4.1.3.6 ACTIVITY: Reflection & Transfer LO#4.1.3.7 VIDEO: Additional material: Workshop documentation LO#4.1.3.8 HTML page: References and further readings	
4.2 Data ethics and privacy principles for teaching analytics		
4.2.1 Awareness toward data privacy	LO#4.2.1.1 ACTIVITY: Poll: Are you transparent with regard to data analytics? LO#4.2.1.2 HTML page: Ethical and privacy challenges	

	associated with the application of educational data analytics LO#4.2.1.3 VIDEO: Educational data analytics and privacy LO#4.2.1.4 HTML page: Privacy in the digital world LO#4.2.1.5 HTML page: Ethical principles LO#4.2.1.6 ACTIVITY: Reflective discussion LO#4.2.1.7 HTML page: References and further readings	
4.2.2 Distinguish different levels of data protection	LO#4.2.2.1 ACTIVITY: Poll: Do you protect learning and teaching data? LO#4.2.2.1 VIDEO: EU GDPR compliance LO#4.2.2.2 VIDEO: Preparing to protect educational data LO#4.2.2.3 HTML page: Understand your data map LO#4.2.2.4 ACTIVITY: Workshop: data consent form LO#4.2.2.5 ACTIVITY: Poll & Discussion LO#4.2.2.6 HTML page: References and further readings	
4.2.3 Identify issues of authorship, ownership, data access and data-sharing	LO#4.2.3.1 HTML page: Privacy calculus LO#4.2.3.2 HTML page: Educational data analytics benefits LO#4.2.3.3 VIDEO: Data for instructional support LO#4.2.3.4 HTML page: Consent and anonymity LO#4.2.3.5 HTML page: Data privacy in productive systems LO#4.2.3.6 HTML page: Use Case: Curtin Challenge LO#4.2.3.7 ACTIVITY: Reflective discussion LO#4.2.3.8 HTML page: References and further readings	
4.3 Applying and communicating educational data and analytics findings		
4.3.1 Designing and revising automated and semi-automated interventions	LO#4.3.1.1 ACTIVITY: Poll: Are your interventions automated? LO#4.3.1.2 VIDEO: Adaptive learning LO#4.3.1.3 HTML page: Adaptive learning technologies LO#4.3.1.4 HTML page: Automated and semi-automated interventions LO#4.3.1.5 HTML page: Instructional design principles for adaptivity LO#4.3.1.6 ACTIVITY: Workshop: tools for adaptivity LO#4.3.1.7 ACTIVITY: Poll LO#4.3.1.8 HTML page: References and further readings	
4.3.2 Methodologies for improving learning and teaching processes as well as curricula	LO#4.3.2.1 HTML page: Creating interventions in classroom settings LO#4.3.2.2 HTML page: Educational Design Research at a glance LO#4.3.2.3 VIDEO: Proliferation of design-based approaches LO#4.3.2.4 HTML page: Conducting educational design research LO#4.3.2.5 HTML page: Designing model-based learning environments LO#4.3.2.6 ACTIVITY: Poll LO#4.3.2.7 HTML page: References and further reading	
Single / Multiple Choice Quiz		

4.0 Introduction

4.0.1 Introduction & Scope

[\(Learning Object #4.0.1.1 HTML page\)](#)

Scope of Module 4 “Teaching Analytics”

This module will introduce the basics of methods and tools for analysing and interpreting educational data for facilitating educational decision making, including course and curricula design.

Teaching analytics use static and dynamic information about the design of learning environments for near real-time modelling, prediction, and optimisation of learning artefacts, learning designs, learning processes, curriculum designs, and educational decision making.

The first topic focuses on data sources for supporting teaching analytics. You will reflect on the instructional design process and locate data sources for optimising learning environments as well as understand limitations and requirements for data quality.

The second topic includes critical reflections on data ethics and privacy principles. You will build awareness toward data privacy, distinguish different levels of data protection and identify issues of authorship, ownership, data access and data-sharing.

The third topic addresses the application and communication of educational data and analytics findings to various stakeholders. You will design and revise automated and semi-automated interventions as well as apply methodologies for improving the design of learning environments, teaching processes as well as curricula.

In order to warm-up, explore the “didactic triangle” and reflect what data may stem from each of the key concepts and related interactions.

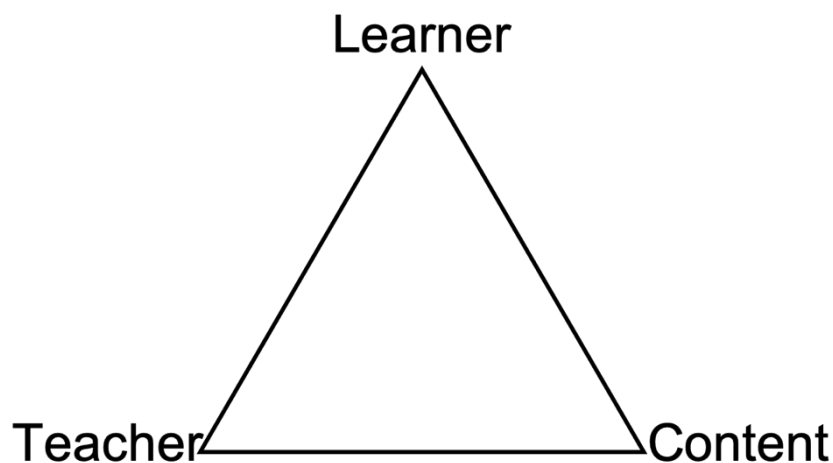


Figure 4.0.2.1: Didactic triangle

[\[END OF PAGE\]](#)

4.0.2 Learning outcomes

([Learning Object #4.0.2.1 HTML page](#))

Module 4 Learning Outcomes

By completing this module, you will:

Module 4 Learning Objectives	Learn2Analyse Educational Data Literacy Competence Profile
Know how to identify data sources within the educational design process	1.1
Be able to explain key concepts of data quality for data collected in the educational design process	1.2
Be able to design automated and semi-automated interventions based on educational data	4.4
Know and understand how to revise course tasks and contents based on educational data	5.1
Be able to construct adequate criteria and indicators for evaluating the impact of a data-driven intervention in educational design of online and blended courses	5.2
Be able demonstrate awareness of data privacy and distinguish between different levels of data protection in educational design of online and blended courses	6.2
Be able to explain the differences between the concepts of authorship, ownership, data access, renegotiation, and data-sharing in education design	6.3

[END OF PAGE]

4.0.3 Poll: Your teaching philosophy

(Learning Object #4.0.3.1 ACTIVITY)

Poll: Your teaching philosophy

A teaching philosophy is regarded as the systematic and critical rationale that focuses on the important components defining effective teaching and learning in a particular discipline and/or institutional context (Schönwetter et al., 2002).

Please share your own teaching philosophy with the course members by documenting it in the text-box below. If possible, pay special attention on how data and analytics may influence your teaching philosophy.

My teaching philosophy is ...

You may check back later for other results after more learners have completed the activity to review the responses of other learners of this course.

[END OF PAGE]

4.1.1 Designing for teaching and learning

(Learning Object #4.1.1.1 ACTIVITY)

Poll: You and teaching with data support

To start with, let's learn a bit more about your teaching experience supported through data. Please answer the poll questions below.

Activity/practice question (poll):

1. Do you refer to different sources of data when designing your learning environments?
 - ☐ Yes
 - ☐ No
2. Do you analyse data to inform your teaching practice in (near) real-time, i.e., while teaching a class (online or face-to-face)?
 - ☐ Yes
 - ☐ No
3. Do you use specific tools to collect and analyse data to inform your teaching?
 - ☐ Yes
 - ☐ No

Thank you for answering your questions. You may check back later for additional results and a comparison with other learners of this module.

[END OF PAGE]

Learning

According to Norbert Seel and Dirk Ifenthaler (2009), learning involves a stable and persisting change of what a person knows, requiring mental representations. The processes that result in learning (e.g., learning activities) can be and often are distinguished from the products of learning (e.g., learning outcomes), as discussed by J. Michael Spector, Tristan Johnson, and Patricia Young (2014).

Several theories of learning have been postulated over the 20th and 21st centuries: Behaviourism, Cognitivism, Constructivism, Connectivism. The following figure illustrates the theories of learning, how learning is conceptualised and what factors may influence learning.

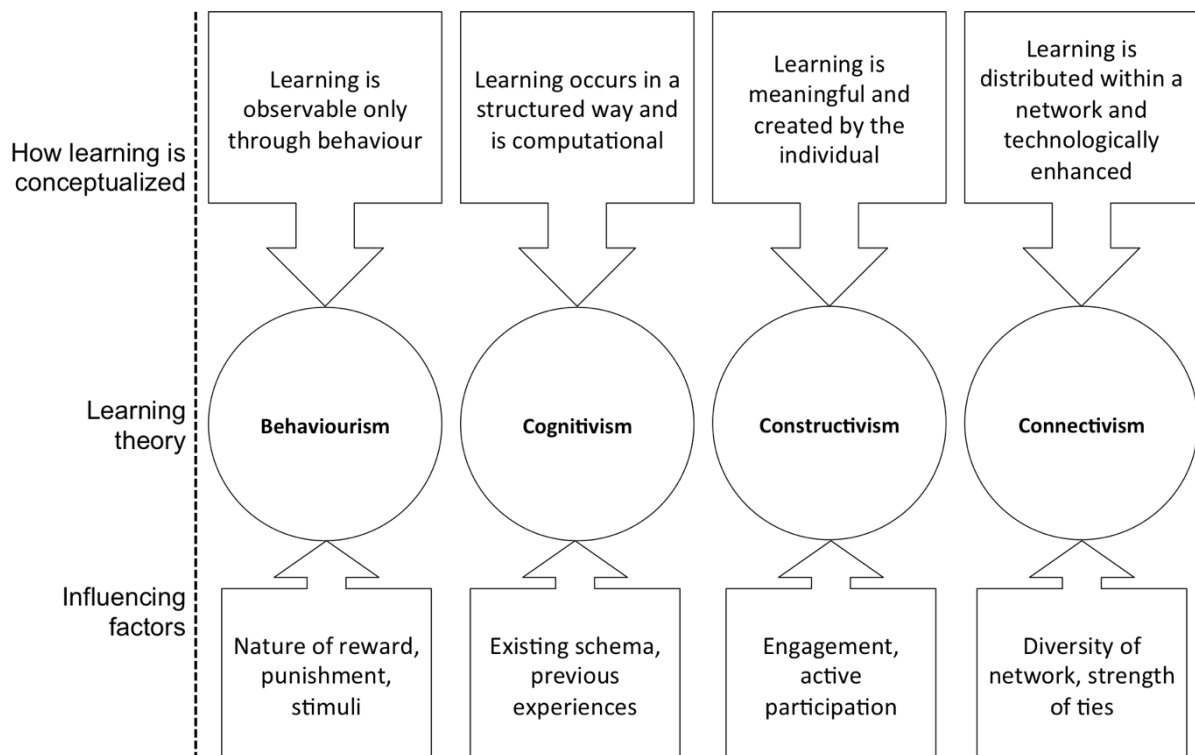


Figure 4.1.1.1: Overview on learning theories (Ifenthaler & Schumacher, 2016)

[END OF PAGE]

Teaching

Teaching is considered as deliberate actions undertaken with the intention of facilitating learning.

Hence, when it comes to teaching, the relevant input and output characteristics for designing a learning environment need to be identified. The elementary parts of teaching include matching of content elements, psychological operations and didactic considerations (Scheerens et al., 2007).

Doyle (1985) defines seven key criteria for effectiveness of teaching as follows:

1. Teaching goals are clearly formulated;
2. The course material to be followed is carefully split into learning tasks and is placed in sequence;
3. The teacher explains clearly what the pupils must learn;
4. The teacher regularly asks questions to gauge pupils' progress and understanding;
5. Pupils have ample time to practice what has been taught, with much use of "prompts" and feedback;
6. Skills are taught until mastery is automatic;
7. The teacher regularly tests the pupils and calls on them to be accountable for their work.

The following table provides an overview of phases in the structuring of teaching (Scheerens et al., 2007):

Table 4.1.1.1 Stages in preparing, executing, and evaluating the teaching act (Scheerens et al., 2007)	
Content dimension	Psychological dimension
- decomposition of content in sequences that represent the structure of the subject matter area	- taxonomy of cognitive, affective, and psychomotor operations that reflect increasing complexity
COMBINE BOTH DIMENSIONS IN	SEQUENCES OF INSTRUCTIONAL OBJECTIVES
- creating tasks and task sequences with pedagogical potential	- taking into consideration cognitive complexity and emotional meaning of tasks
COMBINE BOTH IN	LESSON PLANS AND SCRIPTS
- actual teaching in which multiple representations and explanations of content elements are given	- taking into consideration possible misconceptions, typical difficulties, and frequently made mistakes
COMBINE BOTH IN	TEACHING
- constructing content elements for the development of items for formative and summative assessment instruments	- adding representations of expected psychological operations, with different degree of complexity to each content element of item
COMBINE BOTH IN	ITEM BANKS AND TESTS IN WHICH DIFFICULTY LEVEL AND ABILITY ARE IDENTIFIABLE DIMENSIONS

[END OF PAGE]

Design of learning environments

Learning environments are physical or virtual settings in which learning takes place. Learning theory provides the fundament for the design of learning environments. However, there is no simple recipe for designing learning environments (Ifenthaler, 2012).

Generally, the design of learning environments includes the three simple questions: What is taught? How is it taught? How is it assessed? Yet, the design of learning environments is not simply asking the above stated three questions. Rather, it includes a systematic analysis, planning, development, implementation, and evaluation phases.

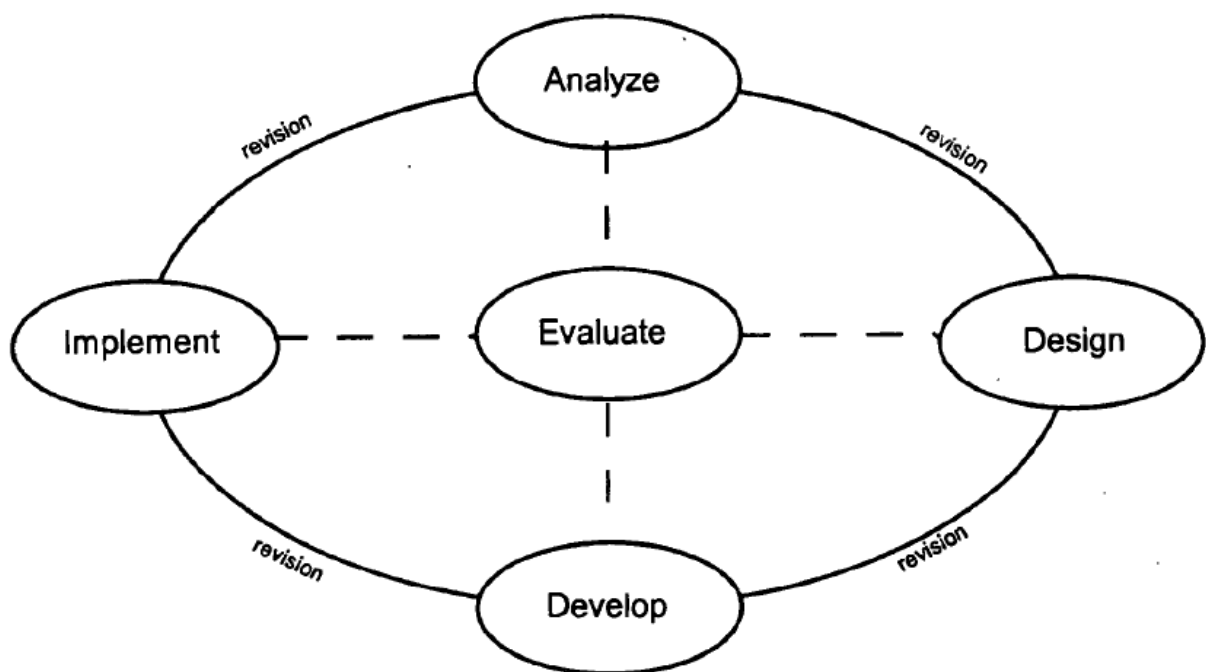


Figure 4.1.1.3: The ADDIE model (Gustafson & Branch, 2002)

The analysis phase includes needs analysis, subject matter content analysis, and job or task analysis. The design phase includes the planning for the arrangement of the content of the instruction. The development phase results in the tasks and materials that are ready for instruction. The implementation phase includes the scheduling of instruction, training of instructors, preparing time tables, and preparing evaluation parts. The evaluation phase includes various forms of formative and summative assessments.

[END OF PAGE]

(Learning Object #4.1.1.5 VIDEO)

Instructional design

Instructional design refers to the systematic process of translating principles of teaching and learning into plans for learning resources and instructional strategies (Branch, 2009).

David M. Merrill (an American education researcher specialising in instructional design and technology) presents his view on instructional design and the issues of technology influencing the discipline in the following video.



External video: [Merrill on instructional design](#) [05:41]

[END OF PAGE]

Learning design

Whereas instructional design is rooted in behaviourist learning theories and seems to on the one hand focus on learning products, such as learning objects and machine-readable representations and on the other hand on delivery systems and the advancement of the automation of designs, learning design is rooted in constructivist learning theories and seems to focus on making the design process explicit and shareable.

The following table includes a list of definitions of learning design exemplifying the roots of this research field.

Table 4.1.1.2

Overview on definitions of learning design (Ifenthaler, Gibson & Dobozy, 2018)

Author(s)	Definition
Agostinho (2006, p. 3)	A learning design is a representation of teaching and learning practice documented in some notational form so that it can serve as a model or template adaptable by a teacher to suit his/her context.
Conole (2008, p. 191)	The range of activities associated with creating a learning activity and crucially provides a means of describing learning activities.
Conole (2013, p. 121)	A methodology for enabling teachers/designers to make more informed decisions in how they go about designing learning activities and interventions, which is pedagogically informed and makes effective use of appropriate resources and technologies. This includes the design of resources and individual learning activities right up to curriculum-level design. A key principle is to help make the design process more explicit and shareable. Learning design as an area of research and development includes both gathering empirical evidence to understand the design process, as well as the development of a range of learning design resource, tools and activities.
Dalziel (2008, p.8)	A framework to describe a sequence of educational activities in an online environment.
Dobozy (2013, p. 68)	A way of making explicit epistemological and technological integration attempts by the designer of a particular learning sequence or series of learning sequences.
Hale (2016, p. 1)	Learning design is the process of designing learning experiences (planning, structuring, sequencing) through facilitated activities that are pedagogically informed, explicit, and make better use of technologies in teaching.
Koper (2006, p. 13)	The description of the teaching-learning process that takes place in a unit of learning. The key principle in learning design is that it represents the learning activities and the support activities that are performed by different persons (learners, teachers) in the context of a unit of learning. These <i>activities</i> can refer to different <i>learning objects</i> that are used during the performance of the activities (e.g. books, articles, software programmes, pictures), and it can refer to <i>services</i> (e.g. forums, chats, wiki's) that are used to collaborate and to communicate in the teaching-learning process.
Mor & Craft (2012, p. 86)	Learning Design is the creative and deliberate act of devising new practices, plans and activities, resources and tools aimed at achieving particular educational aims in a given context.

Papadakis (2012, p. 258)	The creation of sequences of learning activities, which involve groups or learners interacting within a structured set of collaborative environments.
--------------------------	---

[END OF PAGE]

TPACK model

At the heart of good teaching with technology are three core components: content, pedagogy, and technology, plus the relationships among and between them (Mishra & Koehler, 2006).

The TPACK model (i.e., Technological Pedagogical Content Knowledge) describes the core components of teaching where content (*what* you teach) and pedagogy (*how* you teach) must be the basis for any technology that is used in a learning environment in order to support and enhance learning.

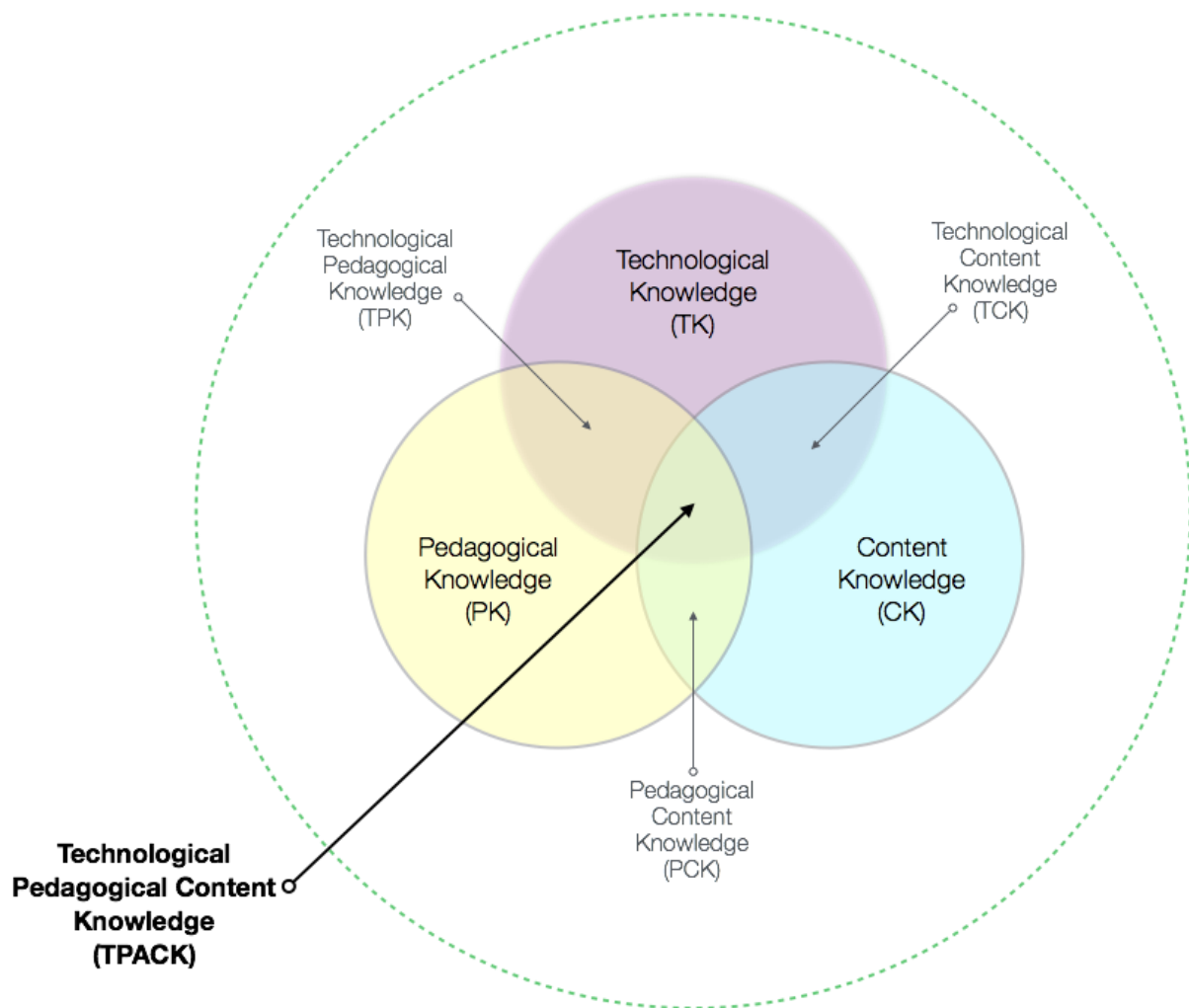


Figure 4.1.1.3: The TPACK model (Mishra & Koehler, 2006)

Pedagogical Content Knowledge (PCK) is the knowledge that teachers have about their content and the knowledge that they have about how to teach that specific content.

Technological Pedagogical Knowledge (TPK) is the set of skills which teachers develop to identify the best technology to support a particular pedagogical approach.

Technological Content Knowledge (TCK) is the set of skills which teachers acquire to help identify the best technologies to support their students as they learn content.

In an additional video resource, Punya Mishra is discussing the TPACK model in-depth (<https://www.youtube.com/watch?v=wn4ElDeZQeM>).

[END OF PAGE]

(Learning Object #4.1.1.8 ACTIVITY)

Poll/Discussion

Activity/practice question (poll):

4. Do you strictly follow one theory of learning (e.g., Behaviourism, Cognitivism) when designing your learning environments?
 - ☐ Yes
 - ☐ No
5. Do you evaluate each phase of the instructional design (i.e., analysis, design, development, implementation) process before moving to the next phase?
 - ☐ Yes
 - ☐ No

Activity/practice question (discussion):

It is now time to stop and reflect on your understanding of designing for teaching and learning. Share your experience and practice by posting your reflections on the following questions:

1. Do you inform your practice through models of instructional design? What is your preferred instructional design model and why?
2. Does your favourite instructional design model include information regarding data analytics?

[END OF PAGE]

References and further readings

References

- Branch, R. M. (2009). *Instructional design: The ADDIE approach*. New York, NY: Springer.
- Doyle, W. (1985). Recent research on classroom management: implications for teacher education. *Journal of Teacher Education*, 36(3), 31–35. doi:10.1177/002248718503600307
- Gustafson, K. L., & Branch, R. M. (2002). *Survey of instructional development models* (4 ed.). Syracuse, NY: ERIC Clearinghouse on Information & Technology.
- Ifenthaler, D. (2012). Design of learning environments. In N. M. Seel (Ed.), *Encyclopedia of the sciences of learning* (Vol. 4, pp. 929-931). New York, NY: Springer.
- Ifenthaler, D., & Schumacher, C. (2016). Connectivism. In S. Danver (Ed.), *The SAGE encyclopedia of online education* (pp. 409–411). Thousand Oaks, CA: Sage.
- Ifenthaler, D., Gibson, D. C., & Dobozy, E. (2018). Informing learning design through analytics: Applying network graph analysis. *Australasian Journal of Educational Technology*, 34(2), 117–132. doi:10.14742/ajet.3767
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017-1054.
- Scheerens, J., Luyten, H., Steen, R., & Luyten-de Thouars, Y. (2007). *Review and meta-analyses of school and teaching effectiveness*. Enschede, NL: Universiteit Twente.
- Seel, N. M., & Ifenthaler, D. (2009). *Online lernen und lehren*. [Online learning and teaching] München: Ernst Reinhardt.
- Spector, J. M., Johnson, T. E., & Young, P. A. (2014). An editorial on research and development in and with educational technology. *Education Technology Research and Development*, 62(1), 1-12. <http://link.springer.com/article/10.1007/s11423-014-9331-z>

Further readings

- Gosper, M., & Ifenthaler, D. (Eds.). (2014). *Curriculum models for the 21st Century. Using learning technologies in higher education*. New York, NY: Springer.
- Heinich, R. (1970). *Technology and the management of instruction*. Washington, DC: Association for Educational Communications and Technology.
- Ifenthaler, D., & Gosper, M. (2014). Guiding the design of lessons by using the MAPLET Framework: Matching aims, processes, learner expertise and technologies. *Instructional Science*, 42(4), 561–578. doi:10.1007/s11251-013-9301-6
- Ifenthaler, D. (2017). Learning analytics design. In L. Lin & J. M. Spector (Eds.), *The sciences of learning and instructional design. Constructive articulation between communities* (pp. 202–211). New

York, NY: Routledge.

Ifenthaler, D. (Ed.) (2018). *Digital workplace learning. Bridging formal and informal learning with digital technologies*. New York, NY: Springer.

Pirnay-Dummer, P., Ifenthaler, D., & Seel, N. M. (2012). Designing model-based learning environments to support mental models for learning. In D. H. Jonassen & S. Land (Eds.), *Theoretical foundations of learning environments* (2 ed., pp. 66–94). New York, NY: Routledge.

Scheerens, J. (1990). Review of school and instructional effectiveness research. *School Effectiveness and School Improvement*, 1(1), 61–80.

Richey, R. C., Klein, J. D., & Tracey, M. W. (2011). *The instructional design knowledge base*. New York, NY: Routledge.

[END OF PAGE]

4.1.2 Data sources within the instructional design process

(Learning Object #4.1.2.1 ACTIVITY)

Poll: Know your data sources

The design of learning environments provides multiple opportunities for collecting and analysing data. However, what are relevant data sources for informing teaching?

Activity/practice question (poll):

1. Are you able to access relevant data to inform your teaching anytime required?
 - ☐ Yes
 - ☐ No
2. Are your students aware of data you are using for informing your teaching?
 - ☐ Yes
 - ☐ No

Thank you for answering your questions. You may check back later in order to compare your answers with other learners of this module.

[END OF PAGE]

Broadening the perspective for data-driven education

The idea of grounding instructional design decisions on educational data has been around for some time. Traditionally, evidence-based instruction has used summative evaluation data to (re-)design instructional programs and systems. Immediate interventions based on formative evaluations have been conducted significantly less frequently. Research on learning and instruction brought attention to additional data sources, as summarized in the 3P-model of teaching and learning (Biggs, Kember, & Leung, 2001): “presage” data focuses on student factors and the teaching context, “process” data on learning focused activities, and “product” data on learning outcomes. Historically, most of this data has been collected with social science research methods. Surveys and questionnaires have been used most often, at times supplemented by different forms of observations.

Online teaching and learning has created a wide range of opportunities for data-driven education. A lot more data sources are now at hand, as well as new technologies for data handling and analysis. While it seems impossible to create a complete list of potential data sources, educational data and the respective data sources can be systematized with a number of attributes.

Educational data can be **primary data (direct data)**, that is: data that is especially collected for the purpose of improving teaching and learning. **Secondary (indirect) data**, on the other hand, has been initially collected for other purposes, but can also be used for teaching analytics. Data can be collected **candid** and **transparent**. This means that the purpose of data collection is clear, as for example in a direct survey, interview or an eye-tracking study. Educational data can also be collected **automatically** and with little or **no transparency**, as it is the case with user trails within the system or logging data. Educational data can be oriented toward the **learning outcome** or the **learning process**. Educational data can be **static**, that is: stable over a defined period of time (e.g., personality traits). Educational data can be **dynamic**, that is: volatile over the course run (e.g., motivational and emotional states). Educational data can be sourced on the **individual** or on a **collective** level. Educational data can be **idiosyncratic** or **generalizable**. Educational data can refer to **learner variables** (person focus; i.e. personal learning goals), it can refer to **contextual variables** (environment focus; i.e. curricular learning objectives), or to **learning behaviour** (person-environment-interaction focus; i.e. course performance). Finally, educational data can be **open** and accessible to anyone (i.e., curriculum data, syllabi), or it can be **protected** (i.e., discussion posts within a course environment) – a distinction which is not always as straightforward as it may sound (Greller & Drachsler, 2012).

[END OF PAGE]

Data sources within a holistic analytics framework

Ifenthaler and Widanapathirana (2014) developed and empirically validated a holistic learning analytics framework that connects a number of different data sources (#1 to #5). A major aim of this model is to create a link between learner characteristics (e.g., prior learning), learning behaviour (e.g., access of materials), and curricular requirements (e.g., learning objectives, sequencing of learning).

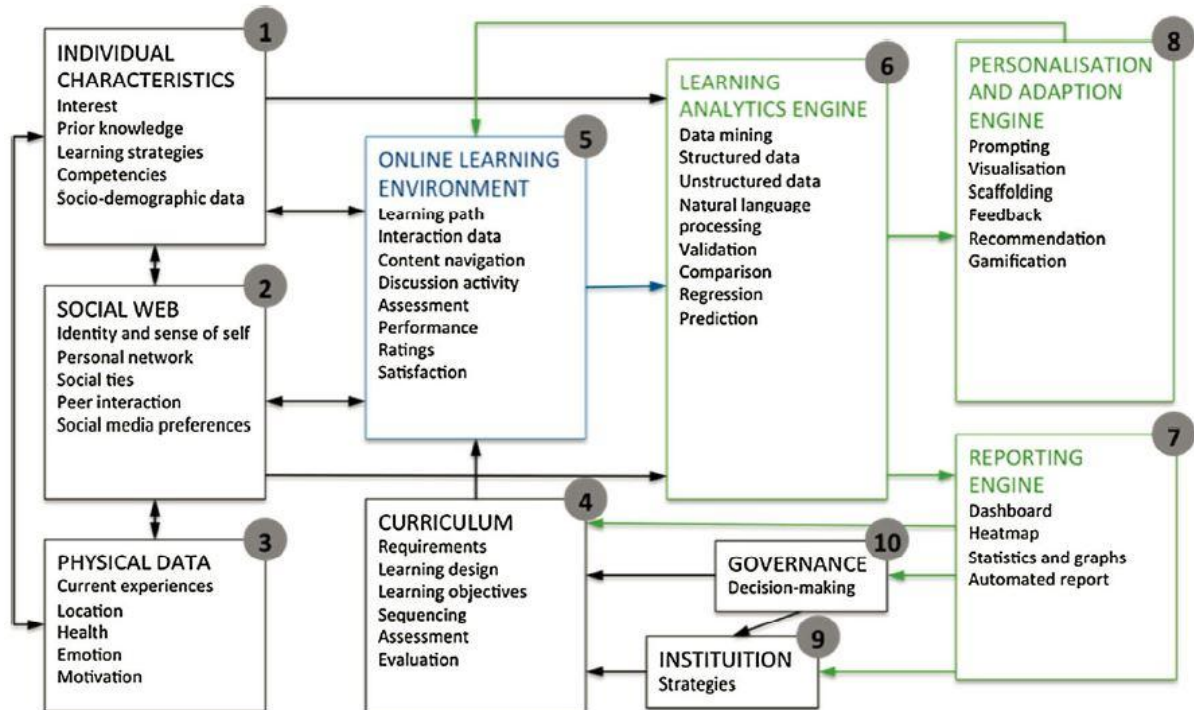


Figure 4.1.2.1: Holistic learning analytics framework (Ifenthaler & Widanapathirana, 2014)

[END OF PAGE]

Sources of learner data

Within the holistic learning analytics framework (see Figure 4.1.2.1), three main areas of learner data and respective data sources have been differentiated.

Characteristics of (1) individual learners include socio-demographic information, personal preferences and interests, responses to standardized inventories (e.g., learning strategies, achievement motivation, personality), demonstrated skills and competencies (e.g., computer literacy), acquired prior knowledge and proven academic performance, as well as institutional transcript data (e.g., pass rates, enrolment, dropout, special needs).

Associated interactions with the **(2) social web** include preferences of social media tools (e.g., Twitter, Facebook, LinkedIn) and social network activities (e.g., linked resources, friendships, peer groups, web identity).

Physical data (3) from outside the educational system is collected through various systems, for example through a library system (i.e., university library, public library). Other physical data may include sensor and location data from mobile devices (e.g., study location and time), or affective states collected through reactive tests (e.g., motivation, emotion, health, stress, commitments). Especially non-cognitive (i.e., emotional and motivational data) can provide deep insights into individual learning processes (D'Mello, 2017).

[END OF PAGE]

Sources of online learning data

Furthermore, there are two areas of data and respective data sources related to online learning behaviour (see Figure 4.1.2.1).

Rich information is available from learners' **activities in the online learning environment (5)** (i.e., learning management system, personal learning environment, learning blog). These mostly numeric data refer to logging on and off, viewing or posting discussions, navigation patterns, learning paths, content retrieval (i.e., learner-produced data trails), results on assessment tasks, responses to ratings and surveys. More importantly, rich semantic and context-specific information is available from discussion forums as well as from complex learning tasks (e.g., written essays, wikis, blogs). Additionally, interactions of facilitators with students and the online learning environment are tracked.

Closely linked to the information available from the online learning environment is the **curriculum information (5)**, which includes metadata of the online learning environment. These data reflect the learning design (e.g., sequencing of materials, tasks, and assessments), and learning objectives as well as expected learning outcomes (e.g., specific competencies). Ratings of materials, activities, and assessments as well as formative and summative evaluation data are directly linked to specific curricula, facilitators, or student cohorts.

In summary, teaching analytics use static and dynamic data sources for informing learning and teaching processes as well as outcomes. The Figure below summarises the profiles approach which includes static and dynamic data from students (e.g., demographic information, academic performance), dynamic data of learning behaviour (e.g., navigation pathways), and static data defined in the curriculum (e.g., learning outcomes, learning artefacts).

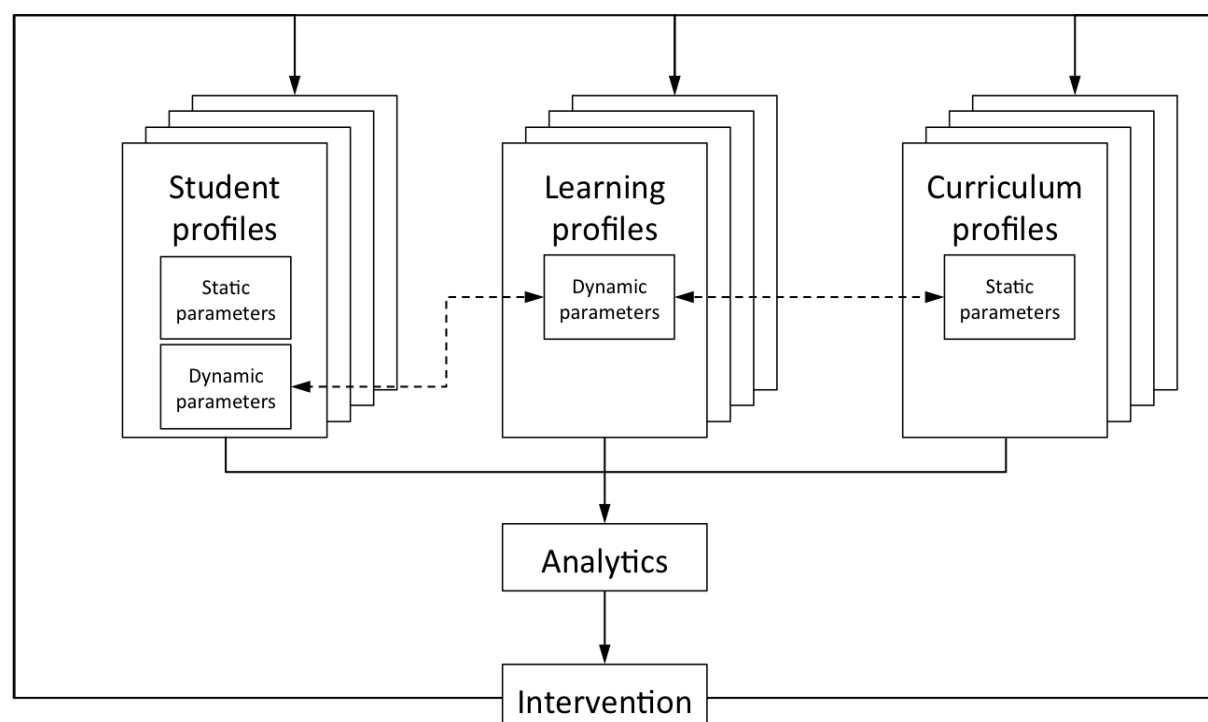


Figure 4.1.2.2: Profiles approach using static and dynamic data (Ifenthaler & Widanapathirana, 2014)

[END OF PAGE]
(Learning Object #4.1.2.6 ACTIVITY)

Transfer & Discussion

Activity/transfer question (discussion):

Please elaborate on the following two questions. Share your ideas by posting your answers.

1. A major aim of the holistic analytics model is to create a link between learner characteristics, learning behaviour, and curricular requirements Please name three or more data sources for which it might be worthwhile to establish such a connection. Where do you see logical relationships that might be helpful for analytics?
2. How would you try to collect emotional and motivational data? What could be feasible data sources?

[END OF PAGE]

(Learning Object #4.1.2.7 HTML page)

References and further readings

References

Biggs, J., Kember, D., & Leung, D. Y. P. (2001). The revised two-factor Study Process Questionnaire: R-SPQ-2F. *British Journal of Educational Psychology*, 71, 133–149. doi:10.1348/000709901158433

D’Mello, S. (2017). Emotional learning analytics. *Handbook of learning analytics*, 115-127. doi:10.18608/hla17.010

Greller, W., & Drachsler, H. (2012). Translating learning into numbers: A generic framework for learning analytics. *Journal of Educational Technology & Society*, 15(3), 42–57.

Ifenthaler, D. (2015). Learning analytics. In J. M. Spector (Ed.), *The SAGE encyclopedia of educational technology* (Vol. 2, pp. 447–451). Thousand Oaks, CA: Sage.

Ifenthaler, D., & Widanapathirana, C. (2014). Development and validation of a learning analytics framework: Two case studies using support vector machines. *Technology, Knowledge and Learning*, 19, 221-240. doi:10.1007/s10758-014-9226-4

Further readings

Ifenthaler, D. (2017). Learning analytics design. In L. Lin & J. M. Spector (Eds.), *The sciences of learning and instructional design. Constructive articulation between communities* (pp. 202–211). New York, NY: Routledge.

Lockyer, L., Heathcote, E., & Dawson, S. (2013). Informing pedagogical action: Aligning learning analytics with learning design. *American Behavioral Scientist*, 57(10), 1439-1459. doi:10.1177/0002764213479367

Lodge, J. M., Alhadad, S. S., Lewis, M. J., & Gašević, D. (2017). Inferring learning from big data: The importance of a transdisciplinary and multidimensional approach. *Technology, Knowledge and Learning*, 22(3), 385-400. doi:10.1007/s10758-017-9330-3

[END OF PAGE]

4.1.3 Key concepts of data quality and limitations of data meaningfulness

(Learning Object #4.1.3.1 ACTIVITY)

Poll: Is your data meaningful?

Not every data is relevant and provides information for supporting teaching processes. How do you decide which data has the meaning you are requiring for pedagogical decision making?

Activity/practice question (poll):

1. Are you aware of how data is collected you are using to inform your teaching?
 - ☐ Yes
 - ☐ No
2. Is it possible to collect data from all relevant sources to inform your teaching?
 - ☐ Yes
 - ☐ No

Thank you for answering your questions. You may check back later in order to compare your answers with other learners of this module.

[END OF PAGE]

Data quality in educational contexts

As the amounts of educational data grow larger, the issue of data quality is becoming more and more important. 'Big Data' in education is characterized by the same attributes as in other domains: **Volume, Velocity, Variety, and Value** (Katal, Wazid, & Goudar, 2013) – see also Module 2. Volume refers to the tremendous volume of the data, usually measured in TB or above. Velocity means that data are being formed at an unprecedented speed and must be dealt with in a timely manner. Variety indicates that big data has all kinds of data types, and this diversity divides the data into structured data and unstructured data. Finally, Value represents low-value density. Value density is inversely proportional to total data size, the greater the big data scale, the less relatively valuable the data (Cai & Zhu, 2015).

Already on a smaller scale, data quality is of crucial importance for teaching and learning analytics, as 'poor data' can impede valid inferences and hamper subsequent educational interventions. However, there is no common definition of educational data quality to date. If the broad ISO 9000:2015 definition of quality is applied, data quality can be defined as the degree to which a set of characteristics of data fulfils pre-defined requirements. These requirements are usually described in quality dimensions, each with specific elements and indicators for measurement (Cai & Zhu, 2015).

Despite the complexity of the topic, the majority of the numerous frameworks on data quality share a common core of quality dimensions that can be transferred to education datasets (Akoka et al. 2007; Goasdoué, Nugier, Duquennoy, & Labois, 2007; Laranjeiro, Soydemir, & Bernardino, 2015): **completeness, accuracy, consistency, freshness and relevancy**.

[END OF PAGE]

Core dimensions of data quality

Data Accuracy is concerned with the correctness and precision with which real world data of interest to an application domain is represented in an information system. It introduces the idea of how precise, valid and errorfree is data: Is data in correspondence with real world? Is data error-free? Are data errors tolerable? Is data precise enough with respect to the user expectations? Is its level of detail adequate for the task on hand? There are three main accuracy definitions in the literature: (i) *Semantic correctness* describes how well data represent states of the real-world. It captures the gap (or the semantic distance) between data represented in the system and real-world data. For example, the recorded address “45, av. des États-Unis” is actually the address of Mike? (ii) *Syntactic correctness* expresses the degree to which data is free of syntactic errors such as misspellings and format discordances. It captures the gap (or syntactic distance) between data representation in the system and expected data representation. For example, the address “45, av. des États-Unis” is valid and well written? (iii) *Precision* concerns the level of detail of data representation. It captures the gap between the level of detail of data in the system and its expected level of detail. For example, the amount “\$2008” is a more precise representation of the salary of John than “\$2000”.

Data Completeness concerns the degree to which all data relevant to an application domain has been recorded in an information system. It expresses that every fact of the real world is represented in the information system. Two different aspects of completeness can be considered: (i) *Coverage* describes whether all required entities for an entity class are included; (ii) *Density* describes whether all data values are present (not null) for required attributes.

Data Consistency expresses the degree to which a set of data satisfies a set of integrity constraints. Data is said consistent if it satisfies these constraints. The most common constraints checks for null values, key uniqueness and functional dependencies.

Data Freshness introduces the idea of how old is the data: Is it fresh enough with respect to the user expectations? Has a given data source the more recent data? Is the extracted data stale? When was data produced? There are two main freshness definitions in the literature: (i) *Currency* describes how stale is data with respect to the sources. It captures the gap between the extraction of data from the sources and its delivery to the users. For example, given an account balance, it may be important to know when it was obtained from the bank data source. (ii) *Timeliness* describes how old is data (since its creation/update at the sources). It captures the gap between data creation/update and data delivery. For example, given a top-ten book list, it may be important to know when the list was created, no matter when it was extracted from sources.

Data relevancy corresponds to the usefulness of the data. Among the huge volumes of data, it is often difficult to identify that which is useful. In addition, the available data is not always adapted to user requirements. This might lead to the impression of poor relevancy. Relevancy plays a crucial part in the acceptance of a data source. This dimension, usually evaluated by rate of data usage, is determined by the user and thus not directly measurable by quality tools.

[END OF PAGE]

(Learning Object #4.1.3.4 HTML page)

Dimensions of educational data quality

Valid examples for the core dimensions of educational data quality from the educational context could look like this:

Table 4.1.3.1
Dimensions of educational data quality

Data Quality Dimension	Description	Example for educational data
Accuracy	Are the data free of errors?	Student number in a campus management system matches the student number in the learning management system
Completeness	Are necessary data missing?	Academic performance record includes all data points necessary to determine study progress (i.e. semester, courses passed, grades, ...)
Consistency	Are the data presented in the same format?	All requested event dates are delivered in a DD/MM/YY format
Freshness	Are the data up-to-date?	Learning Analytics system reflects real-time behavior and performance data
Relevancy	Is the data useful for the task at hand?	Do I need the academic performance record to analyze student interactions?

[END OF PAGE]

Data quality problems

Laranjeiro, Soydemir, and Bernardino (2015) classify data quality problems with respect to the source of information: single or multiple. Single-source problems are related with the (wrong or absent) definition of integrity constraints. Multi-source problems relate with the integration of data from multiple sources, which, for instance, might hold different representations of the same values, or contradictions. Each of these two classes of problems are further divided into schema-level, which are related with defects in the definition of the data model and schema, and instance-level which are problems that are not visible at the schema level and cannot be prevented by restrictions at the schema level (or by redesign).

In exchange for the user-determined ‘relevancy’-Dimension, the authors added ‘Accessibility: The degree to which data can be accessed in a specific context of use’ to their synopsis of data quality problems.

Table 4.1.3.2

Data quality problems mapped into dimensions (Laranjeiro, Soydemir, & Bernardino, 2015)

Problem types		Data quality problems	Accessi- bility	Accuracy	Complete- ness	Consis- tency	Fresh- ness
Source	Level						
Single	Instance	Missing data		X	X		
		Incorrect data		X			
		Misspellings		X			
		Ambiguous data	X	X			
		Extraneous data	X			X	
		Outdated temporal data		X			X
		Misfielded values	X	X		X	
		Incorrect references		X			
		Duplicates	X				
	Schema	Domain violation		X			
		Violation of functional dependency		X			
		Wrong data type	X			X	
		Referential integrity violation	X	X		X	
		Uniqueness violation		X			
Multiple	Instance	Structural conflicts	X			X	
		Different word orderings	X			X	
		Different aggregation levels	X	X		X	
		Temporal mismatch		X		X	X
		Different units	X			X	
		Different representations	X			X	
	Schema	Use of synonyms	X				
		Use of homonyms	X				
		Use of special characters	X				
		Different encoding formats	X			X	

[END OF PAGE]

(Learning Object #4.1.3.6 ACTIVITY)

Reflection & Transfer

Reflection/transfer question (discussion):

Please elaborate on the following question. Share your ideas by posting your answer.

Please think of one type of educational data as introduced in the previous section. How would this data have to be characterised on the different dimensions of data quality in order to be good source of information?

Please explain your indicators to the dimensions and explain your ratings according to those indicators.

[END OF PAGE]

(Learning Object #4.1.3.7 VIDEO)

Additional material: Workshop documentation

“Enhancing educational data quality in heterogeneous learning contexts using Pentaho Data Integration”.

The following video is the documentation of a workshop held at the Learning Analytics Summer Insitute (LASI) 2015 in Bilbao by Alex Rayón Jerez. After a theoretically oriented introduction on data quality, the video gives an impression on how data issues can be solved practically.



<https://www.youtube.com/watch?reload=9&v=sPTX4iSAf1E>

The workshop slides can be found here:

<https://de.slideshare.net/alrayon/enhancing-educational-data-quality-in-heterogeneous-learning-contexts-using-pentaho-data-integration>

Enhancing educational data quality in heterogeneous learning contexts using Pentaho Data Integration

Learning Analytics Summer Institute, 2015

Alex Rayón Jerez
@alrayon, alex.rayon@deusto.es

June, 22nd, 2015



1 von 106



[END OF PAGE]

(Learning Object #4.1.3.8 HTML page)

References and further readings

References

Cai, L., & Zhu, Y. (2015). The challenges of data quality and data quality assessment in the big data era. *Data Science Journal*, 14(2), 1-10. doi:10.5334/dsj-2015-002

Goasdoué, V., Nugier, S., Duquennoy, D., & Labois, B. (2007). An Evaluation Framework For Data Quality Tools. In *Proceedings of the 2007 MIT International Conference on Information Quality (ICIQ)* (pp. 280-294).

Katal, A., Wazid, M., & Goudar, R. (2013) Big Data: Issues, Challenges, Tools and Good Practices. *Procedures of the 2013 Sixth International Conference on Contemporary Computing*, Noida: IEEE (pp 404–409).

Laranjeiro, N., Soydemir, S. N., & Bernardino, J. (2015). A survey on data quality: classifying poor data. In *2015 IEEE 21st Pacific rim international symposium on dependable computing (PRDC)* (pp. 179-188). IEEE. doi:10.1109/PRDC.2015.41

Further readings

Akoka, J., Berti-Equille, L., Boucelma, O., Bouzeghoub, M., Comyn-Wattiau, I., Cosquer, M., Goasdoué-Thion, V., Kedad, Z., Nugier, S., Peralta, V. & Sisaid-Cherfi, S. (2007). A framework for quality evaluation in data integration systems. In *9th International Conference on Enterprise Information Systems (ICEIS)* (p. 10).

Batini, C., & Scannapieca, M. (2006). *Data Quality. Concepts, Methodologies and Techniques*. Heidelberg, Berlin: Springer.

Floridi, L. (2013). Information quality. *Philosophy & Technology*, 26(1), 1-6.
doi: 10.1007/s13347-013-0101-3

[END OF PAGE]

4.2.1 Awareness toward data privacy

(Learning Object #4.2.1.1 ACTIVITY)

Poll: Are you transparent with regard to data analytics

Learners are producers of vast amounts of data you may use for informing your teaching. However, do your learners know what data you are collecting and analysing?

Activity/practice question (poll):

1. Do you include your learners when designing a data analytics strategy?
 - ☐ Yes
 - ☐ No
2. Do you ask for consent to collect data from your learners?
 - ☐ Yes
 - ☐ No

Thank you for answering your questions. You may check back later in order to compare your answers with other learners of this module.

[END OF PAGE]

Ethical and privacy challenges associated with the application of educational data analytics

Educational institutions have always used a variety of data about students, teachers and the learning environment, such as socio-demographic information, grades on entrance qualifications, or pass and fail rates, to inform their curricular planning, academic decision-making as well as for resource allocation. Such data can help to successfully predict student's dropout rates and to enable the implementation of strategies for supporting learning and instruction as well as retaining students (Ifenthaler & Tracey, 2016). However, serious concerns and challenges are associated with the application of data analytics in educational settings:

1. Not all educational data is relevant and equivalent. Therefore, the validity of data and its analyses is critical for generating useful summative, real-time, and predictive insights.
2. Limited access to educational data generates disadvantages for involved stakeholders. For example, invalid forecasts may lead to inefficient decisions and unforeseen problems.
3. Information from distributed networks and unstructured data cannot be directly linked to educational data collected within an institution's environment.
4. Ethical and privacy issues are associated with the use of educational data for learning analytics. That implies how personal data is collected and stored as well as how it is analysed and presented to different stakeholders.

Consequently, educational institutions need to address ethics and privacy issues linked to educational data analytics: They need to define who has access to which data, where and how long the data will be stored, and which procedures and algorithms to implement for further use of the available educational data (Ifenthaler, 2015).

[END OF PAGE]

(Learning Object #4.2.1.3 VIDEO)

Educational data analytics and privacy

At a time of growing interest in educational data analytics, it is important to understand the implications of privacy principles to ensure that implemented systems are able to facilitate learning, instruction, and academic decision-making and do not impair students' perceptions of privacy. To a large extent, students are the producers of data used in learning analytics systems but are passive recipients of information provided on dashboards as well. What data are collected?



External video [Learning analytics and privacy](#) [03:00]

[END OF PAGE]

Privacy in the digital world

Within the digital world, many individuals are willing to share personal information without being aware of who has access to the data, how and in what context the data will be used, or how to control ownership of the data. Accordingly, data are generated and provided automatically by online systems, which limits the control and ownership of personal information in the digital world (Slade & Prinsloo, 2013).

There are several reasons why learners would like to keep their information private: First, there are competitive reasons, for example, if a learner performs poorly, a fellow student shall not know about it. Second, there are personal reasons, for example a learner might not want to share information about him-/ herself. There are also country-specific differences who owns the personal data. In the United States the collected data belongs to the collectors. In Europe the personal data belongs to the individual (e.g., the learner).

The Table below provides an overview of privacy theories in the digital age. The first two concepts (1, 2) emphasize requirements for reaching privacy in a certain situation and focus on protection and normative or descriptive privacy. Early privacy theories (3) are based on control or limitation: Control refers to the influence of individuals on the flow of their personal data, whereas limitation means the possibility to prevent others from accessing personal data. Contemporary privacy theories (4) incorporate these earlier theories as well as normative and descriptive privacy concepts but go beyond them in being more holistic and applicable to different contexts (Ifenthaler & Schumacher, 2016).

TABLE 4.2.1.1 Overview of privacy concepts (Ifenthaler & Schumacher, 2016)			
1	Individual has privacy in a particular situation if they are offered three protections	Protection from interference	Protection from information access by others
Protection from intrusion			
The rights of an individual to be left alone and free from intrusion and interference			
2	Two broad classifications of privacy situations	Normative privacy Zones of privacy	Descriptive privacy
		Individuals are protected by cultural norms: formal laws and informal policies	Privacy can be expected by natural means, such as physical barriers
3	Early theories of privacy	Control theory	Limitation theory
		Allowing individuals control over their personal information	Limitations on the persons who could gain access to personal information
4	More recently proposed information privacy theories aimed at achieving necessary protections by building on earlier theories and normative and descriptive privacy	Floridi ontological theory of information privacy	Nissenbaum contextual integrity theory of informational privacy
			Moor & Tavani hybrid RALC theory of privacy
Contemporary privacy theories are more holistic and go beyond the early theories of privacy; they were developed to apply them to diverse contexts			

Ethical principles

Ethical principles for educational data analytics have been developed to underpin decision-making processes and provide guidance in the application of ethics (West, Huijser, & Heath, 2016). The key principles, as outlined and used in healthcare settings, are also relevant to the discussion of educational data analytics:

1. Respect for Autonomy generally translates to the idea of self-determination and the right of people to make their own decisions.
2. Non-maleficence essentially means that we should do no harm.
3. Beneficence means that in addition to doing no harm, we should also pursue good outcomes for others.
4. Justice translates into the concept of fairness and is often related to the distribution of resources based on equity, need, effort, merit and the market.

The Figure below presents a four step framework that views ethical decision making as an operational process. The aim of this framework is to concisely model how a complex issue can be mapped, refined, decided on, and documented within a fairly linear process that would suit the busy operating environments of most institutions. There may be circumstances where reflection or new information means retracing earlier steps and the framework does not oppose doing so (West et al., 2016).

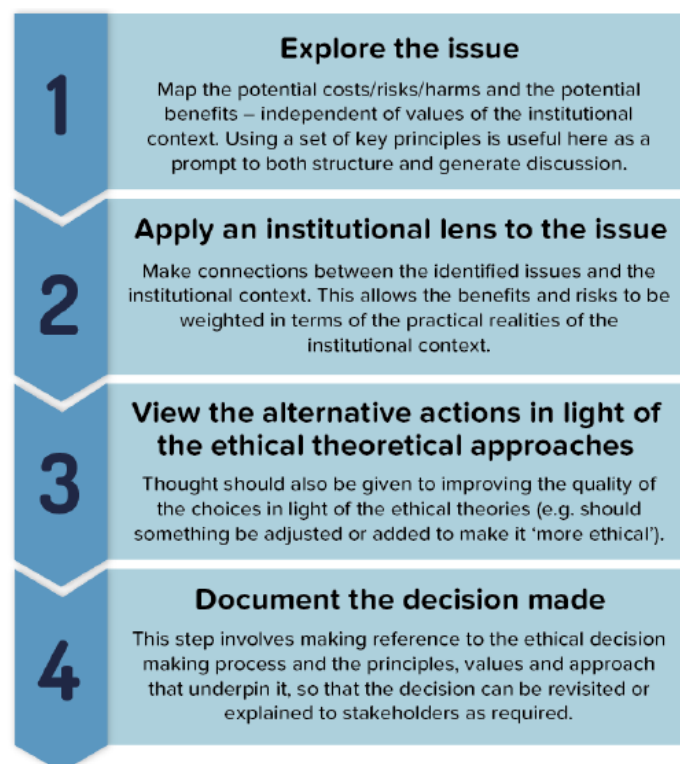


Figure 4.2.1.1: Ethical decision making process for learning analytics (West et al., 016)

[END OF PAGE]

(Learning Object #4.2.1.6 ACTIVITY)

Poll/Discussion

Activity/practice question (poll):

1. Do you have access to all data collected from your own teaching activities?
 - ☐ Yes
 - ☐ No
2. Do you know who can access data collected in the digital learning environments you are involved in?
 - ☐ Yes
 - ☐ No

Activity/practice question (discussion):

Think about the design and implementation of a student self-assessment in a digital learning environment. As data is collected from students' interactions with the self-assessments, ethical concerns arise. You may join the discussion with the following task:

1. Document the data collection and use within the above scenario, with reference to the ethical decision making process and the principles, values and approaches that underpin it.

[END OF PAGE]

References and further readings

References

Drachsler, H., & Greller, W. (2016). *Privacy and analytics - it's a DELICATE issue. A checklist for trusted learning analytics*. Paper presented at the Sixth International Conference on Learning Analytics & Knowledge, Edinburgh, UK.

Ifenthaler, D. (2015). Learning analytics. In J. M. Spector (Ed.), *The SAGE encyclopedia of educational technology* (Vol. 2, pp. 447–451). Thousand Oaks, CA: Sage.

Ifenthaler, D., & Schumacher, C. (2016). Student perceptions of privacy principles for learning analytics. *Educational Technology Research and Development*, 64(5), 923–938. doi:10.1007/s11423-016-9477-y

Ifenthaler, D., & Tracey, M. W. (2016). Exploring the relationship of ethics and privacy in learning analytics and design: implications for the field of educational technology. *Educational Technology Research and Development*, 64(5), 877–880. doi:10.1007/s11423-016-9480-3

Slade, S., & Prinsloo, P. (2013). Learning analytics: Ethical issues and dilemmas. *American Behavioral Scientist*, 57(10), 1510–1529. doi:10.1177/0002764213479366

West, D., Huijser, H., & Heath, D. (2016). Putting an ethical lens on learning analytics. *Educational Technology Research and Development*, 64(5), 903–922. doi:10.1007/s11423-016-9464-3

Further readings

Prinsloo, P., & Slade, S. (2014). Student data privacy and institutional accountability in an age of surveillance. In M. E. Menon, D. G. Terkla, & P. Gibbs (Eds.), *Using data to improve higher education. Research, policy and practice* (pp. 197–214). Rotterdam: Sense Publishers.

Prinsloo, P., & Slade, S. (2015). *Student privacy self-management: Implications for learning analytics*. Paper presented at the Fifth International Conference on Learning Analytics and Knowledge, New York, NY, USA.

[END OF PAGE]

4.2.2 Distinguish different levels of data protection

(Learning Object #4.2.2.1 ACTIVITY)

Poll: Do you protect learning and teaching data?

Not only the EU General Data Protection Regulation (EU-GDPR) guide how data of learning environments need to be protected.

Activity/practice question (poll):

1. Are you familiar with relevant paragraphs of the EU GDPR?
 - ☐ Yes
 - ☐ No
2. Do you know somebody who you could ask regarding the correct protection of stakeholders when using data for learning and teaching?
 - ☐ Yes
 - ☐ No

Thank you for answering your questions. You may check back later in order to compare your answers with other learners of this module.

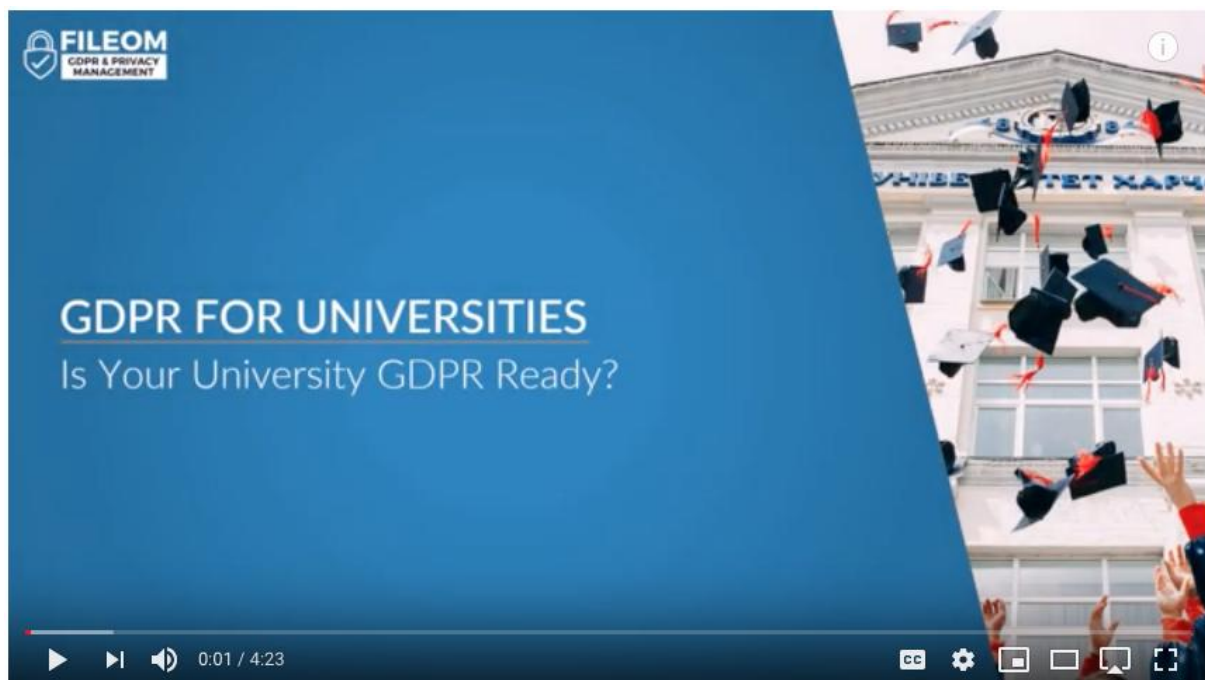
[END OF PAGE]

(Learning Object #4.2.2.2 VIDEO)

EU GDPR compliance

On 25 May 2018 the EU renewed its data protection legislation. The GDPR (General Data Protection Regulation) is more up to date to meet the challenges of a digital world (i.e., rules regarding breach notification, automated decision making and profiling, data portability, etc.). It also promotes the principle of privacy by design as the main design principle for data driven applications. Among these design principles, the GDPR 2018 grants the data subject a set of new rights like the following not exclusive list shows (https://ec.europa.eu/info/law/law-topic/data-protection/reform/what-does-general-data-protection-regulation-gdpr-govern_en):

- Right to be informed on how the software works and how personal data is processed.
- Right to access which forces the data controller to provide a copy of the personal data in an electronic format.
- Right to object to processing of the data subjects' personal data, the data subject can at any time stop processing on illegitimate grounds.
- Right to erasure which entitles the data subject to have the data controller erase his / her personal data.



External video [GDPR for Schools & Universities](#) [04:23]

How does the EU GDPR influence your daily teaching? What will you do different when designing your next learning environment?

[END OF PAGE]

(Learning Object #4.2.2.3 VIDEO)

Preparing to protect educational data

Is your school ready for educational data analytics? Can you explain how your school can review and improve your handling of personal data? Watch the following video and reflect if your institution is prepared to protect the educational data you have available.



External video [Guidance for Schools](#) [06:20]

[END OF PAGE]

Understand your data map

A data map covers all data the educational institution (a) receives, (b) creates, (c) sends, and (d) destroys (Department of Education, 2018). In order to create a data map, all stakeholders are involved and share places where personal data are stored and used in the institution. The creation of the data map is an iterative process which needs to be updated as new data sources emerge in the institution. Based on the data map, legislations and regulations can be defined.

The Table below shows an example of a template for creating a data map for your institution.

Table 4.2.2.1: Template for a data map (Department of Education, 2018)

Do we receive personal data?	Do we create personal data?	Do we send personal data?	Do we destroy personal data?

The following video illustrates a data-ecosystem of an educational institution.



External video [Mind Map: Build your data eco-system](#) [04:36]

For understanding your institution's data, it is further important to document the reasons for processing data identified in the above mentioned data map. Another requirement is the duration of storing the data identified in the data map.

[END OF PAGE]

(Learning Object #4.2.2.5 ACTIVITY page)

Workshop: data consent form

This workshop focusses on the creation of a data consent form for your educational institution.

1. Research different data consent forms using a Web search.
2. Identify relevant contents the examples include.
3. Create your own data consent form meeting the requirements of your educational institution.
4. Share your example with the group of learners in the forum.

You may check back later for other results after more learners have completed the activity to review the responses of other learners of this course.

[END OF PAGE]

(Learning Object #4.2.2.6 ACTIVITY)

Poll/Discussion

Activity/practice question (poll):

1. Does the EU GDPR influence your design of learning environments?
 - ☐ Yes
 - ☐ No
2. Does your school have a data protection officer or similar role?
 - ☐ Yes
 - ☐ No

Activity/practice question (discussion):

Think again about the data map for your educational institution. Outline an information package for different stakeholders informing about your institutions data, its storage, processing, and protection.

1. Share your information package (e.g., a letter to students, parents, teachers) in the forum.

[END OF PAGE]

References and further readings

References

Department of Education. (2018). *Data protection: a toolkit for schools*. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/747620/Data_Protection_Toolkit_for_Schools_OpenBeta.pdf

Drachsler, H., & Greller, W. (2016). *Privacy and analytics - it's a DELICATE issue. A checklist for trusted learning analytics*. Paper presented at the Sixth International Conference on Learning Analytics & Knowledge, Edinburgh, UK.

Kay, D., Korn, N., & Oppenheim, C. (2012). Legal, risk and ethical aspects of analytics in higher education. *Cetis Analytics Series*, 1(6), 1–30.

Pardo, A., & Siemens, G. (2014). Ethical and privacy principles for learning analytics. *British Journal of Educational Technology*, 45(3), 438–450. doi:10.1111/bjet.12152

Further readings

Katsikas, S., López, J., & Pernul, G. (Eds.). (2005). *Trust, privacy, and security in digital business*. Berlin: Springer.

Schünemann, W. J., & Baumann, M.-O. (Eds.). (2017). *Privacy, data protection and cybersecurity in Europe*. Cham: Springer.

[END OF PAGE]

4.2.3 Identify issues of authorship, ownership, data access and data-sharing

(Learning Object #4.2.3.1 HTML page)

Privacy calculus

To enhance the acceptance of educational data analytics, it is relevant to involve all stakeholders as early as possible. Students need to be considered in particular, as they take on two roles in the educational data analytics: (1) as producers of analytics data and (2) as recipients of the analyses derived from them (Slade & Prinsloo, 2013).

The Figure below shows the deliberation process for disclosing information for educational data analytics. Students assess their concern over privacy on the basis of the specific information required for the learning analytics system (e.g., name, learning history, learning path, assessment results, etc.). This decision can be influenced by risk-minimizing factors (e.g., trust in the learning analytics systems and/or institution, control over data through self-administration) and risk-maximizing factors (e.g., non-transparency, negative reputation of the learning analytics system and/or institution). Concerns over privacy are then weighed against the expected benefits of the learning analytics system. The probability that the students will disclose required information is higher if they expect the benefits to be greater than the risk. Hence, the decision to divulge information on learning analytics systems is a cost–benefit analysis based on available information to the student.

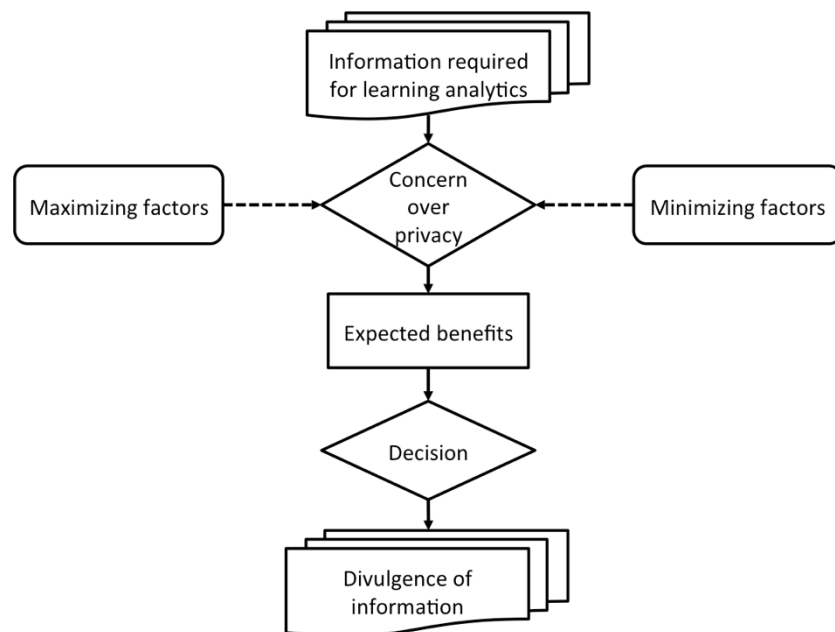


Figure 4.2.3.1. Deliberation process for sharing information for learning analytics systems (Ifenthaler & Schumacher, 2016)

[END OF PAGE]

Educational data analytics benefits

The Table below provides a matrix outlining the benefits of educational data analytics for stakeholders including three perspectives: (1) summative, (2) real-time/formative, and (3) predictive/prescriptive. The summative perspective provides detailed insights after completion of a learning phase (e.g., study period, semester, final degree), often compared against previously defined reference points or benchmarks. The real-time or formative perspective uses ongoing information for improving processes through direct interventions. The predictive or prescriptive perspective is applied for forecasting the probability of outcomes in order to plan for future strategies and actions (Ifenthaler, 2015).

Table 4.2.3.1

Educational data analytics benefits matrix (Ifenthaler, 2015)

Stakeholder	Perspective		
	Summative	Real-time/Formative	Predictive/Prescriptive
Governance	<ul style="list-style-type: none"> – Apply cross-institutional comparisons – Develop benchmarks – Inform policy making – Inform quality assurance processes 	<ul style="list-style-type: none"> – Increase productivity – Apply rapid response to critical incidents – Analyse performance 	<ul style="list-style-type: none"> – Model impact of organizational decision-making – Plan for change management
Institution	<ul style="list-style-type: none"> – Analyse processes – Optimize resource allocation – Meet institutional standards – Compare units across programs and faculties 	<ul style="list-style-type: none"> – Monitor processes – Evaluate resources – Track enrolments – Analyse churn 	<ul style="list-style-type: none"> – Forecast processes – Project attrition – Model retention rates – Identify gaps
Learning design	<ul style="list-style-type: none"> – Analyse pedagogical models – Measure impact of interventions – Increase quality of curriculum 	<ul style="list-style-type: none"> – Compare learning designs – Evaluate learning materials – Adjust difficulty levels – Provide resources required by learners 	<ul style="list-style-type: none"> – Identify learning preferences – Plan for future interventions – Model difficulty levels – Model pathways
Facilitator/Teacher	<ul style="list-style-type: none"> – Compare learners, cohorts and courses – Analyse teaching practices – Increase quality of teaching 	<ul style="list-style-type: none"> – Monitor learning progression – Create meaningful interventions – Increase interaction – Modify content to meet cohorts' needs 	<ul style="list-style-type: none"> – Identify learners at risk – Forecast learning progression – Plan interventions – Model success rates
Learner	<ul style="list-style-type: none"> – Understand learning habits – Compare learning paths – Analyse learning outcomes – Track progress towards goals 	<ul style="list-style-type: none"> – Receive automated interventions and scaffolds – Take assessments including just-in-time feedback 	<ul style="list-style-type: none"> – Optimize learning paths – Adapt to recommendations – Increase engagement – Increase success rates

Each cell of the educational data analytics benefits matrix includes examples to be implemented at different phases of the learning process as well as for different purposes. When choosing a specific

benefit of educational data analytics, the teacher, e-Tutor or instructional designer needs to understand:

- a) who has access?
- b) to what data?
- c) to do what?
- d) for what reason?

In sum, data ownership refers to the possession of, control of, and responsibility for information. Questions surrounding the ownership of data include considerations of who determines what data is collected, who has the right to claim possession over that data, who decides how any analytics applied to the data are created, used and shared, and who is responsible for the effective use of data. Ownership of data also relates to the outsourcing and transfer of data to third parties. A number of scholars point to the lack of legal clarity with respect to data ownership (Corrin et al., 2019). With the absence of legal systems in place to address this issue, the default position has been that the “data belongs to the owner of the data collection tool [who is], typically also the data client and beneficiary” (Greller & Drachsler, 2012, p.50).

[END OF PAGE]

(Learning Object #4.2.3.3 VIDEO)

Data for instructional support

Personalised learning is the notion of customising learning resources and activities to fit the interests and needs of individual learners. As with many educational technologies, personalised learning has a long history. However, with the growth of the Internet and ICTs and the advancement of intelligent systems, it is possible to use learning analytics as the basis for automated recommendation engines that drive individualised e-learning. This technology has been promised by several emerging LMSs, but has not yet become a sustainable reality on any scale. However, personalised learning technology can significantly change how instruction occurs and transform the notion of a learning place dramatically (Spector & Ren, 2015).

Hence, data is a critical tool that makes this personalised learning possible. When students, parents, and teachers are empowered with access to timely, useful, safeguarded data, there are so many ways to support students on their path to success. The following video provides an overview what data are required to personalise learning.



External video [You need data to personalize learning](#) [03:10]

[END OF PAGE]

Consent and anonymity

Corrin and colleagues (2019, p. 11) provide a well-informed overview on issues of educational data analytics focussing on (a) consent and (b) anonymity.

Consent

Consent involves making a contract with the data subjects by seeking their consent for their data to be collected and analysed. For consent to be valid it must be informed; therefore, the subjects should be provided with clear and transparent information on the purposes for data collection so that they are in a position to give informed consent. They should also potentially be provided with the option to opt-out of having their data collected at any stage. However, consent is not necessarily a straightforward issue since it is not always a legal requirement that consent is obtained, such as in cases where data collection is deemed to be necessary for the 'legitimate interests' of an organisation (p. 32). Thus, for example, the JISC code of practice (http://repository.jisc.ac.uk/6985/1/Code_of_Practice_for_learning_analytics.pdf) notes that there may be circumstances in which students would not be permitted to opt out of having their data collected.

The notion of informed consent is one of the more challenging ethical considerations in the context of learning analytics, and one that has received increased attention in recent scholarship. West et al. (2016b) write of the uneasy relationship between 'consent' and 'informed consent' noting that these concepts are often conflated in higher education digital environments, given that students are frequently asked to sign permission for their data to be collected, but the purposes for which the data will be used may not be made explicit (p. 914). Further, as Cormack (2016) suggests, it is not always clear prior to the collection and analysis of data what correlations will emerge or what the impact on individuals will be, which makes it difficult for institutions to provide clear and transparent information for the purposes of obtaining informed consent.

Anonymity

Anonymity involves offering individuals the choice to conceal or reveal their identity and any identifying information about themselves. In the area of learning analytics anonymity may involve the de-identification of individuals prior to data sharing or analysis. However, although it is generally agreed that institutions should make every effort to anonymise data, experts have also argued that anonymity cannot always be one hundred percent guaranteed. Drachsler and Greller (2016) suggest that "anonymised data can rather easily be de-anonymised when they are merged with other information sources" (p. 94). Granting anonymity also limits the potential uses of learning analytics as it hampers or prevents meaningful bilateral communication and limits the capacity for student intervention, feedback and support.

[END OF PAGE]

Data privacy in productive systems

One of the main concerns of educational data analytics is the handling of data privacy issues. As almost every learning analytics feature collects and processes user data by default, it is inevitable to consider this topic, particularly in regard of the country's data privacy act. It is even more important when the decision is to work within the running, productive environment of the educational institution as soon as possible.

As shown in the Figure below, the educational institution decided to use a pseudonymisation in two steps. Wherever a direct touch with students' activities occurs, a 32-bit hash value as an identifier is used. All tracking events and prompting requests use this hash value to communicate with the core application. The core API then takes this hash, enriches it with a secret phrase (a so-called pepper) and hashes it again. The doubled hash is then stored within the core's database. As a result, a match with new student generated data can be made to already existing data without being directly traceable back to a specific student by a given date within the database.

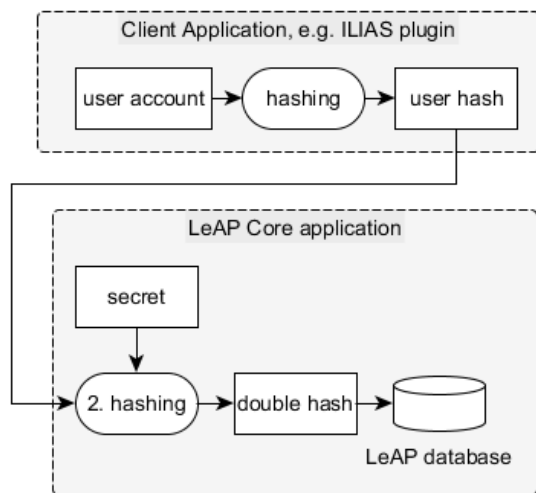


Figure 4.2.3.1: Concept of the encryption of student's identity (Klasen & Ifenthaler, 2019)

Another important issue for implementing educational data analytics in productive systems is the setting of data collection and data analytics functionalities. The Figure below shows an example implemented in a productive Learning Management System allowing the student to change the setting for data collection and data analytics anytime. In addition, the student may request to delete the data stored or download all stored data for self-inspection. Hence, compliance with EU GDPR is given in this case.

Content Info Members Learning Progress ... ▾

Within this course, information about the used objects is being tracked. Thereby, only a pseudo-anonym hash of your account is tracked, which allows no direct conclusion to individual students. The data is used in an active research project at the Chair of Business Economics V. Please support this research by allowing us to track the object id and timestamp of your clicks in ILIAS. If you have any questions, please do not hesitate to contact us.
Thank you,

LA-Profile:

☒ LA-profile aktive
Tracking is anonymous. But some LA-Features are not available.

☐ LA-profile not active
Tracking is disabled. No LA-Features are available.

Save Cancel

Figure 4.2.3.2: Individual setting for data collection and analytics (Klasen & Ifenthaler, 2019)

Given the examples how to implement data privacy settings in productive systems, think about your own institution and how you may implement similar features in order to be compliant with the EU GDPR.

[END OF PAGE]

Case study: Curtin Challenge

This case study demonstrates how the analysis of navigation patterns and network graph analysis informs the learning design of self-guided digital learning experiences.

The Curtin Challenge digital learning platform (<http://challenge.curtin.edu.au>) supports individual and team-based learning via gamified, challenge-based, open-ended, inquiry-based learning experiences that integrate automated feedback and rubric-driven assessment capabilities. The Challenge platform is an integral component of Curtin University's digital learning environment along with the Blackboard learning management system and the edX MOOCs platform. The Challenge development team at Curtin Learning and Teaching are working towards an integrated authoring system across all three digital learning environments with the view of creating reusable and extensible digital learning experiences (Ifenthaler, Gibson, & Dobozy, 2018).

Curtin Challenge includes several content modules, for example Leadership, Careers and English Language Challenge. Since 2015, over 2,600 badges have been awarded for the completion of a challenge. The design features of each module contain approximately five activities that might include one to three different learner interactions.

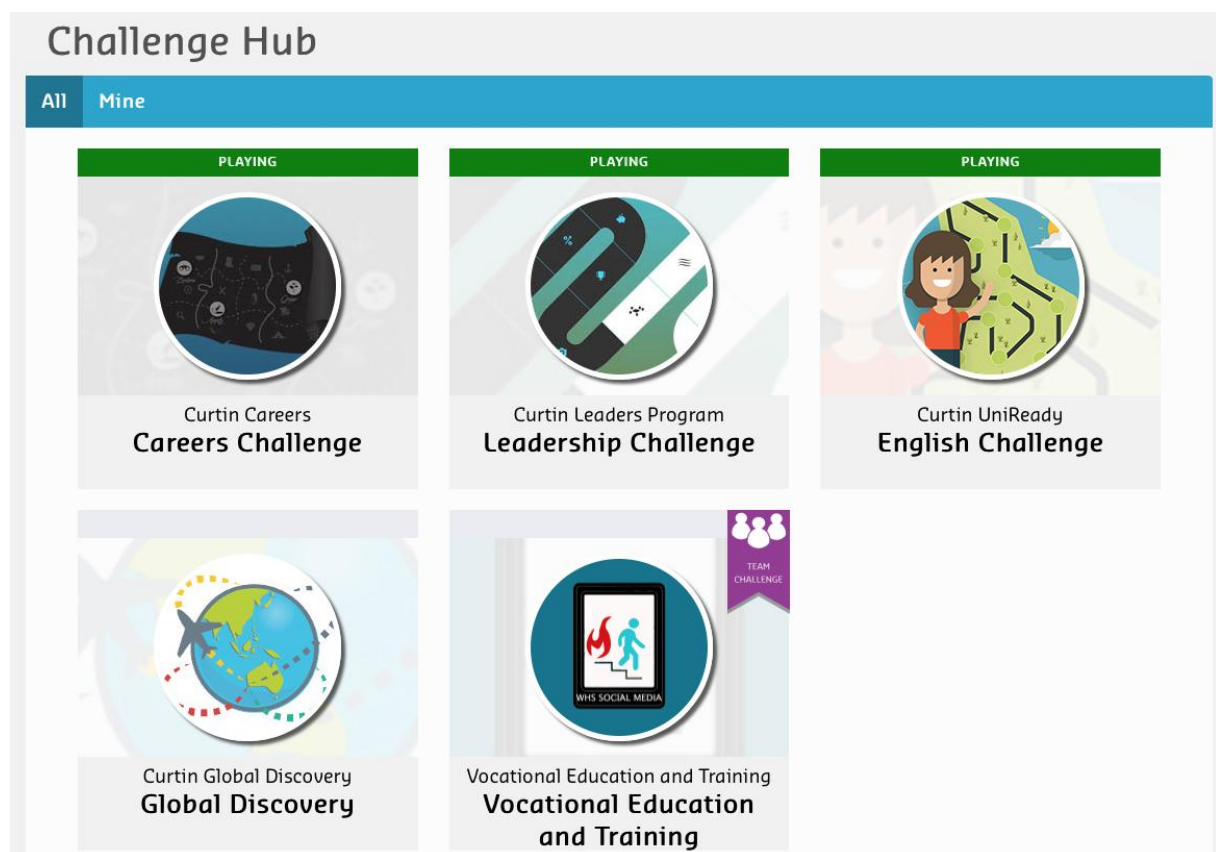


Figure 4.2.3.1: Curtin Challenge Hub (<http://challenge.curtin.edu.au>)

Educational analytics data for the presented case study includes 2,753,142 database rows. Overall, 3,550 unique users registered and completed a total of 14,587 navigation events within a period of 17 months. The Figure below provides an overview of modules started ($M = 3427$, $SD = 2880$) and completed ($M = 2903$, $SD = 2303$) for the Curtin Careers Challenge. The average completion rate for the Curtin Careers Challenge was 87%. The most frequently started module was "Who am I?"

(10,461) followed by the module “Resumes” (7996). The module “Workplace Rights and Responsibilities” showed the highest completion rate of 96%, followed by the module “Interviews” (92%).

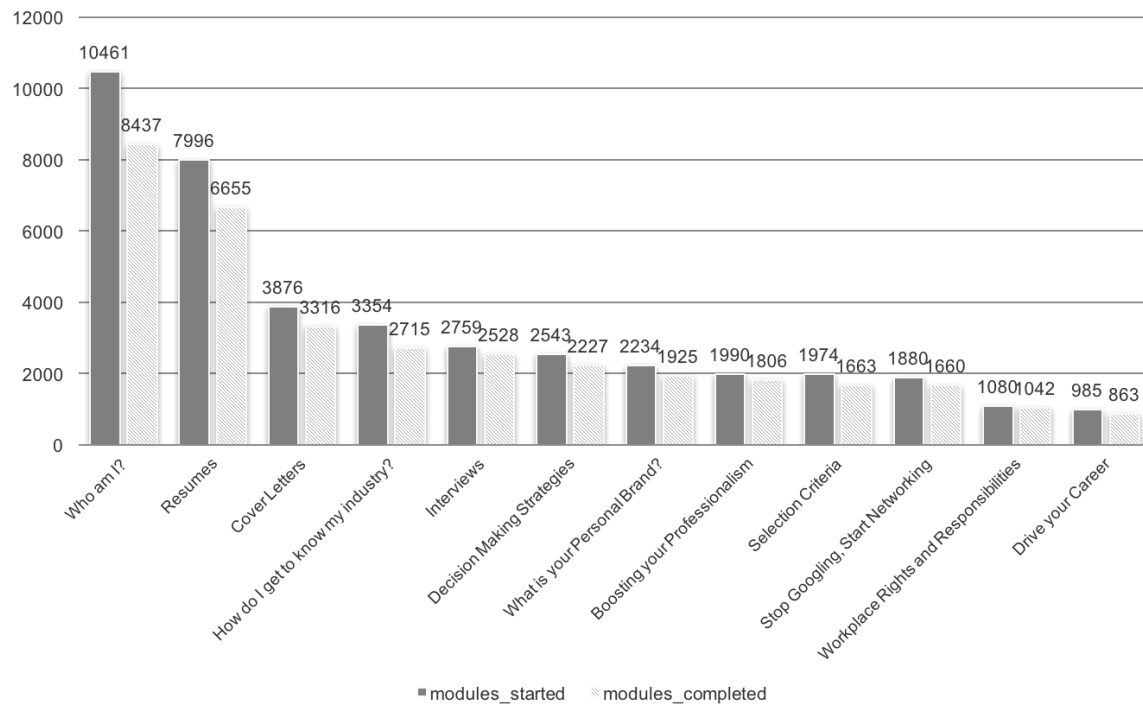


Figure 4.2.3.2: Module completion of Curtin Careers Challenge (Ifenthaler et al., 2018)

The network analysis identifies user paths within the learning environment and visualises them as a network graph on the fly. The dashboard visualisations help the learning designer to identify specific patterns of learners and may reveal problematic learning instances. The nodes of the network graph represent individual interactions. The edges of the network graph represent directed paths from one interaction to another. The indicator on the edges represent the frequency of users taking the path from one interaction to another and in parenthesis the percentage of users who took the path. An aggregated network graph shows the overall navigation patterns of all users. A network graph can be created for each individual user, for selected groups of users (e.g., with specific characteristics), or for all users of the learning environment.

The aggregation of all individual network graphs provides detailed insights into the navigation patterns of all users. The Figure below shows the aggregated network graph including paths taken by all 3550 users showing 14,587 navigation events. The five modules are highlighted using different colours.

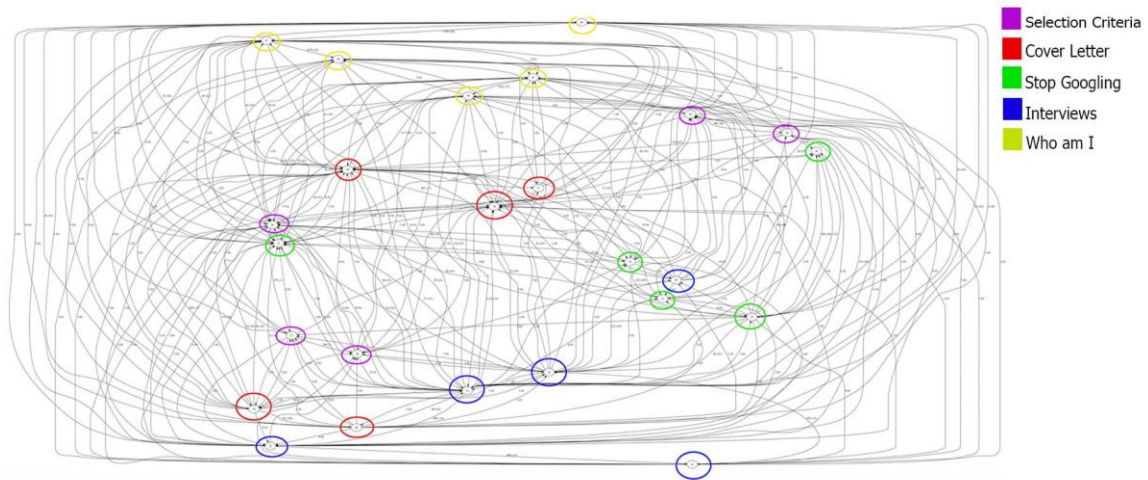


Figure 4.2.3.3: Aggregated network graph (Ifenthaler et al., 2018)

Provided the case study above, the following questions arise:

- Who is the author of the data presented?
- Who holds ownership of the data presented?
- Who can access the data presented?
- Who can share the data presented (and to what purpose)?

[END OF PAGE]

(Learning Object #4.2.3.7 ACTIVITY)

Poll/Discussion

Activity/practice question (poll):

1. Is all the data you use for informing your teaching compliant with EU GDPR?
 - ☐ Yes
 - ☐ No
2. Are you able to provide your students all the data collected about them when they may request it?
 - ☐ Yes
 - ☐ No

Activity/practice question (discussion):

It is necessary to involve all stakeholders in the conversation about data protection and privacy issues. Think about your own educational institution and who you need to involve in this conversation. You may join the discussion with the following task:

1. Describe how you prepare and implement data protection regulations, data consent and other guidelines in your educational institution.
2. Provide tips for other learners when reflecting on their own experiences and institutional practice.

You may check back later for other results after more learners have completed the activity to review the responses of other learners of this course.

[END OF PAGE]

References and further readings

References

Corrin, L., Kennedy, G., French, S., Buckingham Shum, S., Kitto, K., Pardo, A., . . . Colvin, C. (2019). The ethics of learning analytics in Australian higher education. A discussion paper. Retrieved from <https://melbournecshe.unimelb.edu.au/research/research-projects/edutech/the-ethical-use-of-learning-analytics>

Drachsler, H., & Greller, W. (2016). *Privacy and analytics - it's a DELICATE issue. A checklist for trusted learning analytics*. Paper presented at the Sixth International Conference on Learning Analytics & Knowledge, Edinburgh, UK.

Greller, W., & Drachsler, H. (2012). Translating learning into numbers: A generic framework for learning analytics. *Educational Technology & Society*, 15(3), 42–57.

Ifenthaler, D. (2015). Learning analytics. In J. M. Spector (Ed.), *The SAGE encyclopedia of educational technology* (Vol. 2, pp. 447–451). Thousand Oaks, CA: Sage.

Ifenthaler, D., & Schumacher, C. (2016). Student perceptions of privacy principles for learning analytics. *Educational Technology Research and Development*, 64(5), 923–938. doi:10.1007/s11423-016-9477-y

Ifenthaler, D., Gibson, D. C., & Dobozy, E. (2018). Informing learning design through analytics: Applying network graph analysis. *Australasian Journal of Educational Technology*, 34(2), 117–132. doi:10.14742/ajet.3767

Klasen, D., & Ifenthaler, D. (2019). Implementing learning analytics into existing higher education legacy systems. In D. Ifenthaler, J. Y.-K. Yau, & D.-K. Mah (Eds.), *Utilizing learning analytics to support study success* (pp. 61–72). New York, NY: Springer.

Slade, S., & Prinsloo, P. (2013). Learning analytics: Ethical issues and dilemmas. *American Behavioral Scientist*, 57(10), 1510–1529. doi:10.1177/0002764213479366

Spector, J. M., & Ren, Y. (2015). History of educational technology. In J. M. Spector (Ed.), *The SAGE encyclopedia of educational technology* (Vol. 2, pp. 335–345). Thousand Oaks, CA: Sage.

West, D., Huijser, H., & Heath, D. (2016). Putting an ethical lens on learning analytics. *Educational Technology Research and Development*, 64(5), 903–922. doi:10.1007/s11423-016-9464-3

Further readings

Heath, J. (2014). Contemporary privacy theory contributions to learning analytics. *Journal of Learning Analytics*, 1(1), 140–149.

Nissenbaum, H. (2011). A contextual approach to privacy online. *Deadalus*, 140(4), 32–48.

Pardo, A., & Siemens, G. (2014). Ethical and privacy principles for learning analytics. *British Journal of Educational Technology*, 45(3), 438–450. doi:10.1111/bjet.12152

Weippl, E. R., & Min Tjoa, A. (2005). Privacy in e-learning: anonymity, pseudonyms and authenticated usage. *Interactive Technology and Smart Education*, 2(4), 247–256.

[END OF PAGE]

4.3.1 Designing and revising automated and semi-automated interventions

(Learning Object #4.3.1.1 ACTIVITY)

Poll: Are your interventions automated?

Utilising data for supporting pedagogical interventions has raised many hopes and concerns. How about you?

Activity/practice question (poll):

1. Are you aware of automated interventions for your daily teaching practice?
 - ☐ Yes
 - ☐ No
2. Are you willing to implement automated interventions for better supporting your learners?
 - ☐ Yes
 - ☐ No

Thank you for answering your questions. You may check back later in order to compare your answers with other learners of this module.

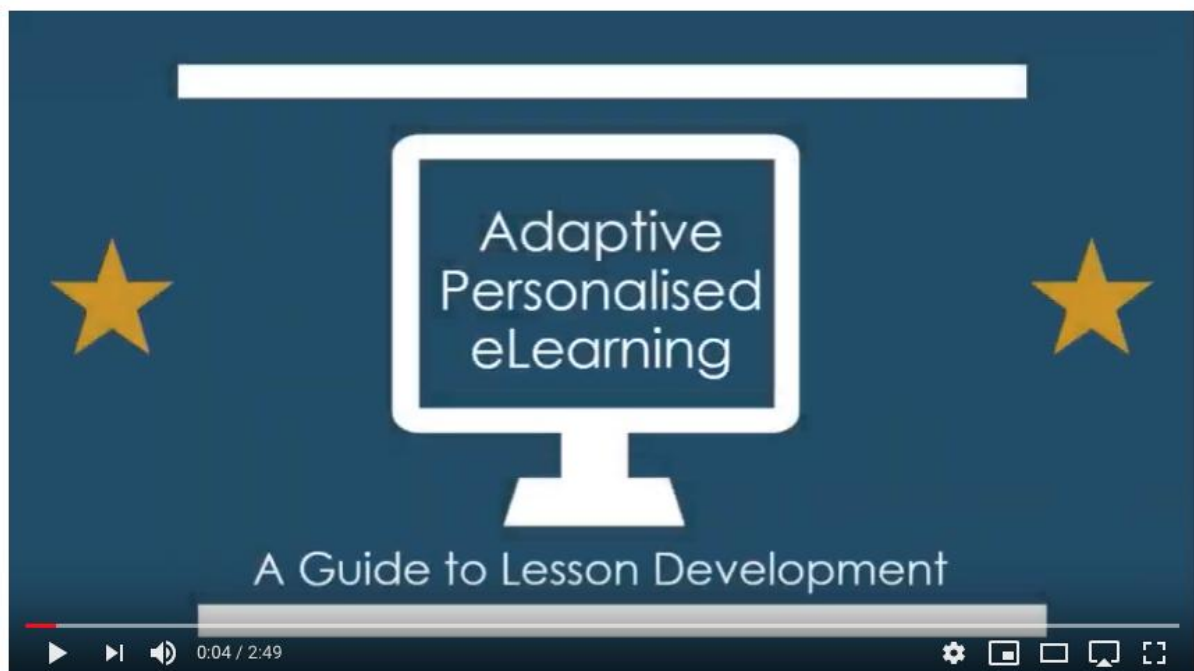
[END OF PAGE]

(Learning Object #4.3.1.2 VIDEO)

Adaptive learning

Adaptive learning and teaching are an alternative to the traditional “one-size-fits-all” approach in the development of digital learning environments. Adaptive learning systems build a model of the goals, preferences and knowledge of each individual learner, and use this model throughout the interaction with the learner, in order to adapt to the needs of that learner (Brusilovsky, 1996).

Educational data analytics provides the key element for designing and implementing adaptive learning experiences. In sum, adaptive learning and teaching are referred to as customised learning experiences that focus on the just-in-time need of an individual learning by providing meaningful interventions, feedback or support. The video below introduces the concept of adaptive learning.



External video [Adaptive Learning](#) [2:49]

[END OF PAGE]

Adaptive learning technologies

The systems that are most commonly used in technology-enhanced learning, namely, learning management systems (LMSs), typically present exactly the same course for every learner without consideration of the learner's individual characteristics, situation, and needs (Graf & Kinshuk, 2014). Such a one-size-fits-all approach often leads to frustration, difficulties in learning, and a high dropout rate, as for example in Massive Open Online Courses (MOOCs).

Adaptive learning technologies address this issue by enabling learning systems to adapt the learning environment and/or learning activities automatically to adjust to the learners' individual situation, characteristics and needs, and therefore provide personalized learning experiences. In order to be able to generate adaptive interventions, the system has to model the learner and the learning context. This is where data and analytics come in.

According to Graf and Kinshuk (2014), adaptive interventions can be based on the following areas:

- Learning styles
- Cognitive abilities
- Affective states
- Context and environment

Besides the term “adaptive learning system,” there are other terms that are often used in similar contexts. The term “personalized learning system” emphasizes the aim of the system to consider a learner's individual differences. The term “intelligent learning (or tutoring) system” refers to systems that focus on the use of techniques from the field of artificial intelligence to provide better support for learners. On the other hand, the term “adaptive learning system” stresses the ability of a learning system to automatically provide different courses, learning material, or learning activities for different learners. Most of the learning systems relying on learning analytics to tailor education to learners' characteristics and needs can be considered as adaptive, personalized, and intelligent.

In their framework of personalization in technology enhanced learning, FitzGerald et. al. (2018) characterized learning analytics systems as follows:

Table 4.3.1.1
Personalization dimensions and learning analytics (FitzGerald et al., 2018)

<i>Dimension 1: What is being personalised?</i>	<i>Dimension 2: Type of learning</i>	<i>Dimension 3: Personal characteristics of the learner</i>	<i>Dimension 4: Who/what is doing the personalisation</i>	<i>Dimension 5: How is personalisation carried out?</i>	<i>Dimension 6: Impact/ beneficiaries</i>
Content Assessment Visual design/ presentation of resources	Formal	Demographic (e.g., age, cultural background) Prior knowledge (e.g., based on recent assessment scores) Self-assessed knowledge (by teacher or learner) Demonstrated interests or personal relevance (e.g., could feed into learner profile) Level of learner commitment/ motivation and self-regulation	Computer software and/or algorithms	Whole person personalisation (affective elements)	Learners Teachers Schools/organisations (in terms of large scale learner tracking)

Automated and semi-automated interventions

Closely linked to the demand of new approaches for designing and developing up-to-date adaptive learning environments is the necessity of enhancing the design and delivery of assessment systems and automated computer-based diagnostics (Almond, Steinberg, & Mislevy, 2002; Ifenthaler, Pirnay-Dummer, & Seel, 2010). These systems need to accomplish specific requirements, such as:

- a. adaptability to different subject domains,
- b. flexibility for experimental and instructional settings,
- c. management of huge amounts of data,
- d. rapid analysis of specific data,
- e. immediate feedback for learners and educators, and
- f. generation of automated reports of results (Pirnay-Dummer, Ifenthaler, & Seel, 2012).

Recently, promising methodologies have been developed which provide a strong basis for applications in learning and instruction in order to follow up with the demands that come with better theoretical understanding of the phenomena that are a prerequisite or an integral part or go along with the learning process.

Several possible solutions to the assessment and analysis problems of knowledge representations have been discussed (Ifenthaler & Pirnay-Dummer, 2014). Therefore, it is worthwhile to compare the model-based assessment and analysis approaches in order to illustrate their advantages and disadvantages, strengths and limitations (see Table below). Yet, there is no ideal solution for the automated assessment of knowledge. However, within the last five years strong progress has been made in the development of model-based tools for knowledge assessment. Still, the Table below highlights necessary further development of the available tools, especially for everyday classroom application.

Table 4.3.1.1.
Comparison of model-based assessment tools

	Pathfinder	ALA-Reader	jMAP	HIMATT	AKOVIA
Descripti on	•Converting estimates of relatedness of pairs of concepts into a network representation	•Scoring open-ended concept maps and essays	•Workbench to map concepts onto a pre-defined structure	•Experimental toolset to elicit and analyze graphical or text-based artifacts	•Automated researcher tool to analyze existing graphical or text-based artifacts
Measures	•Graph theory-based measures •Network representation	•Graph theory-based measures •Scoring algorithm	•Adjacency matrix of links	•Quantitative structural measures •Semantic measures •Graphical	•Quantitative structural •Semantic measures •Graphical representa

				representation as qualitative measure	tion as qualitative measure
Objectivity	<ul style="list-style-type: none"> Model building process depends on the interpretation by the subjects 	<ul style="list-style-type: none"> Model building process depends on observers 	<ul style="list-style-type: none"> Model building process depends on observers 	<ul style="list-style-type: none"> Automated analysis 	<ul style="list-style-type: none"> Automated analysis
Reliability	<ul style="list-style-type: none"> Tested () 	<ul style="list-style-type: none"> Tested (Clariana, 2010) 	<ul style="list-style-type: none"> Not tested 	<ul style="list-style-type: none"> Tested (Ifenthaler & Pirnay-Dummer, 2010) 	<ul style="list-style-type: none"> Tested (Ifenthaler & Pirnay-Dummer, 2010)
Validity	<ul style="list-style-type: none"> Tested () 	<ul style="list-style-type: none"> Tested (Clariana, 2010) 	<ul style="list-style-type: none"> Not tested 	<ul style="list-style-type: none"> Tested (Ifenthaler & Pirnay-Dummer, 2010) 	<ul style="list-style-type: none"> Tested (Ifenthaler & Pirnay-Dummer, 2010)
Automation	<ul style="list-style-type: none"> Partly 	<ul style="list-style-type: none"> Partly 	<ul style="list-style-type: none"> Analysis only 	<ul style="list-style-type: none"> Elicitation & analysis 	<ul style="list-style-type: none"> Model-elicitation (text) & analysis
Strength	<ul style="list-style-type: none"> Well established research approach 	<ul style="list-style-type: none"> Instant analysis 	<ul style="list-style-type: none"> Off-line availability Instant analysis 	<ul style="list-style-type: none"> Complete experimental setup Server-based for both the elicitation and the analysis 	<ul style="list-style-type: none"> Large datasets Fast analysis Scripting server & online access Data can be assessed by any means outside of the system
Limitations	<ul style="list-style-type: none"> Connectivity to other learning environments is rather weak 	<ul style="list-style-type: none"> Connectivity to other learning environments is rather weak 	<ul style="list-style-type: none"> Model construction objectivity 	<ul style="list-style-type: none"> Connectivity to other learning environments is rather weak 	<ul style="list-style-type: none"> No elicitation module available

[END OF PAGE]

Instructional design principles for adaptivity

Leutner (2004) has summarized ten instructional design principles for fostering adaptivity in open learning environments. These principles highlight various instructional elements that can be designed for adaptivity and personalized learning. The principles are:

Adapting ...

- P 1: ... the amount of instruction
- P 2: ... the sequence of instructional units
- P 3: ... the content of information
- P 4: ... the presentation format of information
- P 5: ... task difficulty
- P 6: ... concept definitions
- P 7: ... the system response time
- P 8: ... advice in exploratory learning
- P 9: ... the menu structure of computer software in software training programs
- P10: ... system control versus learner control

[END OF PAGE]

(Learning Object #4.3.1.6 ACTIVITY)

Workshop: tools for adaptivity

This workshop focusses on tools for adaptive learning environments.

1. Research different tools for adaptivity using a Web search.
2. Identify relevant tools and document their technical as well as pedagogical features.
3. Create a top-ten list of tools for adaptivity meeting the requirements of your educational institution.
4. Share your top-ten list of tools for adaptivity with the group of learners in the forum.

You may check back later for other results after more learners have completed the activity to review the responses of other learners of this course.

[END OF PAGE]

(Learning Object #4.3.1.7 ACTIVITY)

Poll

Activity/practice question (poll):

1. When interacting with an adaptive learning system, do you trust the recommendations the system provides for your own learning?
 - ☐ Yes
 - ☐ No
2. Have you designed or developed an adaptive tool for implementing in your learning environments?
 - ☐ Yes
 - ☐ No

[END OF PAGE]

References and further readings

References

- Almond, R. G., Steinberg, L. S., & Mislevy, R. J. (2002). Enhancing the design and delivery of assessment systems: A four process architecture. *Journal of Technology, Learning, and Assessment*, 1(5), 3-63.
- Brusilovsky, P. (1996). Methods and techniques of adaptive hypermedia. *User Modeling and User-Adapted Interaction*, 6(2-3), 87-129.
- FitzGerald, E., Kucirkova, N., Jones, A., Cross, S., Ferguson, R., Herodotou, C., Hillaire, G. & Scanlon, E. (2018). Dimensions of personalisation in technology-enhanced learning: A framework and implications for design. *British Journal of Educational Technology*, 49(1), 165-181. doi:10.1111/bjet.12534
- Graf, S. & Kinshuk (2014). Adaptive technologies. In Spector, J.M., Merrill, M.D., Elen, J., Bishop, M.J. (Eds.), *Handbook of research on educational communications and technology* (pp. 771-779). New York, NY: Springer. doi:10.1007/978-1-4614-3185-5_62
- Ifenthaler, D., Pirnay-Dummer, P., & Seel, N. M. (Eds.). (2010). *Computer-based diagnostics and systematic analysis of knowledge*. New York, NY: Springer.
- Ifenthaler, D., & Pirnay-Dummer, P. (2014). Model-based tools for knowledge assessment. In J. M. Spector, M. D. Merrill, J. Elen, & M. J. Bishop (Eds.), *Handbook of research on educational communications and technology* (4 ed., pp. 289-301). New York, NY: Springer.
- Leutner, D. (2004). Instructional-design principles for adaptivity in open learning environments. In Seel, N. M., & Dijkstra, S. (Eds.), (2004). *Curriculum, plans, and processes in instructional design: International perspectives* (pp. 289-307). Mahwah, NJ: Erlbaum.
- Pirnay-Dummer, P., Ifenthaler, D., & Seel, N. M. (2012a). Designing model-based learning environments to support mental models for learning. In D. H. Jonassen & S. Land (Eds.), *Theoretical foundations of learning environments* (2 ed., pp. 66-94). New York: Routledge.

Further readings

- Brusilovsky, P. (2001). Adaptive hypermedia. *User Modeling and User-Adapted Interaction*, 11, 87-110.
- Fortenbacher, A., Pinkwart, N., & Yun, H. (2017). *Learning analytics for sensor-based adaptive learning*. Paper presented at the LAK '17 Proceedings of the Seventh International Learning Analytics & Knowledge Conference, Vancouver, British Columbia, Canada, 13-03-2017.
- Fuchs, K., Henning, P. A., & Hartmann, M. (2016). INTUITEL and the hypercube model - Developing adaptive learning environments. *Journal on Systemics, Cybernetics and Informatics*, 14(3), 7-11.
- Jones, M., & Winne, P. H. (Eds.). (1992). *Adaptive learning environments. Foundations and frontiers*. Berlin: Springer.

Koedinger, K. R., & Corbett, A. T. (2006). Cognitive tutors: Technology bringing learning sciences to the classroom. In R. K. Sawyer (Ed.), *The cambridge handbook of the learning sciences* (pp. 61–77). New York: Cambridge University Press.

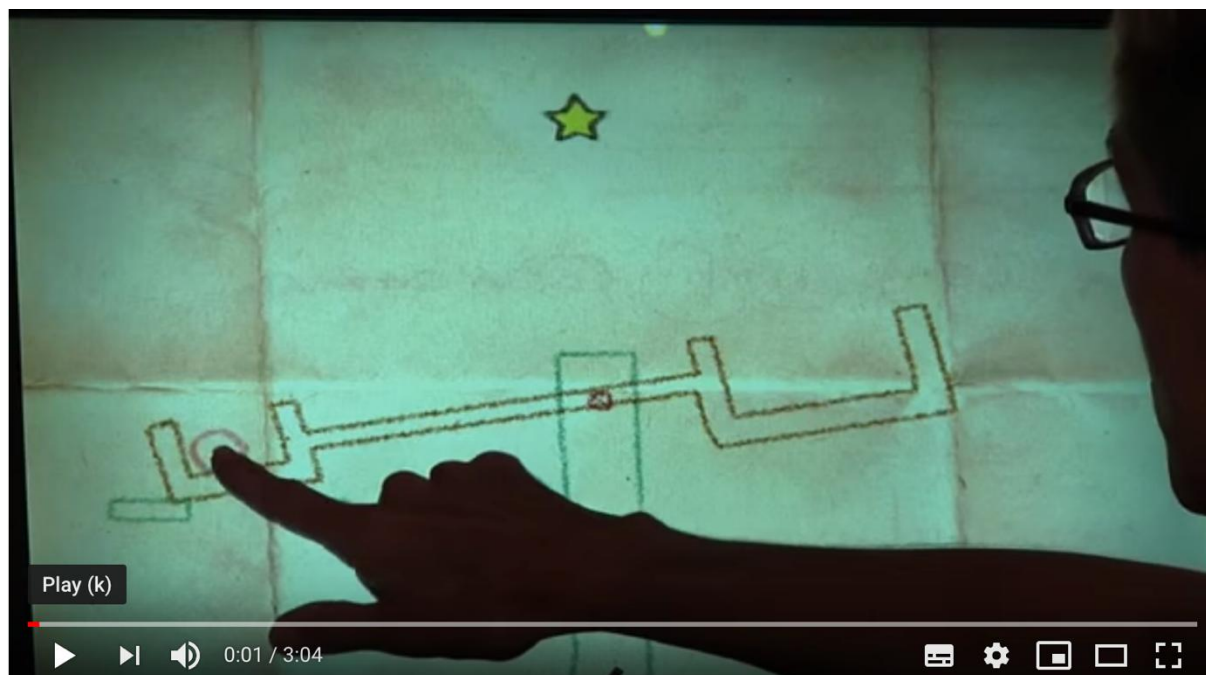
Paramythis, A., & Loidl-Reisinger, S. (2004). Adaptive learning environments and e-learning standards. *Electric Journal of e-Learning*, 2(1), 181–194.

[END OF PAGE]

4.3.2 Methodologies for improving learning and teaching processes as well as curricula

(Learning Object #4.3.2.1 VIDEO)

This short video explains how researchers at Florida State University, USA, implement research approaches into learning environments in order to inform (a) advances in research and (b) support students to better learn in classrooms.



External video [Combining research and practice in education](#) [3:04]

[END OF PAGE]

Creating interventions in classroom settings

Following Ann L. Brown's (1992) article, the effective methodology for improving learning and teaching processes as well as curricula is the combination of creating innovative educational environments and conducting experimental studies of those innovations. The so called design experiment is illustrated in the Figure below.

Brown (1992) explains, that a functional classroom is central to the design experiment before an investigation can be implemented. Hence, classroom life is synergistic: Aspects of it that are often treated independently, such as teacher training, curriculum selection, testing, and so forth actually form part of a systemic whole. Just as it is impossible to change one aspect of the system without creating perturbations in others, so too it is difficult to study any one aspect independently from the whole operating system. Brown (1992) suggests that we must operate always under the constraint that an effective intervention should be able to migrate from our experimental classroom to average classrooms operated by and for average students and teachers, supported by realistic technological and personal support.

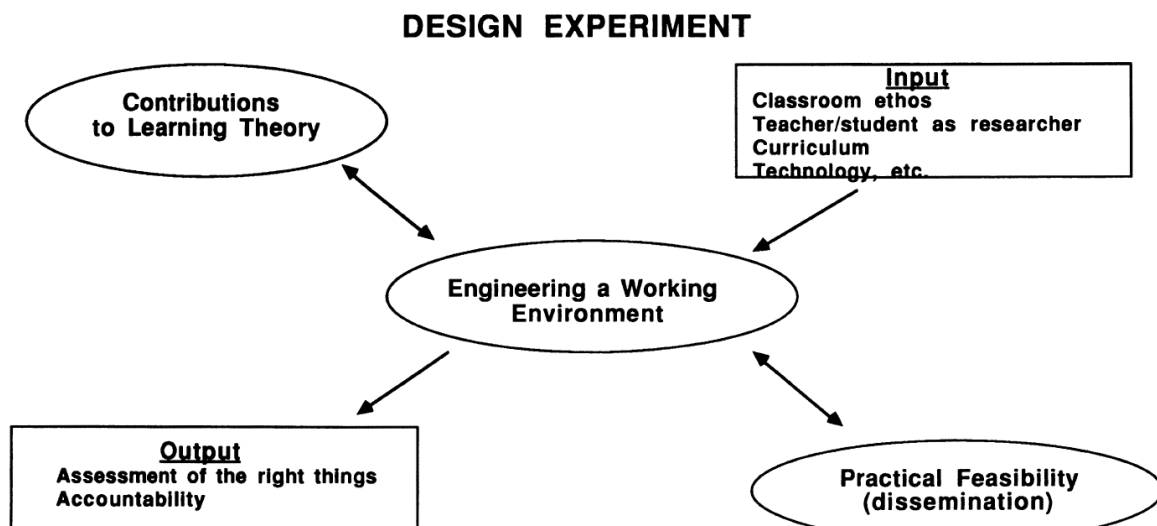


Figure 4.3.2.1: Features of design experiments (Brown, 1992)

[END OF PAGE]

Educational Design Research at a glance

Educational Design Research (EDR) or Design-Based Research (DBR) – the terms are mostly used synonymously – is a meta-methodology in educational research. It represents a genre of applied research in which the iterative development of solutions to practical and complex educational problems provides the setting for scientific inquiry. The solutions can be educational products, processes, programs, or policies. EDR not only targets solving significant problems educational practitioners face but at the same time seeks to discover new knowledge that can inform the work of others with similar problems. EDR distinguishes itself from other forms of inquiry by attending to both solving problems by putting knowledge to use, and through that process, generating new knowledge. (McKenney, & Reeves, 2014). EDR projects seek to establish collaborations among researchers and practitioners in real-world settings in order to avoid the widespread theory vs. practice dilemmata.

EDR is closely related to research-based educational design as conducted with teaching and learning analytics, yet entails a bit more. Both concepts are shaped by iterative, data -driven processes to reach successive approximations of a desired intervention. However, research -based educational design focuses solely on intervention development, whereas design research strives explicitly to make a 'transferable' scientific contribution in form of design principles (McKenney, & Reeves, 2014).

Major characteristics of Educational Design Research are shown in the Table below:

Table 4.3.2.1

Characteristics of EDR/DBR (Wang, & Hannafin, 2005)

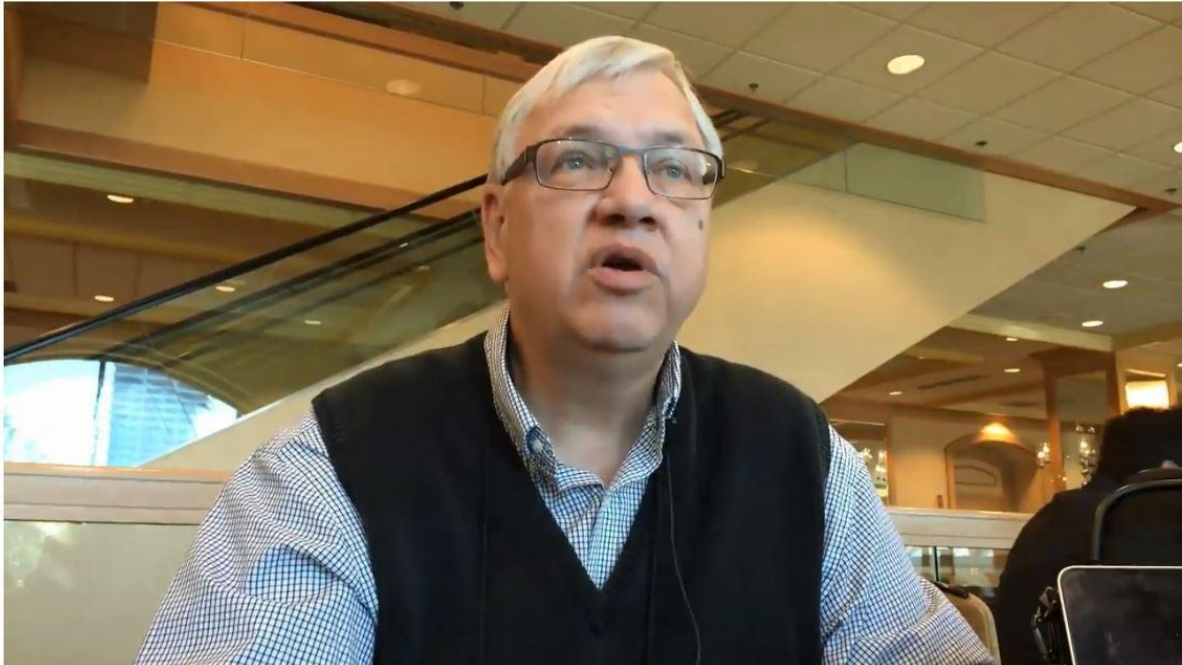
<i>Characteristics</i>	<i>Explanations</i>
Pragmatic	<ul style="list-style-type: none">• Design-based research refines both theory and practice.• The value of theory is appraised by the extent to which principles inform and improve practice.
Grounded	<ul style="list-style-type: none">• Design is theory-driven and grounded in relevant research, theory and practice.• Design is conducted in real-world settings and the design process is embedded in, and studied through, design-based research.
Interactive, iterative, and flexible	<ul style="list-style-type: none">• Designers are involved in the design processes and work together with participants.• Processes are iterative cycle of analysis, design, implementation, and redesign.• Initial plan is usually insufficiently detailed so that designers can make deliberate changes when necessary.
Integrative	<ul style="list-style-type: none">• Mixed research methods are used to maximize the credibility of ongoing research.• Methods vary during different phases as new needs and issues emerge and the focus of the research evolves.• Rigor is purposefully maintained and discipline applied appropriate to the development phase.
Contextual	<ul style="list-style-type: none">• The research process, research findings, and changes from the initial plan are documented.• Research results are connected with the design process and the setting.• The content and depth of generated design principles varies.• Guidance for applying generated principles is needed.

[END OF PAGE]

(Learning Object #4.3.2.3 VIDEO)

Proliferation of design-based approaches

Thomas Reeves, Professor Emeritus from the University of Georgia, College of Education talks about the different design-based approaches and about what he sees as the core of the concept.



What are the differences between the various design-based methods of inquiry?

External video [Design-based methods](#) [2:49]

[END OF PAGE]

Conducting Educational Design Research

McKenney and Reeves (2014) described a process model for conducting educational design research.

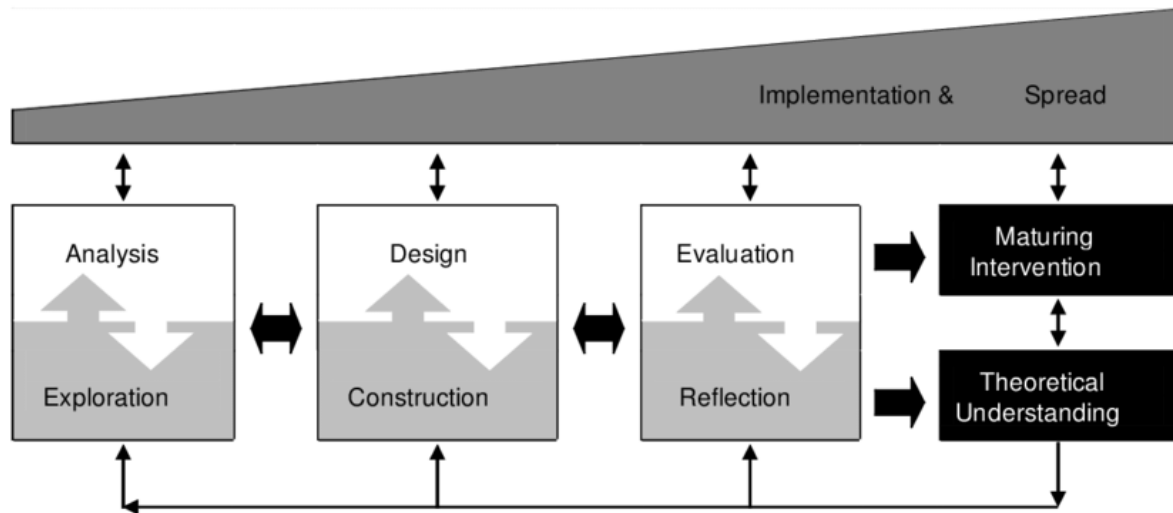


Figure 4.3.2.2: Generic model for conduction Educational Design Research (McKenney & Reeves, 2014)

The model has three main features (Huang, Spector, & Yang, 2019):

- Three core phases in a flexible, interactive structure: analysis, design, and evaluation.
- Dual focus on theory and practice; integrated research and design processes; theoretical and practical outcome
- Indications of being use-inspired: planning for implementation and spread; interaction with practice; contextually responsive

[END OF PAGE]

Designing model-based learning environments

In model-based and model-oriented learning environments two kinds of models need to be considered: (1) the model of the learning goal, which represents the expertise, set of skills, or, in general, the things to be learned and (2) the model within the learner that is constructed and retained in dependence on the learning environment and on the basis of the current epistemic beliefs active within the learner, i.e., whether and how the learner usually explains parts of the world. We will abbreviate the first type as the LE model (model of the learning environment) and the L model (model of the learner), always assuming that the two types are closely intertwined, especially in well-designed learning environments (Pirnay-Dummer, Ifenthaler, & Seel, 2012).

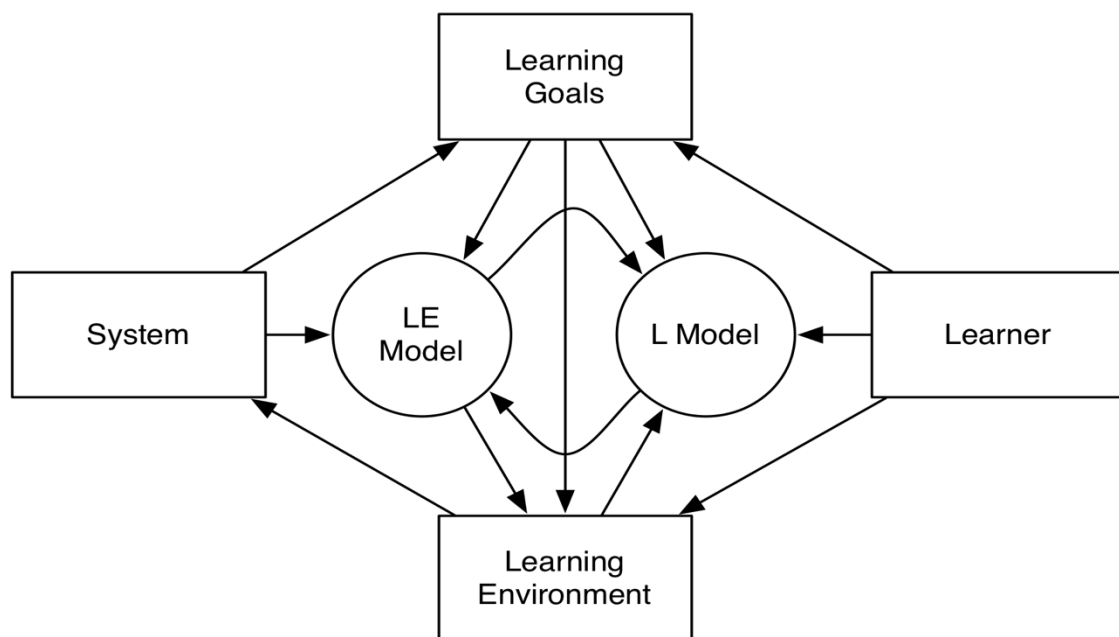


Figure 4.3.2.3: Interdependences of system, learning goals, learner, and learning environment (Pirnay-Dummer et al., 2012)

As shown in the Figure above, the educational system (meso- and exo-system) and the learners have different influences on the learning goals at different times. The learning goals constitute the constraints for the learning environment. The learning environment is a manifestation (a derivate) of the LE model. Possible and available learning environments (technology and/or best practices) influence the system by setting the boundaries for what is possible – and decidable as regards educational planning. The learner has influence on the learning environment (as more or less pre-structured by its design). Learning takes place as soon as the LE model and the L model interact. During that time, the learning goal influences and guides the interaction between the two models. LE model-oriented technologies usually focus on the L model while model-centered technologies concentrate more on the LE model. It is our understanding that the two (very similar) approaches will always go hand in hand and influence each other (Pirnay-Dummer et al., 2012).

[END OF PAGE]

(Learning Object #4.3.2.6 ACTIVITY)

Poll/Discussion

Activity/practice question (poll):

1. Do you always have sufficient information about the educational system before you design a learning environment?
 - ☐ Yes
 - ☐ No
2. Do you use evidence from different stakeholders when revising a curriculum?
 - ☐ Yes
 - ☐ No

Activity/practice question (discussion):

It is now time to stop and reflect on your understanding of methodologies for improving learning and teaching processes. Share your experience and practice by posting your reflections on the following questions:

1. What is the advantage of a design-based research approach in your daily work?
2. Are you using identical theoretical underpinnings for creating evidence for the implementation of a learning environment?

[END OF PAGE]

References and further readings

References

Brown, A. L. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *The Journal of the Learning Sciences*, 2(2), 141–178.

Huang, R., Spector, J. M., & Yang, J. (2019). Design-based research. In R. Huang, J. M. Spector, & J. Yang (Eds.), *Educational technology. A primer for the 21st century* (pp. 179–188). Singapore: Springer.

McKenney, S., & Reeves, T. C. (2014). Educational design research. In J. M. Spector, M. D. Merrill, J. Elen, & M. J. Bishop (Eds.), *Handbook of research on educational communications and technology* (4 ed., pp. 131–140). New York, NY: Springer.

Pirnay-Dummer, P., Ifenthaler, D., & Seel, N. M. (2012). Designing model-based learning environments to support mental models for learning. In D. H. Jonassen & S. Land (Eds.), *Theoretical foundations of learning environments* (2 ed., pp. 66–94). New York, NY: Routledge.

Wang, F., & Hannafin, M. J. (2005). Design-based research and technology-enhanced learning environments. *Educational Technology Research and Development*, 53(4), 5–23.

Further readings

McKenney, S., & Reeves, T. C. (2018). *Conducting educational design research* (2 ed.). New York, NY: Routledge.

Van den Akker, J., Gravemeijer, K., McKenney, S., & Nieveen, N. (Eds.). (2006). *Educational design research*. London: Routledge.

[END OF PAGE]

Module 4:

MULTIPLE CHOICE QUIZ

This quiz contributes to the final assessment for receiving the Learn2Analyse MOOC **Certificate of Achievement**. Your grade in the course is calculated based on your replies to **100 multiple choice quizzes** distributed to the 6 core modules. In order to successfully complete this course and gain your Certificate of Achievement you must gain a mark of **60% or greater** overall to all 100 quizzes.

The quiz of Module 4 consists of **15 questions**, including:

- multiple choice with one correct answer;
- multiple choice with more than one correct answer; and
- true/false questions.

It is "open book" and there is no set time limit.

You will have **two attempts** to answer all quiz questions except for the "true/false" questions. When you click "Check", it will register as your first attempt. If your answer is incorrect, try again and then click "Final Check".

It should take less than **45 minutes** of your time to complete this quiz.

Topic 4.1 Data sources for supporting teaching analytics

Question 4.1: The didactic triangle consists of ... (select all the correct answers)

1. Learner
2. Teacher
3. Content
4. Technology
5. Environment

Question 4.2: Effective teaching includes ... (select all the correct answers)

1. Clearly formulated goals
2. Sequenced learning tasks
3. Formative assessment
4. Time pressure
5. Pure exploration

Question 4.3: A key principle of learning design includes ... (select the correct answers)

1. Representation of learning activities
2. Limitation of learning time
3. Real-time monitoring of performance

4. Exclusion of supportive technology
5. Governance of exam regulations

Question 4.4: Primary educational data is especially collected for the purpose of improving teaching and learning

1. True
2. False

Question 4.5: An example for data accuracy is:

1. Student number in a campus management system matches the student number in the learning management system
2. Academic performance record includes several data points of study progress
3. Event dates are stored in various formats
4. Real-time user behaviour is stored for at least 10 days
5. Interactions are limited to 1.000 records per day

Topic 4.2 Data ethics and privacy principles for teaching analytics

Question 4.6: Reasons for learners to keep data private include ... (select the correct answers)

1. competitive reasons
2. personal reasons
3. technical reasons
4. environmental reasons
5. seasonal reasons

Question 4.7: Descriptive privacy is based on the assumption of natural means, e.g., physical barriers

1. True
2. False

Question 4.8: Based on the data map, legislations and regulations can be defined

1. True
2. False

Question 4.9: Ethical key principles for educational data analytics include ... (select the correct answers)

1. respect for autonomy
2. doing no harm to every involved stakeholder
3. pursue good outcomes for all involved stakeholder
4. building advantages over competitors
5. separating high from low achieving performance

Question 4.10: Educational data ownership refers to ... (select the correct answers)

1. the possession of data
2. the control of data
3. the marketing of data
4. the analytics strategy of data
5. the revenue made with data

Question 4.11: The EU GDPR includes the right to buy personal data from third party.

1. True
2. False

Topic 4.3 Applying and communicating educational data and analytics findings

Question 4.12: Adaptive learning and teaching include the following characteristics ... (select the correct answers)

1. customised learning experience
2. providing meaningful interventions
3. making the learner transparent
4. building misconceptions
5. hiding errors in groups

Question 4.13: Design principles for adaptive learning environments include ... (select the correct answers)

1. adapting the task difficulty
2. adapting the presentation format of learning artefacts
3. adapting the sequence of instructional units
4. adapting the speed of algorithms for data processing
5. adapting the number of learners in a data model

Question 4.14: Informing teaching through data requires realistic technological and personal support

1. True
2. False

Question 4.15: Educational Design Research seeks to establish collaborations among researchers and practitioners in real-world settings

1. True
2. False

[END OF PAGE]

Learn2Analyze

Knowledge Alliances (Key Action 2)

AGREEMENT NUMBER: 2017 - 2733 / 001 – 001

PROJECT NUMBER: 588067-EPP-1-2017-1-EL-EPPKA2-KA

WP3. Learn2Analyse MOOC Design and Development

Result 6a Learn2Analyze MOOC version 1 Learning Materials

Module 5: Educational Data Analytics with Moodle

Module 5

EDUCATIONAL DATA ANALYTICS WITH MOODLE

Estimated Effort to complete: 12 hours

Assessment Multiple Choice Questions: 25

5.0 INTRODUCTION	
5.0.1 Welcome	LO#5.0.1 html page: Welcome
5.0.2 Introduction	LO#5.0.2 html page with video: Introduction
5.0.3 Learning Outcomes	LO#5.0.3 html page: Learning Outcomes
5.0.4 LMS Intro	LO#5.0.4 html page with video: LMS Intro
5.0.5 Case Study	LO#5.0.5 html page: Case Study
5.0.6 Pre-module Survey	LO#5.0.6 activity: Pre-module Poll
5.1 TOPIC 1 : SITE LEVEL REPORTING	
5.1.0 Introduction	LO#5.1.0 html page: Site Level Reporting Introduction
5.1.1 Pre-topic Poll	LO#5.1.1 activity: Site Level Reporting Pre-topic Poll
5.1.2 Site Level Analytics	LO#5.1.2.1 html page: Introduction LO#5.1.2.2 html page: Comments LO#5.1.2.3 html page: Course overview LO#5.1.2.4 html page: Logs LO#5.1.2.5 html page: Statistics LO#5.1.2.6 html page with video: Event monitoring rules LO#5.1.2.7 html page: Conclusion
5.1.3 Inspire Analytics	LO#5.1.3.1 html page with video: Introduction LO#5.1.3.2 html page: Students at risk of dropping out LO#5.1.3.3 html page: No teaching LO#5.1.3.4 html page with video: Conclusion
5.1.4 GDPR Features	LO#5.1.4.1 html page: Introduction LO#5.1.4.2 html page with video: Moodle 3.5 & GDPR in practice LO#5.1.4.3 html page: User agreements LO#5.1.4.4 html page: Data requests LO#5.1.4.5 html page with video: Conclusion
5.1.5 Quiz	LO#5.1.5 activity: Site Level Reporting Quiz
5.1.6 How To	LO#5.1.6 html page with video: How To - Site Level Reporting
5.1.7 Survey	LO#5.1.7 activity: Site Level Reporting Post-topic Poll
5.2 TOPIC 2 : COURSE LEVEL REPORTING	
5.2.0 Introduction	LO#5.2.0 html page: Course Level Reporting Introduction
5.2.1 Survey	LO#5.2.1 activity: Course Level Reporting Pre-topic Poll
5.2.2 Course Level Analytics	LO#5.2.2.1 html page with video: Introduction

	LO#5.2.2.2 html page: Course completion report LO#5.2.2.3 html page: Logs and live logs reports LO#5.2.2.4 html page: Activity report LO#5.2.2.5 html page: Course participation report LO#5.2.2.6 html page: Activity completion report LO#5.2.2.7 html page: Statistics report LO#5.2.2.8 html page: Event monitoring LO#5.2.2.9 html page: Conclusion
5.2.3 Activity level analytics	LO#5.2.3.1 html page: Introduction LO#5.2.3.2 html page: Assignment LO#5.2.3.3 html page: Lesson LO#5.2.3.4 html page: Quiz LO#5.2.3.5 html page: SCORM LO#5.2.3.6 html page: Conclusion
5.2.4 Quiz	LO#5.2.4 activity: Course Level Reporting Quiz
5.2.5 How To	LO#5.2.5 html page with video: How To - Course Level Reporting
5.2.6 Survey	LO#5.2.6 activity: Course Level Reporting Post-topic Poll
5.3 TOPIC 3 : USER LEVEL REPORTING	
5.3.0 Introduction	LO#5.3.0 html page: User Level Reporting Introduction
5.3.1 Survey	LO#5.3.1 activity: User level Reporting Pre-topic Poll
5.3.2 User Level Analytics	<ul style="list-style-type: none"> • LO#5.3.2.1 html page: Introduction • LO#5.3.2.2 html page: Log reports • LO#5.3.2.3 html page: Complete report • LO#5.3.2.4 html page: Statistics • LO#5.3.2.5 html page: Grades overview & Grade reports • LO#5.3.2.6 html page: Conclusion
5.3.3 Quiz	LO#5.3.3 activity: User Level Reporting Quiz
5.3.4 How To	LO#5.3.4 html page with video: How To - User Level Reporting
5.3.5 Survey	LO#5.3.5 activity: User Level Reporting Post-topic Poll
5.4 TOPIC 4 : 3RD PARTY TOOLS REPORTING	
5.4.0 Introduction	LO#5.4.0 html page: 3rd Party Reporting Tools in Moodle Introduction
5.4.1 Survey	LO#5.4.1 activity: 3rd Party Reporting Tools in Moodle Pre-topic Poll
5.4.2 IntelliBoard	LO#5.4.2.1 html page with video: Introduction LO#5.4.2.2 html page: Most active users LO#5.4.2.3 html page: Most visited courses LO#5.4.2.4 html page: Time spent on site / courses / activities LO#5.4.2.5 html page: Learning progress LO#5.4.2.6 html page: Overdue users LO#5.4.2.7 html page with video: Conclusion
5.4.3 Configurable Reports	LO#5.4.3.1 html page: Introduction LO#5.4.3.2 html page: Creating and assigning a report LO#5.4.3.3 html page: Global reports LO#5.4.3.4 html page: Site reports LO#5.4.3.5 html page with video: Conclusion

5.4.4 Other 3rd Party Tools	LO#5.4.4.1 html page: Introduction LO#5.4.4.2 html page: Engagement dashboard LO#5.4.4.3 html page with video: Re-engagement LO#5.4.4.4 html page with video: Checklist LO#5.4.4.5 html page: Course check block LO#5.4.4.6 html page: Learning analytics enriched rubric LO#5.4.4.7 html page: Level up! – Gamification LO#5.4.4.8 html page: Analytics and recommendations LO#5.4.4.9 html page: Adaptive quiz LO#5.4.4.10 html page: Events graphic LO#5.4.4.11 html page: Conclusion
5.4.5 Quiz	LO#5.4.5 activity: 3rd Party Reporting Tools in Moodle Quiz
5.4.6 Webinar	LO#5.4.6 html page with video: Moodle & IntelliBoard Webinar by Enovation
5.4.7 Survey	LO#5.4.7 activity: 3rd Party Reporting Tools in Moodle Post-topic Poll
5.5 MODULE SUMMARY AND CONCLUSION	
5.5.1 Summary	LO#5.5.1 html page with video: Summary of Topics Learnt
5.5.2 Use case	LO#5.5.2.1 html page: Background story – frame of reference LO#5.5.2.2 html page: Data Collection & Data Ethics LO#5.5.2.3 html page: Data Analysis LO#5.5.2.4 html page: Data Comprehension & Interpretation LO#5.5.2.5 html page: Data Application
5.5.3 Feedback	LO#5.5.3 activity: Feedback
5.5.4 Next Up	LO#5.5.4 html page: Next Up
5.5.5 Reminder	LO#5.5.5 html page: Reminder
5.6 REFERENCES AND READING	
	LO#5.6.1 html page: References, Suggested Reading and Videos
5.7 ASSESSMENT QUIZ	
5.7.1 Guidelines	LO#5.7.1 html page: Guidelines for Module Assessment Quiz
5.7.2 Assessment	LO#5.7.2 activity: Module Assessment Quiz

5.0 INTRODUCTION

([Learning Object #5.0.1 html page](#))

Welcome

Learning analytics and elearning reporting offer insights into the progress of learners and ensure that objectives are being met. Viewing trends of participation, submissions and other data can assist educators improve the elearning experience, vastly helping retention rates and student success.

In this module we will be looking at Applying Educational Data Analytics with Moodle. More specifically, this module will present tools for educational data analytics in Moodle and focus on the use of these tools to support school teachers in the design and delivery of their online and blended learning courses.

[END OF PAGE]

([Learning Object #5.0.2 html page with video](#))
Introduction

The scope of the Module:

A Key component of being able to design online learning courses and of being able to properly facilitate and be a tutor on those courses is to be able to access and interpret the data available to you within the Learning Management System. Viewing trends of participation, submissions and other data can assist educators to improve the learning experience, vastly helping retention rates and student success rates.

This module will present tools for educational data analytics in Moodle and focus on the use of these tools to support the design and delivery of online learning courses to improve learner engagement and, in turn, results.

Learning analytics is a concept that has been emerging under a number of different names throughout the past decades. Its origins lie in research in data mining and intelligent tutoring systems. Learning analytics tools can be categorised in a number of ways:

- Descriptive (what happened?)
- Diagnostic (why did it happen?)
- Predictive (what will happen next?)
- Prescriptive (what is the best action?)



Dr. Bart Rienties is Professor of Learning Analytics at the Institute of Educational Technology at the Open University UK.

Please find below a video where he explains how Learning Analytics are used at their institution to understand their students' journeys and better support their learning.



External Video: What is Learning Analytics - Bart Rienties <https://youtu.be/6jlfggjOjPU>
[6:44]

[END OF PAGE]

(Learning Object #5.0.3 html page)
Learning Outcomes

Learning Outcomes of the Module

By completing this module, you will:

Module 5 Learning Objectives	Learn2Analyse Educational Data Literacy Competence Profile
Know how to obtain, access and gather the appropriate educational data in Moodle	1.1
Be able to apply informed consent within Moodle	6.1
Be able to apply educational data privacy and distinguish between different levels of data protection within Moodle	6.2
Demonstrate an understanding of key data analysis and modelling methods and how they are applied to teaching and learning in Moodle	3.1
Understand how to communicate your interpretation of the educational data in an intuitive accessible way within Moodle	3.2
Be able to interpret insights from educational data analysis within Moodle	4.3
Be able to elicit potential implications of the educational data insights from data analysis to instruction within Moodle	4.4
Be able to use educational data analysis results to make decisions to revise instruction within Moodle	5.1

[END OF PAGE]

(Learning Object #5.0.4 html page with video)
LMS Intro



External video: What is Moodle? - Enovation Solution Partner
<https://youtu.be/cDoqpZZ7-sc> [1:12]

Moodle is the world's most popular LMS that lets you build the perfect education solution

Moodle is the world's most widely used learning platform, with a community of over 100 million users and 90,000 registered sites across the globe ranging from schools, colleges & universities to businesses, charities and public sector organisations.

Designed by educators, for educators, the Moodle platform is extremely customisable, allowing it to be configured to meet the individual needs of your school or business. It is hugely flexible in terms of the available functionality, the visual design of the e-learning software and its integration with other systems.

As an open-source learning platform, Moodle benefits from a large and active online community, many of whom contribute to the development of the platform as well as providing advice and support on user forums.

This means a huge range of add-ons or “plugins” developed both by Moodle HQ and by third party developers, which extend the functionality of the VLE / LMS (Virtual Learning Environment / Learning Management System).

An advantage of the Moodle platform is the open source model – any school or business using the software avoids being “locked in” to a specific vendor.

Recently, Moodle has undergone a significant redesign and now boasts an engaging user experience complete with a new powerful Mobile app for iPhone and Android.



90,000+

Registered sites



147 million

Active users



230

Countries



1,500+

Moodle plugins

Find out what Moodle can do for you. [Click here for more information on the world's most popular learning platform :](#)

[Find out more](#)

Click here to explore Moodle in action on this site populated with courses, activities and users :



Creating your learning environment is easy. Click here to create your own free learning environment with the world's leading open source learning platform Moodle, hosted in the cloud :



Community driven, globally supported. Click here to join the Moodle community and discover the value of an open, collaborative effort by one of the largest open-source teams in the world :



[END OF PAGE]

(Learning Object #5.0.5 html page)
Case Study

CLL Language Centres delivers blended learning lessons in 37 languages thanks to Enovation

CLL use an innovative blended learning model to suit the needs of their 3,500 clients from international institutions



The Challenge

Since its creation by the Université Catholique de Louvain in 1984, CLL Language Centres has given a communicative, oral and interactive approach to language teaching. A team of 600 trainers teaching 37 languages actively provide education for the general public – kids, teenagers and adults – for businesses, and members of staff from international institutions in Belgium.

In order to better suit the needs and busy agenda of the 3,500 professionals from international institutions, CLL decided to move from a traditional learning approach to a blended learning solution that combines face-to-face lessons with online tutored self-study. Moodle, the leading open source Learning Management System (LMS), was the technical solution selected by the language school.

The Solution

In 2012, CLL chose to engage with Enovation, a long-established Moodle partner to develop the eLearning solution that would allow for their client staff to learn outside of the face-to-face lessons and for the trainers to guide and follow the learners' progress online. The flexibility of Moodle allows for personalised learning to adapt to the learner's professional objectives. Based on the learner's needs, CLL trainers will define a tailor-made learning plan, with a certain number of modules to complete to achieve the desired level and be certified. Trainers can track and monitor the learner's activities thanks to rich data and powerful reporting tools.

Built as an all-in-one platform, Moodle easily integrates external tools, such as the web conferencing system Big Blue Button tool deployed by Enovation, in order for CLL's trainers to deliver a high-quality learning experience to the remote learners.

CLL also called on Enovation's technical expertise to design and build customised plugins to adapt to the particular needs of the public institutions. An email-based self-registration feature was developed to enable learners to create their own account on Moodle and enrol into courses while observing the institutions' rules of confidentiality about their staff. Another enabling key feature built by Enovation was a collaborative portfolio used by teachers to index and share resources with other trainers, while learners use it to export and categorise their work and document their learning. As part of the project, Enovation customised Moodle to match CLL's branding. Enovation also securely host the eLearning solution for CLL to guarantee a 24/7 access to the online learning platform and provide them with a web-based issue reporting and tracking system. Throughout the years, Moodle has been maintained by Enovation to ensure the best learning experience to CLL's customers.

"

In 2012 we selected Enovation to work with us to customise and implement the Moodle learning management system for our language schools. We wanted a Partner who could deliver on our requirements in terms of implementing a custom solution and providing ongoing hosting and support, that would meet the needs of our Corporate language learning customers. Enovation have delivered all that we have required and their level of service and professionalism has often exceeded our expectations. We look forward to continuing our partnership into the future.

Jonathan Quique, ICT Manager, CLL Language Centres, Belgium

The Results

Thanks to Enovation, CLL's online learning platform provides staff from international institutions with a structured and flexible learning program under the guidance of expert trainers. Since the implementation of Moodle, the numbers of customers from public institutions has increased 3 fold to reach 3,500 users.

Delighted with the results, CLL and Enovation are already working together to extend the use of Moodle to the other 25,000 customers of CLL, which includes the general public and business clientele.

[END OF PAGE]

(Learning Object #5.0.6 activity)
Pre-module Poll

Have you used any Learning Management System before? *

Not selected

Yes

No

Have you used Moodle before? *

Not selected

Yes; I'm very familiar with Moodle.

Yes; I've got a good understanding of Moodle.

Yes; I've got a basic understanding of Moodle.

No, I haven't used Moodle before.

In what capacity have you used Moodle previously? *

Administrator

Manager

Course creator

Teacher

Student

Guest

I have not used Moodle

How would you rate your knowledge of reporting tools in any Learning Management System? *

Not selected

(5) Very comfortable

(4) Good

(3) Average

(2) Know a little

(1) Completely unfamiliar

How would you rate your knowledge of reporting tools in Moodle? *

Not selected

(5) Very comfortable

(4) Good

(3) Average

(2) Know a little

(1) Completely unfamiliar

There are required fields in this form marked *.

[END OF PAGE]

5.1 TOPIC 1 : SITE LEVEL REPORTING

(Learning Object #5.1.0 html page)
[Site Level Reporting Introduction](#)

This section provides an outline of the reporting capabilities of Moodle at site level, i.e. reports which can be accessed by users who have administrative access to the Moodle site.

Site Level Analytics : This section covers tools which allow administrators, for example, to monitor when certain events happen, see which courses have the highest participation rate and view detailed statistics in order to make informed decisions on site and course design.

Inspire Analytics : With the Moodle Inspire Analytics tool administrators can analyse progress and identify which students might be falling behind in their courses based on a range of definable indicators and follow-up using various appropriate action options.

Moodle GDPR Features : Moodle administrators have a number of options to help with GDPR compliance, including the handling of user agreements to policies and the acceptance of data requests.

[END OF PAGE]

(Learning Object #5.1.1 activity)
Site Level Reporting Pre-topic Poll

Please rate your current level of knowledge with respect to the following Moodle site level features:

Comments report*

Poor Fair Good Very good Excellent

Course overview report*

Poor Fair Good Very good Excellent

Log and Live logs reports*

Poor Fair Good Very good Excellent

Statistics report*

Poor Fair Good Very good Excellent

Event monitoring*

Poor Fair Good Very good Excellent

Inspire Analytics*

Poor Fair Good Very good Excellent

GDPR Compliance*

Poor Fair Good Very good Excellent

There are required fields in this form marked *.

[END OF PAGE]

(#5.1.2 sub-topic)

5.1.2 Site Level Analytics

(Learning Object #5.1.2.1 html page)

Introduction

Throughout this section, we will examine how the site administrator can access reports which provide the ability to view the details of the student's interactions with the Moodle site, and generate graphs and tables based on these engagements, as well as automatic notifications to the site administrator when certain events occur in the context of the Moodle site.

All of the features we will look at can be accessed via *Reports* in the Moodle *Site Administration* menu.

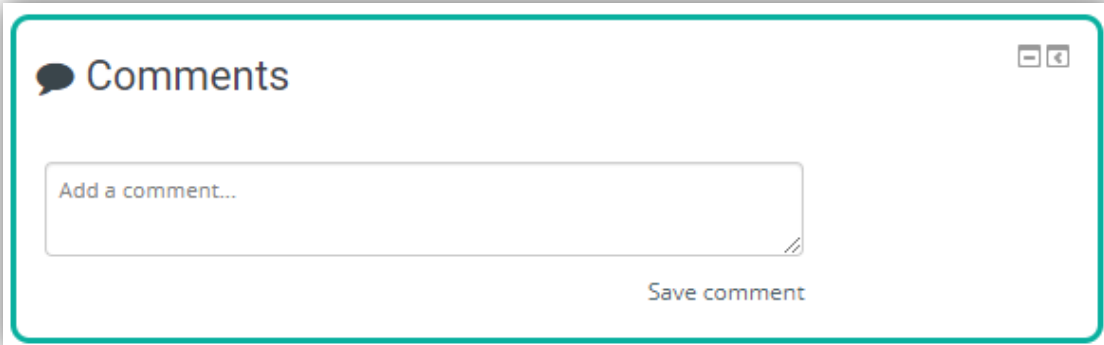
[END OF PAGE]

(Learning Object #5.1.2.2 html page)
Comments

Comments

This first method we will look at for analysing site use for future improvements is the most direct and immediate.

The **Comments** block can be added to a Moodle page, either within or external to a Moodle course, which provides the user with the ability to add comments based on anything they feel is relevant to a Moodle course or the site in general. A similar interface enables comments to be added to glossary, database activity and blog entries. The comments are added instantly without needing a page refresh.

The image shows a screenshot of the 'Comments' block in a Moodle interface. It features a teal border and a speech bubble icon next to the title 'Comments'. Below the title is a text input field with the placeholder text 'Add a comment...'. To the right of the input field is a 'Save comment' button. In the top right corner of the block, there are two small icons: a minus sign and a plus sign.

The *Comments* report provides the site administrator with the ability to view a compilation of comments drawn from all Comments blocks throughout the Moodle site and can use any useful information received to make changes as necessary.

Site administration > Reports > Comments			
Comments			
<input type="checkbox"/> Select all	Author	Content	Action
<input type="checkbox"/>	Dave Danvers	Great course!	Delete
<input type="checkbox"/>	Anna Learner	The dashboard link to my certificates is very handy. Thank you.	Delete
<input type="checkbox"/>	Dave Danvers	The activity completion check-boxes are helpful for checking my progress.	Delete
<input type="checkbox"/>	Hailie Mckay	It would be good if we could earn badges for the Fire Safety course.	Delete

The site administrator can delete a comment if deemed inappropriate for display.

[END OF PAGE]
[\(Learning Object #5.1.2.3 html page\)](#)
[Course overview](#)

Course overview

An administrator can generate **course overview** reports for a particular time period. Reports can be viewed for the **most active courses** or the **most participatory courses** over a certain period of time.

The most active courses report displays the total of all activity whereas the most participatory courses report displays the ratio of activity to the number of users.

Results are displayed in a bar chart and in a table. These reports refer to the concepts of Activity, Views and Posts.

What is Activity? Activity = number of Views + number of Posts from users in the course, over the period of interest.

What's the difference between a View and a Post?

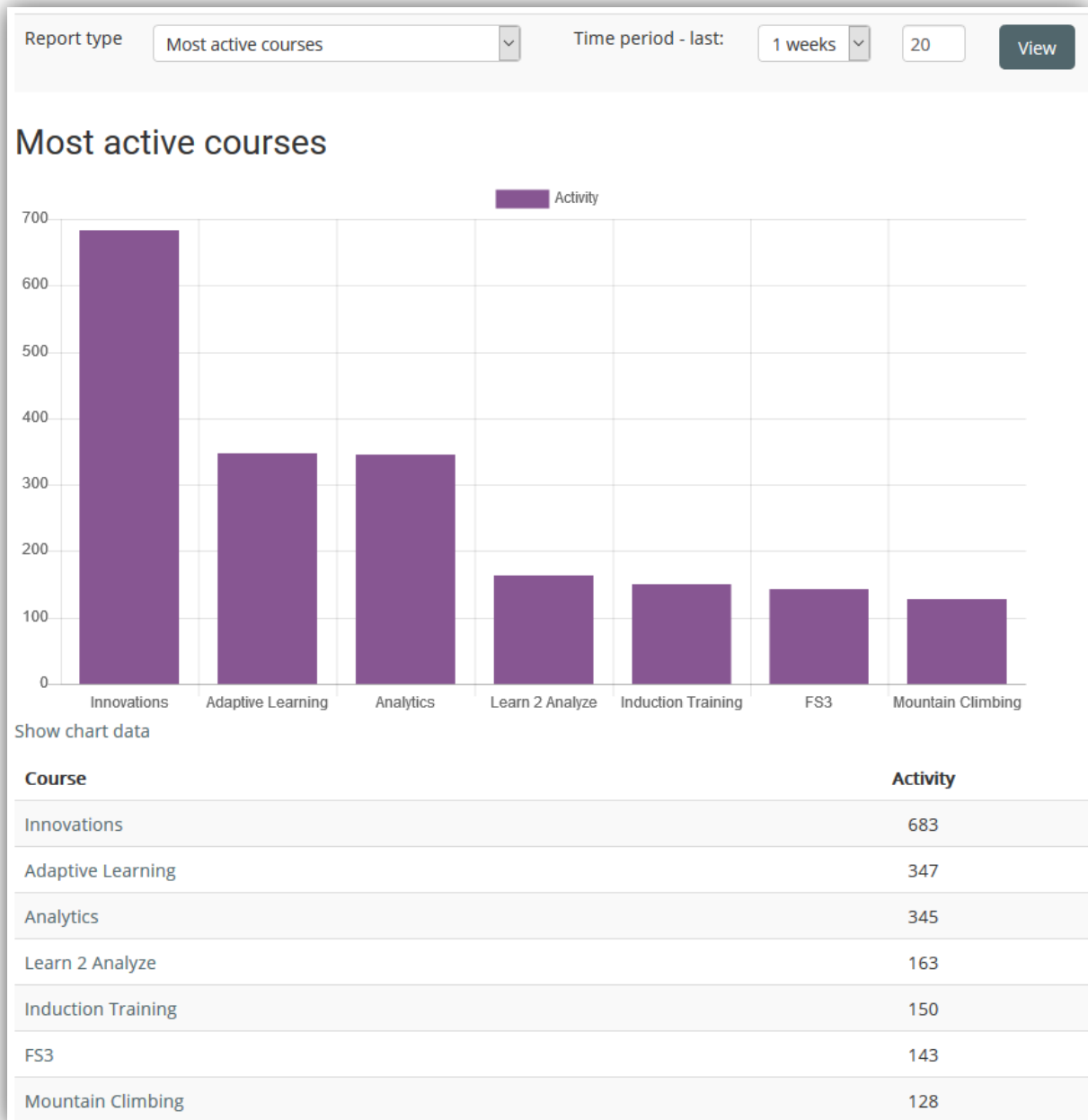
- "Views" are instances of a user accessing a Moodle resource or activity to "read" or download it.
- "Posts" are more active responses such as: submit a quiz, submit an assignment, respond to a discussion forum etc. Posts are not just discussion forum posts!

In order to generate a report, the following selections must be made:

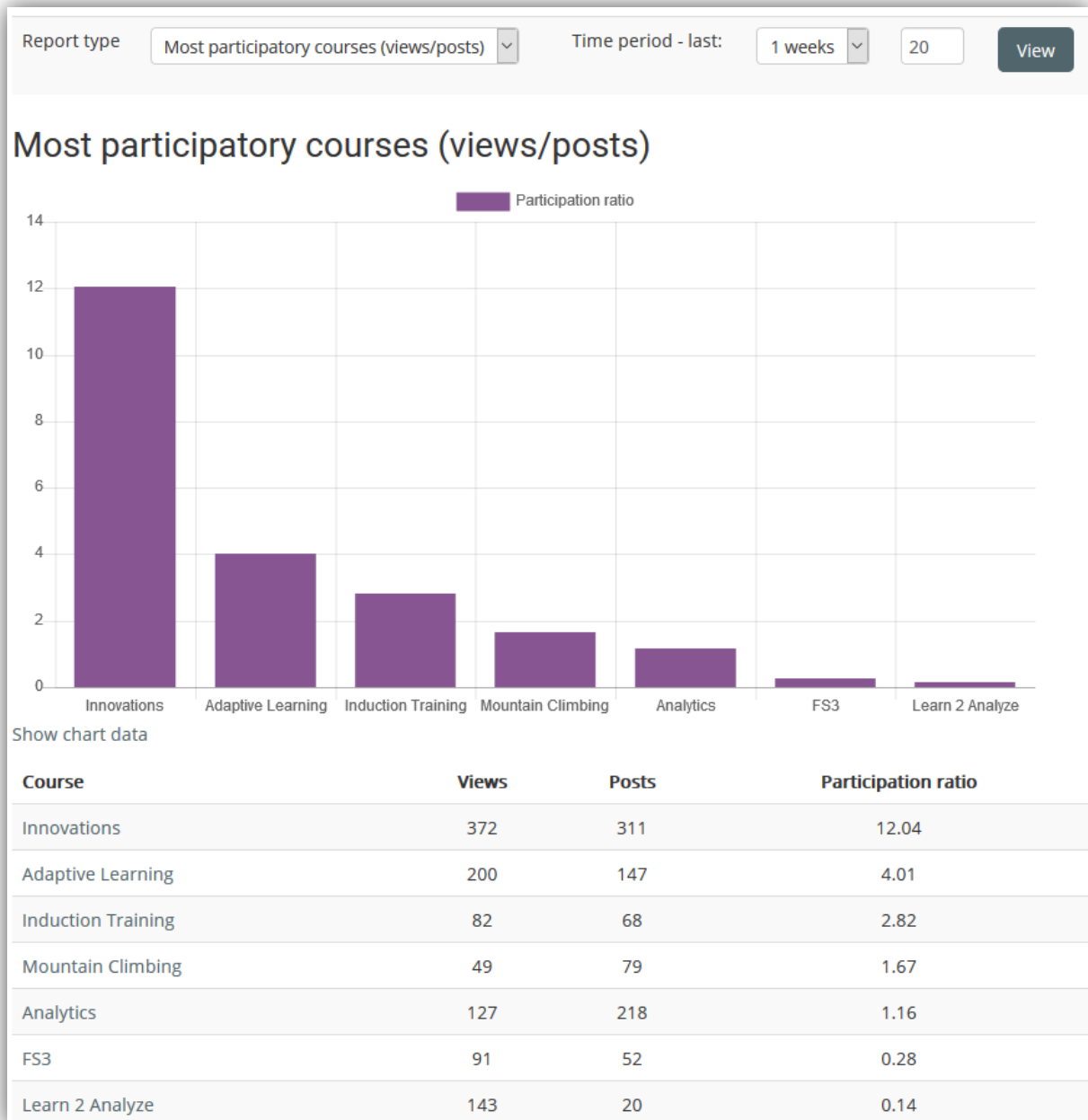
- The type of report to be run must be chosen from the *Report type* dropdown list.
 - Options available from this field include overall course activity, course activity with respect to enrolments only or course activity with respect to views and posts.

- A period of time from which course data is to be drawn must be selected from the *Time period - last:* dropdown list. The values in this list range from the past week up to the past four weeks, in increments of one week.
- The number of courses to be displayed in the list once the report is run may be chosen.
 - By default, the number 20 is present in this field, meaning that the “top 20” courses, according to the pre-selected criteria, will be displayed by the report.

Most active courses:



Most participatory courses:



The Participation ratio is the quantitative relationship between site or course activity and the number of users. Each of the courses on the site are listed, and the site itself is listed. In the screenshot above we see this as 'Learn 2 Analyze'. Site level activity, such as logins or user profile views, is represented here.

Clicking on *Show chart data* at the lower left of the bar chart expands a vertical list of these courses, with the participation ratio's numerical value for each course displayed to the right of the course name. Clicking on *Hide chart data* collapses this list.

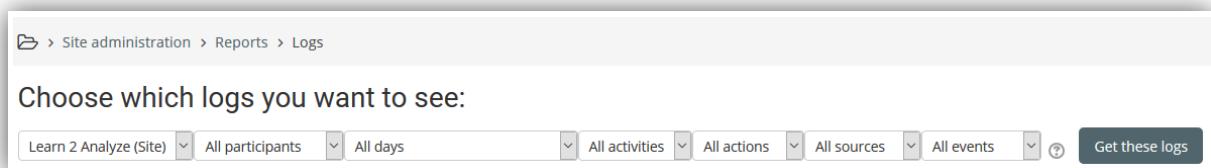
[END OF PAGE]
 (Learning Object #5.1.2.4 html page)

Logs and Live Logs Report

Logs Report

The **Logs** report provides the site administrator with the ability to generate a report comprising a list of all users at the Moodle site, or just one in particular, and details of their interactions with the site during a particular period of time.

Prior to generating the report, the following are some of the selections which can be made:



The screenshot shows the Moodle interface for generating a logs report. At the top, a breadcrumb trail reads: > Site administration > Reports > Logs. Below this, the heading "Choose which logs you want to see:" is followed by a row of seven dropdown menus. The first dropdown is labeled "Learn 2 Analyze (Site)", the second "All participants", the third "All days", the fourth "All activities", the fifth "All actions", the sixth "All sources", and the seventh "All events". To the right of the last dropdown is a small question mark icon. A dark blue button labeled "Get these logs" is positioned to the right of the dropdowns.

- An area of the Moodle site from which the *Logs* report draws data must be selected from a dropdown list. Areas in this list are presented in alphabetical order.
 - When the *Logs* report is run via the *Site administration* section external to a Moodle course, as opposed to from within a particular course, the overall Moodle site (i.e. all interactions with the site) is selected in this dropdown list by default.
- From the second dropdown list, all participants or the name of one user in particular whose actions you wish to view the details of must be chosen. *All participants* is the default value present in this field.
- A period of time from which site logs are to be taken must be selected from the third dropdown list at the report page. Either all days or one day in particular can be chosen from this dropdown list. *All days* is the default value present in this field.
- Either all activities or site errors (e.g. a failed login) must be selected from the fourth dropdown list.
- The type of action it is desired to view log details of must be chosen from the next dropdown list. *All actions*, *Create*, *View*, *Update*, *Delete* and *All changes* are the options available from this list. By default, *All actions* is selected.

Site logs, as constrained by the above selection criteria, are then presented in reverse chronological order, i.e. the most recent appear at the top of the report.

Site administration > Reports > Logs

Learn 2 Analyze (Site) Anna Learner All days All activities All actions All sources Participating

« 1 2

Time	User full name	Affected user	Event context	Component	Event name	Description	Origin
19 February 2019, 9:31 AM	Anna Learner	Anna Learner	Custom certificate: 3rd Certificate - Fire Safety	System	Course activity completion updated	The user with id '17' updated the completion state for the course module with id '135' for the user with id '17'.	web
19 February 2019, 9:31 AM	Anna Learner	-	Custom certificate: 3rd Certificate - Fire Safety	Custom certificate	Course module viewed	The user with id '17' viewed the 'customcert' activity with course module id '135'.	web
19 February 2019, 9:31 AM	Anna Learner	-	Custom certificate: 3rd Certificate - Fire Safety	Custom certificate	Course module viewed	The user with id '17' viewed the 'customcert' activity with course module id '135'.	web
19 February 2019, 9:31 AM	Anna Learner	Anna Learner	Quiz: 3rd Certificate	Quiz	Quiz attempt submitted	The user with id '17' has submitted the attempt with id '37' for the quiz with course module id '134'.	web
19 February 2019, 9:31 AM	Anna Learner	Anna Learner	Quiz: 3rd Certificate	System	Course activity completion updated	The user with id '17' updated the completion state for the course module with id '134' for the user with id '17'.	web
19 February 2019, 9:31 AM	Anna Learner	Anna Learner	Quiz: 3rd Certificate	Quiz	Quiz attempt viewed	The user with id '17' has viewed the attempt with id '37' belonging to the user with id '17' for the quiz with course module id '134'.	web
19 February 2019, 9:31 AM	Anna Learner	Anna Learner	Quiz: 3rd Certificate	Quiz	Quiz attempt started	The user with id '17' has started the attempt with id '37' for the quiz with course module id '134'.	web

25 February 2019, 4:52 PM	Hailie Mckay	Hailie Mckay	User: Hailie Mckay	User tours	Step shown	The user with id '8' has viewed the tour with id '2' at step index '0' (id '7') on the page with URL 'https://learn2analyze.enovation.ie/my/'.	web
25 February 2019, 4:52 PM	Hailie Mckay	Hailie Mckay	User: Hailie Mckay	User tours	Tour started	The user with id '8' has started the tour with id '2' on the page with URL 'https://learn2analyze.enovation.ie/my/'.	web
25 February 2019, 4:52 PM	-	-	Front page	System	Course viewed	The user with id '0' viewed the course with id '1'.	web
25 February 2019, 4:51 PM	Dave Danvers	-	Course: Adaptive Learning	Comments	Comment created	The user with id '20' added the comment with id '5' to the 'block_comments' with course module id '2'.	web
25 February 2019, 4:49 PM	Dave Danvers	-	Course: Adaptive Learning	System	Course viewed	The user with id '20' viewed the course with id '2'.	web

Live Logs Report

The *Live logs* report provides the site administrator with the ability to very simply and quickly view the recent interactions (*Create, View, Update* and *Delete*) of users of the Moodle site.

Log information displayed by this report is unfiltered, and it therefore displays all types of interactions by all users of the Moodle site. As with the *Logs* report, live log

information is displayed in reverse chronological order, so the most recent logs appear at the top of the report.

The report is automatically refreshed as new interactions occur, but can be paused via a *Pause live updates* button.

[END OF PAGE]

Statistics

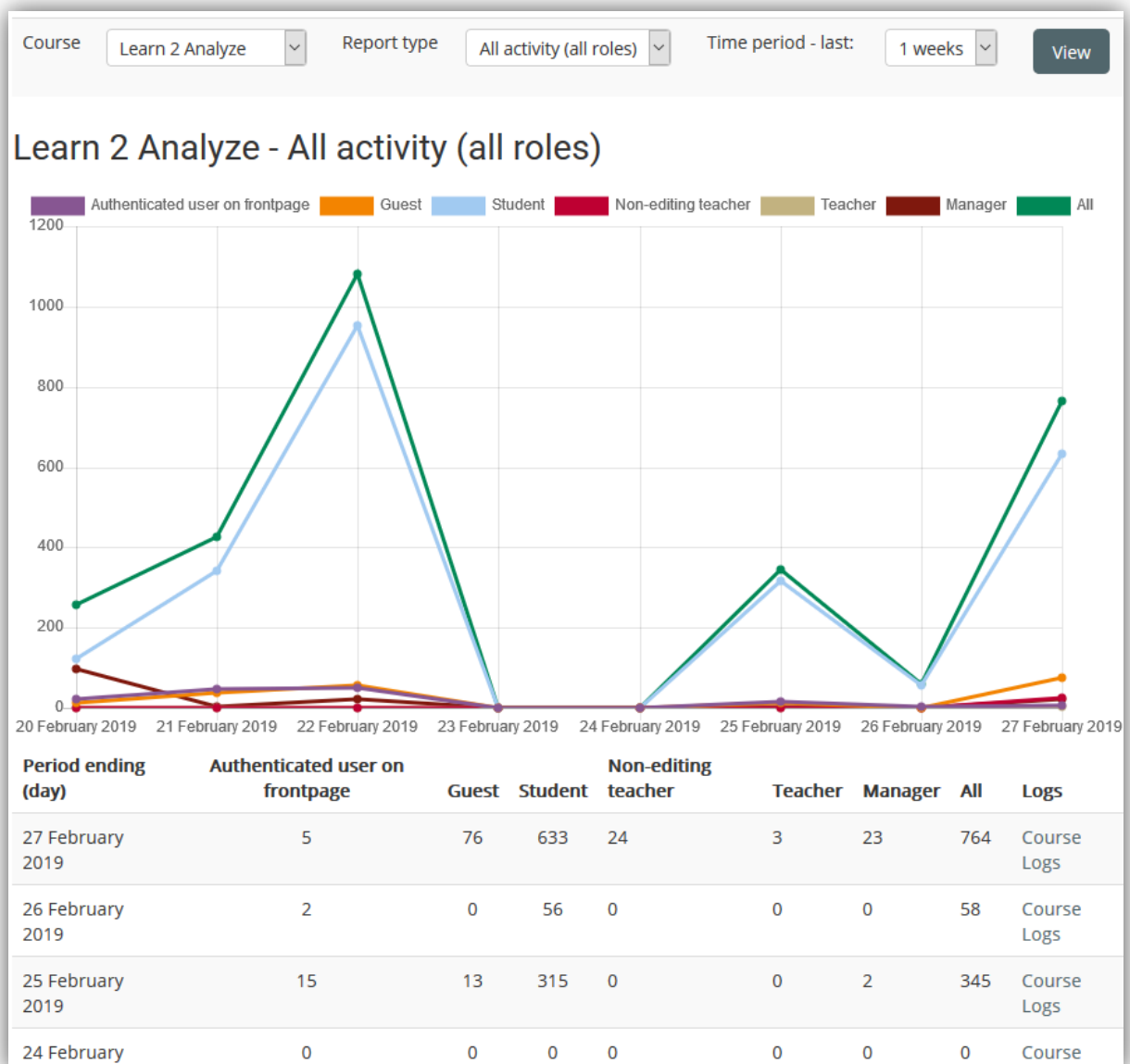
If statistics are enabled for the site via Advanced Features in the Moodle Site Administration menu, graphs and tables of user activity may be generated. The statistics graphs and tables show how many **hits** there have been on various parts of your site during various time frames. They **do not** show how many distinct users there have been. They are processed daily at a time you specify.

Prior to generating the report, the following selections must be made:

- An area of the Moodle site from which the *Statistics* report draws data must be selected from the Course dropdown list. Areas in this list are presented in alphabetical order.
 - When the *Statistics* report is run via the *Site administration* section external to a Moodle course, as opposed to from within a particular course, the overall Moodle site (i.e. all activity within the site) is selected in the *Course* dropdown list by default.
- The type of site data to be included in the report must be chosen from the *Report type* dropdown list.
 - Options available from this field include all activity from all users, all views from all users, all posts from all users or all logins.
- A period of time from which site data is to be drawn must be selected from the *Time period - last:* dropdown list. The values in this list range from the past week up to the past four weeks, in increments of one week.

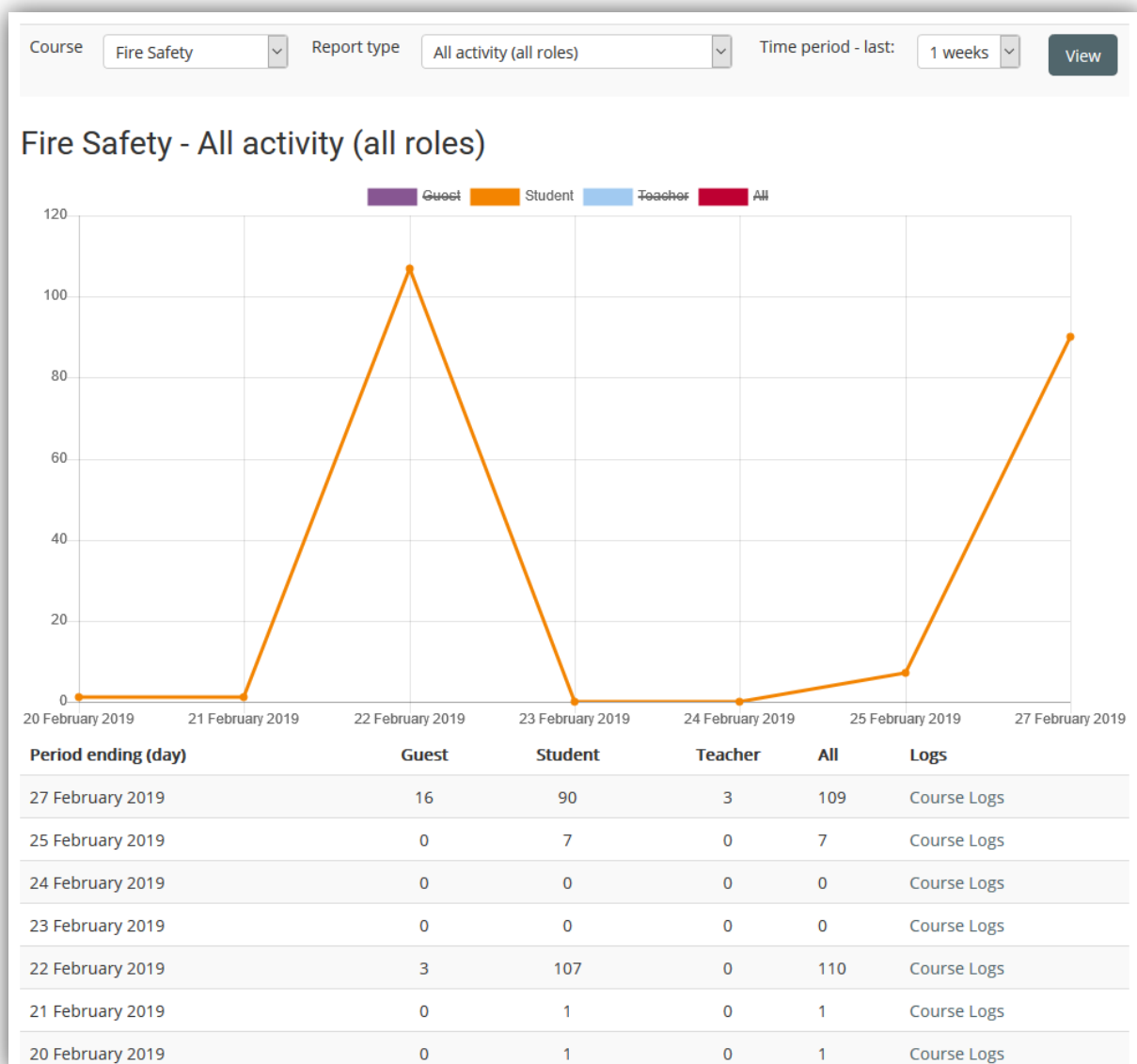
Similar information is presented again, below the graph, this time in a tabular format comprising rows (the dates displayed on the X axis in the graph) and columns (the type of Moodle user, e.g. student or teacher, and the number of “hits”).

Statistics showing hits by all categories of users at a site level:



The graph above shows all interactions by all categories of users on the Moodle site. We can see that there has been activity, principally by students, every day except the weekend of the 23rd and 24th of February.

Statistics showing hits by students only in the course entitled Fire Safety:



The peaks in the graph above correspond to the days just before and just after their face to face classroom session. In this flipped classroom course the students completed pre-class preparation work online and took a post-class homework quiz afterwards.

[END OF PAGE]

(Learning Object #5.1.2.6 html page with video)
Event monitoring rules

Event monitoring rules

Event monitoring provides the site administrator with the ability to generate automatic notifications when a particular event occurs at the Moodle site. This is done by creating a rule, which generates such a notification when the event occurs.

In order to receive a notification in relation to an *Event monitoring* rule, the site administrator must subscribe to it after it has been created.

Rules can be created based upon events which occur with respect to Moodle site activity, plugins, reports, etc. Examples of events around which *Event monitoring* rules could be created in order to generate a notification to the site administrator are as follows:

- A language pack has been installed.
- A user policy agreement has been updated.
- A user tour has been reset.

Take a look at the following video that introduces the Event Monitor tool which can notify teachers and admins when certain patterns of behaviour are detected.



External Video: Moodle 2.8 Release Highlight: Event Monitor
<https://youtu.be/YkuK2w1Jnk> [3:14]

A list of current *Event monitoring* rules is displayed at the *Event monitoring rules* page. From here, these existing *Event monitoring* rules can be edited, duplicated (and then edited) or deleted. A new *Event monitoring* rule can be created via the *Add a new rule* button at the bottom of the list.

You can find below some example rules created at a site level:

- Course completed is a general rule that can be applied per course.
- Site visits shows the number of logins so would only be used at a site level.

Event monitoring rules

Event monitoring is currently enabled. Disable ?

Rule name	Description	Course	Area	Event	Notification threshold	Manage
Course completed	Course completed	Site	Core	Course completed	1 time(s) in 1 minute(s)	
Site visits	Site visits	Site	Core	User has logged in	1 time(s) in 1 minute(s)	

Add a new rule

You can subscribe to rules from the Event monitoring page.

Course level rules show rules created at a site level plus rules created in the specific course.

Event monitoring rules

Event monitoring is currently enabled. Disable ?

Rule name	Description	Course	Area	Event	Notification threshold	Manage
Cert		Fire Safety	Custom certificate	Course module viewed	1 time(s) in 1 minute(s)	
Course completed	Course completed	Site	Core	Course completed	1 time(s) in 1 minute(s)	
Site visits	Site visits	Site	Core	User has logged in	1 time(s) in 1 minute(s)	

Add a new rule

You can subscribe to rules from the Event monitoring page.

All subscribed rules, at both a site level and per course :

Your current subscriptions

Rule name	Description	Course	Area	Instance	Event	Notification threshold	Unsubscribe
Site visits	Site visits	Site	Core	All events	User has logged in	1 time(s) in 1 minute(s)	✕
Course completed	Course completed	Adaptive Learning	Core	All events	Course completed	1 time(s) in 1 minute(s)	✕
Course completed	Course completed	Induction Training	Core	All events	Course completed	1 time(s) in 1 minute(s)	✕
Course completed	Course completed	Innovations	Core	All events	Course completed	1 time(s) in 1 minute(s)	✕
Course completed	Course completed	Analytics	Core	All events	Course completed	1 time(s) in 1 minute(s)	✕
Cert		Fire Safety	Custom certificate	All instances	Course module viewed	1 time(s) in 1 minute(s)	✕
Course completed	Course completed	Fire Safety	Core	All events	Course completed	1 time(s) in 1 minute(s)	✕
Course completed	Course completed	Mountain Climbing	Core	All events	Course completed	1 time(s) in 1 minute(s)	✕
Course completed	Course completed	Reading	Core	All events	Course completed	1 time(s) in 1 minute(s)	✕

[END OF PAGE]

Conclusion

Throughout this section, we have examined Moodle's reporting features at site level, with which the site administrator can track and monitor the progress of the student. These features include the following:

- The ability to generate illustrative graphs and tables based upon the interactions of both the student and teacher with the Moodle site and constituent courses (*Course overview report*, *Statistics report*)
- The ability to view details of the various interactions and engagements of the student with the Moodle site (*Logs report*, *Live logs report*)
- The ability to generate automatic notifications to the site administrator when certain events occur in the context of the Moodle site (*Event monitoring*)

[END OF PAGE]

(#5.1.3 sub-topic)

5.1.3 Inspire Analytics

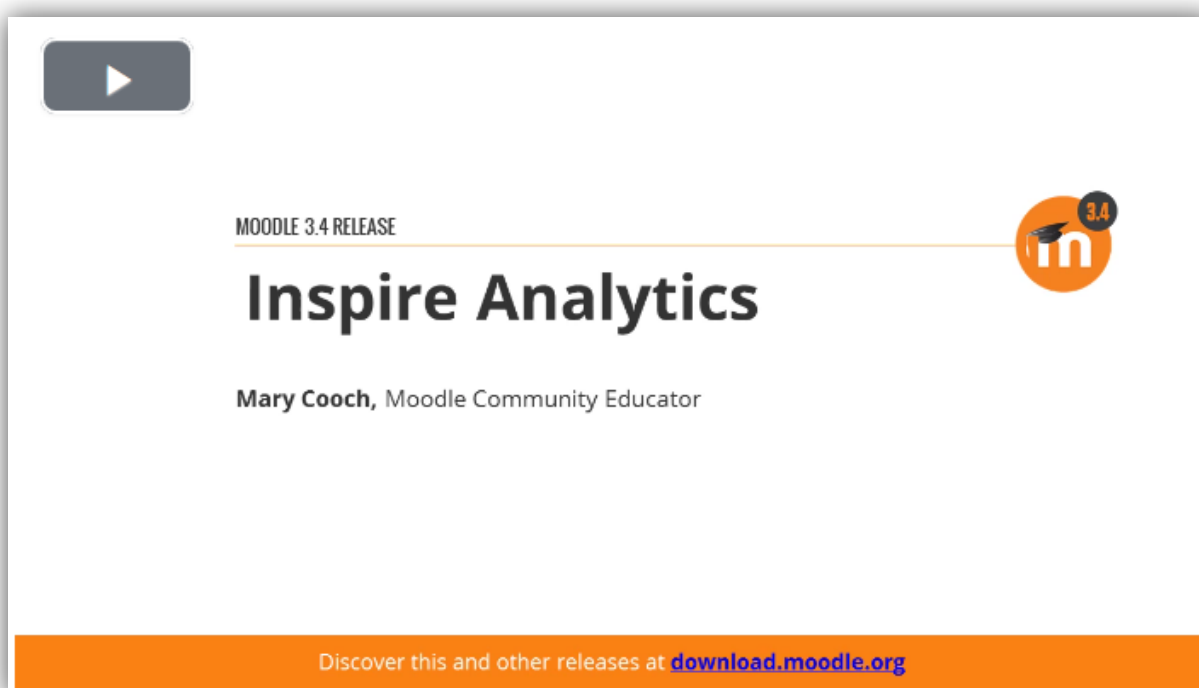
(Learning Object #5.1.3.1 html page with video)

Introduction

Introduction

This section covers tools which allow Moodle site administrators to analyse progress and identify which students might be falling behind in their courses based on a range of definable indicators. They can then follow-up using various appropriate action options.

Here is a short introduction to Inspire Analytics, which provides predictive and descriptive data analysis.



External Video: Inspire Analytics In Moodle 3.4 <https://youtu.be/MS1lqKsrXAI> [1:34]

The Moodle Analytics API (Application Programming Interface) allows Moodle site managers to define prediction models that combine indicators and a target. The target is the event we want to predict. The indicators are what we think will lead to an accurate prediction of the target.

For more information on APIs see :

https://en.wikipedia.org/wiki/Application_programming_interface

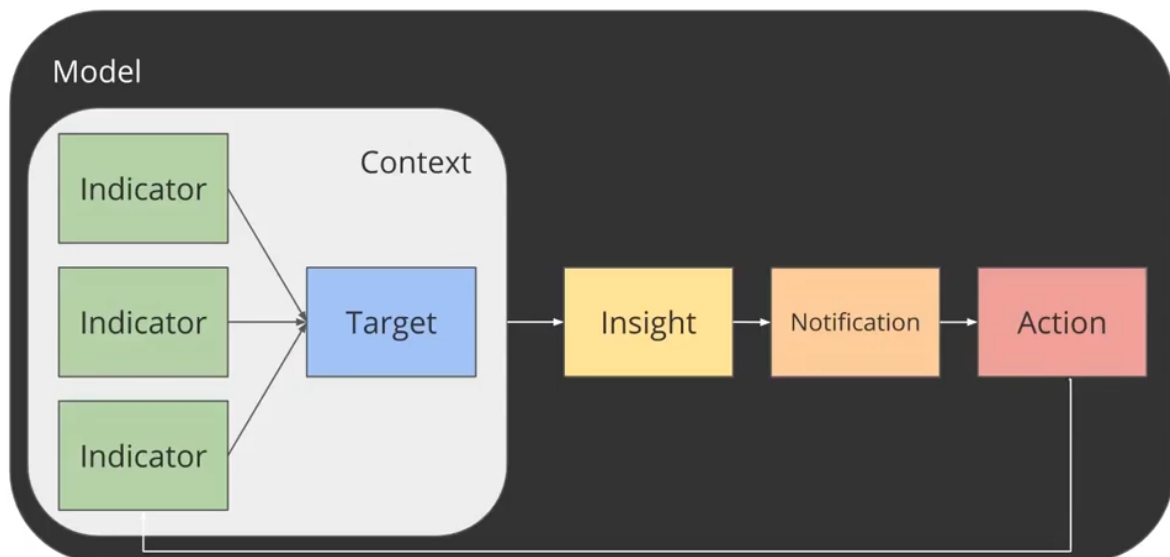
Moodle is able to evaluate these models and, if the prediction accuracy is high enough, Moodle internally trains a machine learning algorithm by using calculations based on the defined indicators within the site data. Once new data that matches the criteria defined by the model is available, Moodle starts predicting the probability that the target event will occur.

Indicators such as *User posts in any Forum* are used to try to predict the **target** outcome of *Low participation courses*.

When the **target** of *Low participation courses* is reached the **insight** of *Low participation in sample-course X and sample-course Y* is generated to match.

Administrators or eTutors are notified about new insights available. These users receive a **notification** with a link to the predictions page where all predictions of that context are listed.

A set of suggested **actions** will be available for each prediction. In cases like *Low participation courses* the actions can be things like sending a message to the students, viewing the course activity report, etc



KEY :

Indicators - Predictors

Examples: User posts in any Forum
 User views content
 Number of Resources
 Average attempts required to pass quiz

Targets - The outcome we are trying to predict

Examples: Students at risk of dropping out
Low participation courses
Difficulties to pass a specific quiz

Insights - The predictions themselves

Examples: 2 students, John and Mary, at risk of dropping out in course A
Low participation course in *sample-course B* and *sample-course C*
Average of 4 attempts to pass quiz X in *sample-course D*

Notifications - Messages sent as a result of insights

Examples: Notifications to course teachers
Messages to students with difficulties
Activities recommendations

Actions - Offered to recipients of messages, which can become indicators in turn

Examples: Reach out to students with difficulties
Increased activity
Activities viewed

There are two built-in models:

- **Students at risk of dropping out**
- **No teaching activity**

The system can be easily extended with new custom models, based on reusable targets, indicators, and other components.

Learning analytics models must be trained on your site data before they can generate predictions. The Moodle Learning Analytics engine needs historical data (previous courses), so it will need to be enabled on the site. The model training process happens in the background once the model is enabled on your Moodle site. Once the model has been trained, you will start to receive predictions about current courses.

Features

- Two built-in prediction models: "Students at risk of dropping out" and "No Teaching".
- A set of student engagement indicators based on the Community of Inquiry.
- Built-in tools to evaluate models against your site's data
- Proactive notifications for instructors using Events
- Instructors can easily send messages to students identified by the model, or jump to the Outline report for that student for more detail about student activity
- An API to build indicators and prediction models for third-party Moodle plugins
- Machine learning backend plugin type - supports PHP and Python, and can be extended to implement other ML backends

[END OF PAGE]

Students at risk of dropping out

Moodle core implements open source, transparent next-generation learning analytics with a built-in model called "Students at risk of dropping out."

This model predicts students who are at risk of non-completion (dropping out) of a Moodle course, based on low student engagement. In this model, the definition of "dropping out" is "no student activity in the last quarter of the course." This prediction model uses the Community of Inquiry model of student engagement, consisting of three parts:

- Cognitive presence
- Social presence
- Teacher presence

For more information on the Community of Inquiry theoretical framework see:

https://en.wikipedia.org/wiki/Community_of_inquiry

Features

By abstracting the concepts of "cognitive presence" and "social presence," this prediction model is able to analyze and draw conclusions from a wide variety of courses, and apply those conclusions to make predictions about new courses, even courses never taught on the Moodle system before. The model is not limited to making predictions about student success only in exact duplicates of courses offered in the past.

Limitations

- This prediction model assumes that courses have fixed start and end dates, and is not designed to be used with rolling enrollment courses. Models that support a wider range of course types will be included in future versions of Moodle.
- This model requires the use of sections within the courses, in order to split all activities into time ranges.
- Courses with start and end dates further than one year apart will not be used.
- This model requires a certain amount of in-Moodle data with which to make predictions. At the present time, only core Moodle activities are included in the indicator set. Courses which do not include several core Moodle activities per "time slice" will have poor predictive support in this model. This prediction model will be most effective with fully online or "hybrid" or "blended" courses with substantial online components.

Cognitive depth

Cognitive depth is a measure of the construct "cognitive presence" within the Community of Inquiry theoretical framework. Cognitive presence is defined as "The

extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication”

Cognitive presence has usually been determined in research by manual content analysis.

In this model, we define this construct based on the type of activity offered to the student, and the extent to which the student demonstrates cognitive engagement in that activity. The level of depth ranges from 0 to 5, where 0 indicates that the learner has not even viewed the activity. The levels of potential cognitive depth are:

1. The learner has viewed the activity details
2. The learner has submitted content to the activity
3. The learner has viewed feedback from an instructor or peer for the activity
4. The learner has provided feedback to the instructor or a peer within the activity
5. The learner has revised and/or resubmitted content to the activity

Social breadth

Social breadth is a measure of the construct "social presence" within the Community of Inquiry theoretical framework. It is defined as “The ability of participants to identify with the group or course of study, communicate purposefully in a trusting environment, and develop personal and affective relationships progressively by way of projecting their individual personalities”

In the past, social presence has usually been measured via post-course surveys and manual discourse analysis, though there have been increasing attempts to automate this process. This model implements social presence as "social breadth" by examining the breadth of opportunities the participant has to communicate with others. The level of breadth ranges from 0 to 5, where 0 indicates the learner has not interacted with the activity. The levels of potential social breadth are:









1. The learner has not interacted with any other participant in this activity (e.g. they have read a page)
2. The learner has interacted with at least one other participant (e.g. they have submitted an assignment or attempted a self-grading quiz providing feedback)
3. The learner has interacted with multiple participants in this activity, e.g. posting to a discussion forum, wiki, database, etc.
4. The learner has interacted with participants in at least one "volley" of communications back and forth
5. The learner has interacted with people outside the class, e.g. in an authentic community of practice



Actions

Each insight can have one or more actions defined. For this model, the actions are:

- Send a message to the student
- View the Outline report for the student in this course
- View prediction details
- Acknowledge the notification
- Mark the notification as "not useful"

Analytics models					
Target	Enabled	Indicators	Time splitting	Insights	Actions
Students at risk of dropping out ?	✓	<ul style="list-style-type: none"> Course accessed after end date ? Course accessed before start date ? Any write action in the course ? Read actions amount ? Assignment cognitive ? Assignment social ? Book cognitive ? Book social ? Chat cognitive ? 	Tenths accumulative ?	<div>Choose...</div> <div> Choose... Course: Adaptive Learning Course: Analytics Tools Course: Fire Safety Course: Induction Training Course: Literacy Course: Mountain Climbing </div>	Actions ▾

Prediction: ⚠ Student at risk of dropping out	
Name	Actions
 Denis Minor	Actions ▾
 Roselyn Giles	Actions ▾
 Nigel Russell	Actions ▾
 Hailie McKay	<div> Send message 📄 Outline report 🔍 View prediction details ✓ Acknowledged ✕ Not useful </div>
 Francisco Heath	
 Colton Kidd	
 Angelica Buck	
 Melany Duke	Actions ▾

Prediction: ✓ Not at risk	
Name	Actions
 Anna Meadows	Actions ▾
 Dave Danvers	Actions ▾
 Daisy Dwyer	Actions ▾
 Leo Stein	Actions ▾

[END OF PAGE]

(Learning Object #5.1.3.3 html page)
No teaching

No teaching

This model's insights will inform site managers of which courses with an upcoming start date will not have teaching activity.

This is a simple model and it does not use machine learning backend to return predictions. It bases the predictions on assumptions, e.g. there is no teaching if there are no students. If this is the case it might indicate an unpopular self-enrolment course.

The screenshot shows a web interface titled "No teaching". Below the title, it says "Prediction: ⚠ No teaching". There is a table with two columns: "Name" and "Actions". The table lists three activities: "Reading", "Mountain Climbing", and "Analytics". For the "Reading" activity, the "Actions" column has a dropdown menu open, showing options: "View", "Participants", "View prediction details", "Acknowledged", and "Not useful".


Name	Actions
Reading	Actions View Participants View prediction details Acknowledged Not useful
Mountain Climbing	
Analytics	


The following example is a course with students but no teachers since all activities are online with automatic completion. In this case there might be a site administrator who is responsible for checking all course completions and therefore it was not considered necessary to enrol a teacher in the course. A recommendation would be to enrol this administrator as a teacher in each course with automatic completion to give learners a reference point for any queries or guidance needs they might have.

Prediction:  **No teaching**

Name

Actions

 Analytics

Actions 

Prediction details

Time predicted

Tuesday, 19 February 2019, 1:02 AM

Time range

Friday, 15 February 2019, 9:53 AM to Tuesday, 19 February 2019, 1:02 AM

Indicator

Calculated value

There are no teachers

 Yes

There are no students

 No

[END OF PAGE]

(Learning Object #5.1.3.4 html page with video)
Conclusion

Conclusion

Throughout this section, we have examined tools which provide the site administrator with the ability to analyse the progress of and identify students who are in danger of falling behind in courses on which they are enrolled. Furthermore, we have explored how this can be rectified via appropriate follow-up actions.

Targets and *Indicators* can be used to define both events we wish to predict, as well as occurrences which would lead us to believe that these events are likely to take place.

Learning analytics systems go beyond day to day utility and offer all participants in the educational process a chance to take on the role of educational researcher. Learning analytics can be used by individual educators in small scale "action research", but also supports research on a much larger scale and a much greater level of detail than has been possible before.

Below you'll find a video of Gavin Henrick giving a very clear overview of Project Inspire.



External Video: Learning Analytics through Machine Learning: Project Inspire | Gavin Henrick at #MootIEUK17 https://youtu.be/_-PPp1LdE5c [14:56]

“When we study the past, we do so not to predict the future, but to change it.”

- Tim McKay, University of Michigan (quoted in Sclater 2017, p97).

[END OF PAGE]

(#5.1.4 sub-topic)

5.1.4 GDPR Features

(Learning Object #5.1.4.1 html page)
Introduction

Moodle & GDPR Compliance

This section provides an outline of the new features released with Moodle 3.5 in order to assist the site administrator and/or DPO (Data Protection Officer) with GDPR compliance.

First of all, here's a brief recap of what the GDPR is:

A new European Union-wide framework known as the General Data Protection Regulation (GDPR) came into force across the EU on 25 May 2018. The GDPR provides for significant reforms to current data protection rules. It provides for higher standards of data protection for individuals and impose increased obligations on organisations that process personal data.

There are two main types of data under the GDPR: *personal data* and *special category personal data*.

Under the GDPR, *personal data* is data that relates to or can identify a living person, either by itself or together with other available information. Examples of personal data include a person's name, phone number, bank details and medical history. A *data subject* is the individual to whom the personal data relates.

Special category personal data (also known as *sensitive personal data*) means personal data relating to any of the following:

- The data subject's racial or ethnic origin, their political opinions or their religious or philosophical beliefs
- Whether the data subject is a member of a trade union
- The data subject's physical or mental health or condition or sexual life
- Whether the data subject has committed or allegedly committed any offence
- Any proceedings for an offence committed or alleged to have been committed by the data subject, the disposal of such proceedings or the sentence of any court in such proceedings

The processing of special category data is prohibited unless the data subject has given their explicit consent before processing begins or the processing is authorised by law, for example, to protect the interests of a data subject, to comply with employment legislation or for reasons of public interest.

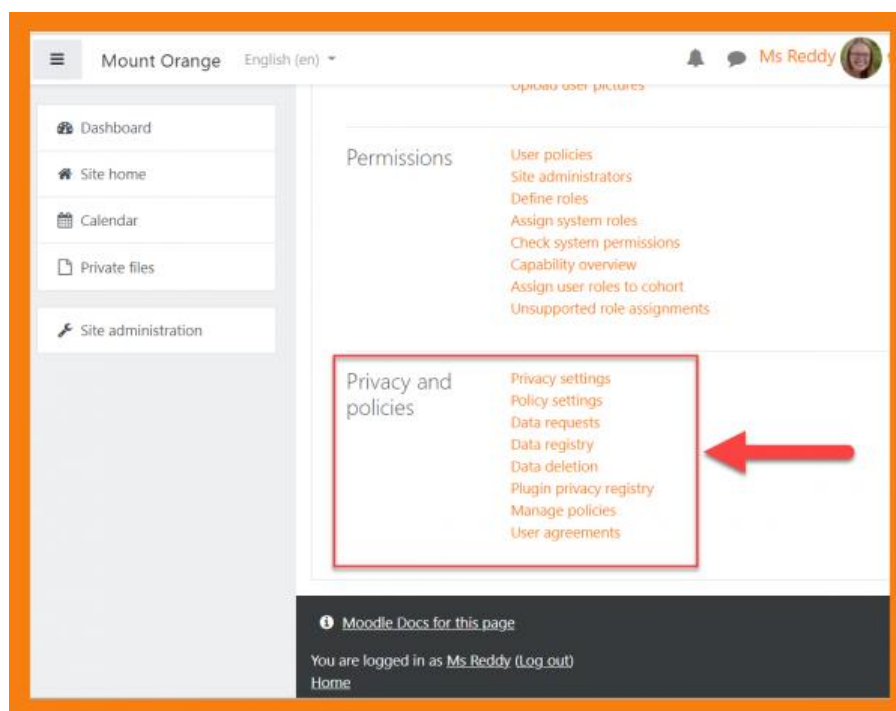
Personal data relating to criminal convictions and offences may only be processed under the control of an official authority.

So what features does Moodle have to help with GDPR compliance?

Throughout this section, we will examine the various aspects which comprise these GDPR compliance features.

In privacy settings, an administrator can request an age check before a new user can access the site, and can provide a link to contact the organisation's Data Protection Officer. In Policy settings, the administrator can specify how to handle user agreements to site and privacy policies.

Further privacy functionality available under Privacy settings and Policy settings includes features to handle subject access requests and erasure requests, define and maintain a data registry, define or manage and track policies and user agreements.



[END OF PAGE]

(Learning Object #5.1.4.2 html page with video)
Moodle 3.5 & GDPR in practice

Moodle 3.5 & GDPR in Practice

Throughout this section, we will examine some of Moodle's GDPR features, which were released with Moodle 3.5 in order to assist the site administrator and/or DPO (Data Protection Officer) with compliance. These features include the following:

- An age check for new Moodle users
- Management of user agreements to site and privacy policies
- Data export and deletion requests
- Definition and maintenance of a data registry
- The ability to give consent on behalf of minors

Please watch the short video below which introduces each of these features.



External Video: GDPR Compliance features in Moodle 3.5 https://youtu.be/bl_h4FX2WDI
[3:42]

It is important to note that upgrading to Moodle 3.5 or installing these plugins alone will not be enough to meet GDPR requirements. Additionally, appropriate configuration and implementation of the associated processes and procedures is necessary. IT and Legal departments should also be engaged with in relation to these requirements.

We will now look at the two most used elements, user agreements and data requests.

[END OF PAGE]

(Learning Object #5.1.4.3 html page)
User agreements








User agreements

The site administrator, or any user with the capability to view user agreements, can access the *User agreements* page, and thereby:

- View user consents
- Filter by policy, permission, status or role
- Give consent on behalf of minors
- Download table data

User agreements for a particular policy may also be viewed via the 'Manage policies' page.

The site administrator, or any user with the capability to agree to policies on behalf of someone else, can give consent on behalf of minors, or when written consent has been received offline.

Select	First name ^ / Surname	Email address	Overall	Site policy
<input type="checkbox"/>	 Adam Admin	deborah.couedelo@enovation.ie	✓ Accepted Withdraw	✓ Accepted Withdraw
<input type="checkbox"/>	 Angelica Buck	angelica.buck@example.com	⌚ Pending Accept Decline	⌚ Pending Accept Decline
<input type="checkbox"/>	 Anna Meadows	dc2@enovation.ie	✓ Accepted Withdraw	✓ Accepted Withdraw
<input type="checkbox"/>	 Colton Kidd	colton.kidd@example.com	✓ Accepted Withdraw	✓ Accepted Withdraw
<input type="checkbox"/>	 Daisy Dwyer	daisy.dwyer@example.com	⌚ Pending Accept Decline	⌚ Pending Accept Decline
<input type="checkbox"/>	 Dave Danvers	dc3@enovation.ie	✓ Accepted Withdraw	✓ Accepted Withdraw
<input type="checkbox"/>	 Denis Minor	dc2testminor@example.com	✓ Accepted on user's behalf Withdraw	✓ Accepted on user's behalf Withdraw

[END OF PAGE]

(Learning Object #5.1.4.4 html page)
Data requests

Data requests

The site administrator, or DPO, has the ability to manage data requests, which can be initiated either by the site administrator/DPO or by the user. Assuming it is the latter, the site administrator/DPO will receive a data request at that point.

Two types of request can be made:

- Export all of my personal data
- Delete all of my personal data

The message field enables data subjects to contextualise their reason for the request. It is not required, however it is especially helpful to add a comment when an admin is making the request, to explain why they are doing it rather than the user (e.g. the request came in via email).

If the user has requested a copy of all of their personal data, once the request is approved, they will receive a notification to inform them that their personal data may be downloaded from their Data requests page.

If the user has requested that their personal data should be deleted, once the request is approved, they will receive an email to inform them and they will no longer be able to log in to the site.

<input type="checkbox"/>	Type	User	Date requested ▲	Requested by	Status	Message	
<input type="checkbox"/>	Export	Melany Duke	Tuesday, 5 March 2019, 12:02 PM	Melany Duke	Approved	Could I get a copy of my personal data please?	Actions ▼
<input type="checkbox"/>	Export	Grace Teachly	Tuesday, 23 April 2019, 12:30 AM	Grace Teachly	Approved	Can I access my data please?	Actions ▼
<input type="checkbox"/>	Export	Leo Stein	Tuesday, 23 April 2019, 11:09 PM	Leo Stein	Awaiting approval	Hi. I need a copy of my data please.	View the request Approve request Deny request
<input type="checkbox"/>	Delete	Nigel Russell	Tuesday, 23 April 2019, 11:10 PM	Nigel Russell	Awaiting approval	Can you delete me please.	

[END OF PAGE]

(Learning Object #5.1.4.5 html page with video)
Conclusion

Conclusion

We invite you to watch the following optional video.

In the webinar below, we explore the features and associated benefits of Moodle's GDPR compliance functionality, which is designed to assist in ensuring that the Moodle site is fully compliant with GDPR requirements.

You will be able to find out about the following key features:

- A new site administration area – Privacy and policies – presents the administrator with a number of options
- Request an age check before a new user can access the site
- Handle user agreements to site and privacy policies
- Manage data export and deletion requests
- Define and maintain a data registry



External Video: Moodle 3.5 & GDPR Compliance webinar https://youtu.be/foB_JoOrivo
[42:10]

[END OF PAGE]

(Learning Object #5.1.5 activity)
Site Level Reporting Quiz

Correct answer

1. In Moodle Inspire Analytics, what are 'Targets'?

Predictors

The outcome we are trying to predict

Recipients of messages

2. Which type of report provides the site administrator with the ability to view a compilation of comments drawn from all Comments blocks throughout the Moodle site?

Comments report.

Course overview report.

Live logs report.

3. Which of these is considered a 'Post' action in a quiz?

attempt

view

upload

4. Where can an administrator request an age check for new user access to the site?

In privacy settings under Privacy and Policies in Site Administration.

In policy settings under Privacy and Policies in Site Administration.

In policy settings under Users in Site Administration.

5. Which type of report provides the site administrator with the ability to generate a report comprising a list of the most active courses at the Moodle site during a particular period of time?

Comments report

Course overview report

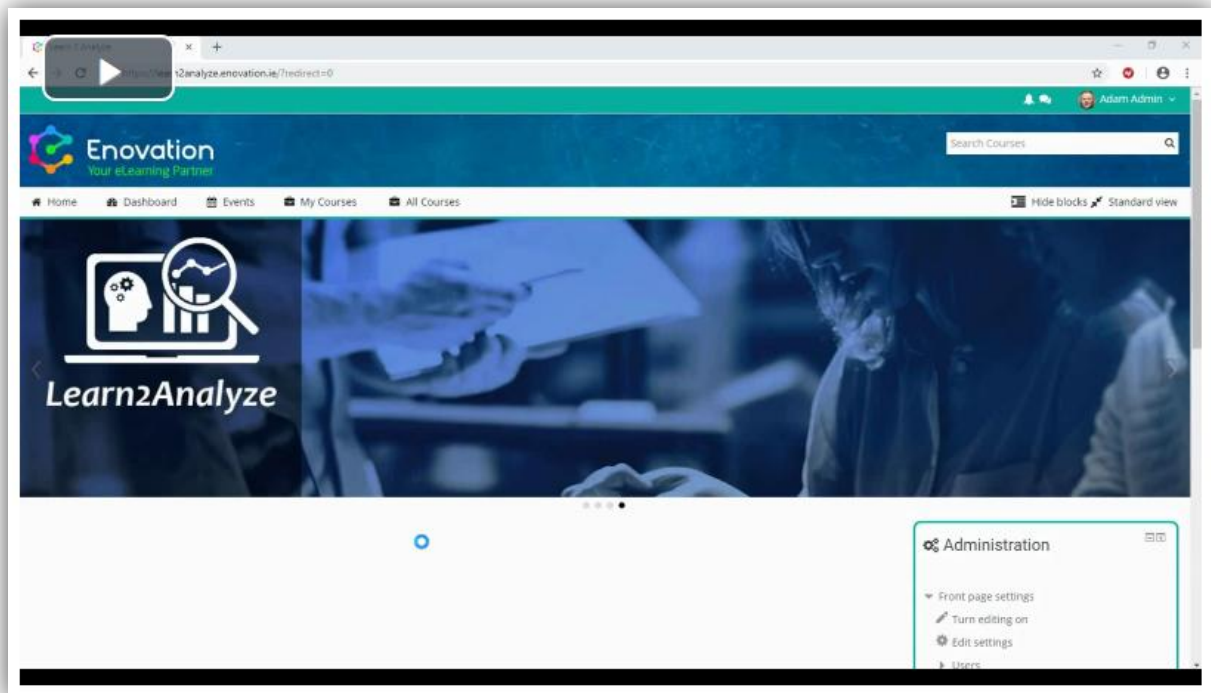
Statistics report

[END OF PAGE]

(Learning Object #5.1.6 html page with video)
How To - Site Level Reporting

How To - Site Level Reporting

Now that you've seen some of the most important and useful reporting and analytical tools at a site level in Moodle here is a run-through of those tools in action on site.



Internal Video: [How To Find Site Level Reporting Tools \[8:02\]](#)

[END OF PAGE]

(Learning Object #5.1.7 activity)
Site Level Reporting Post-topic Poll

Please rate your current level of knowledge with respect to the following Moodle site level features:

Comments report*

Poor Fair Good Very good Excellent

Course overview report*

Poor Fair Good Very good Excellent

Log and Live logs reports*

Poor Fair Good Very good Excellent

Statistics report*

Poor Fair Good Very good Excellent

Event monitoring*

Poor Fair Good Very good Excellent

Inspire Analytics*

Poor Fair Good Very good Excellent

GDPR Compliance*

Poor Fair Good Very good Excellent

There are required fields in this form marked *.

[END OF PAGE]

5.2 TOPIC 2 : COURSE LEVEL REPORTING

[\(Learning Object #5.2.0 html page\)](#)
[Course Level Reporting Introduction](#)

This section provides an outline of the reporting capabilities of Moodle at course level, i.e. reports which can be accessed by users who have been enrolled onto a particular Moodle course.

Throughout this topic, we will examine how the teacher or site administrator can set criteria which must be met in order for the student to attain a status of complete in both individual activities and resources in a Moodle course, and thereby, overall course completion, as well as how the progress of the student in this respect can be tracked and monitored via different reporting capabilities.

These reports also provide the ability to view the details of the student's interactions with the Moodle course, and generate graphs and tables based on these engagements, as well as automatic notifications to the teacher or site administrator when certain events occur in the context of the Moodle course.

[END OF PAGE]

(Learning Object #5.2.1 activity)
Course Level Reporting Pre-topic Poll

Please rate your current level of knowledge with respect to the following Moodle course level features:

Course completion report*

Poor Fair Good Very good Excellent

Logs and Live logs reports*

Poor Fair Good Very good Excellent

Activity report*

Poor Fair Good Very good Excellent

Course participation report*

Poor Fair Good Very good Excellent

Activity completion report*

Poor Fair Good Very good Excellent

Statistics report*

Poor Fair Good Very good Excellent

Event monitoring*

Poor Fair Good Very good Excellent

Assignment reporting*

Poor Fair Good Very good Excellent

Lesson reporting*

Poor Fair Good Very good Excellent

Quiz reporting*

Poor Fair Good Very good Excellent

SCORM reporting*

Poor Fair Good Very good Excellent

There are required fields in this form marked *.

[END OF PAGE]

(#5.2.2 sub-topic)

5.2.2 Course Level Analytics

(Learning Object #5.2.2.1 html page with video)

Introduction

Introduction

In this section we will focus on some of the reports available within a Moodle course to users with the role of teacher and above. These reports offer views on learner participation and progress. They can all be found under *Reports* in the *Course administration* menu within the particular course that needs reviewing.

Take a look at the following short video for an introduction to course reports in Moodle.



External video: Course reports <https://youtu.be/VR91YcB3tCw> [3:18]

[END OF PAGE]

Course completion report

Course Completion

Course completion within a Moodle course provides the teacher or site administrator with the ability to specify a criterion or set of criteria which must be met by the student in order for the course to be deemed completed by that student.

Examples of the aforementioned criteria are as follows:

- **Course activity completion:** the student attains course completion as a result of the completion of one or more activities within the Moodle course.
- **Completion of other courses:** the student attains course completion as a result of the completion of one or more other Moodle courses.
- **Enrolment duration:** the student attains course completion by virtue of being enrolled on the Moodle course for a specified length of time.
- **Course grade:** the student attains course completion by achieving a required overall grade in the Moodle course.

Other means by which the student may attain course completion are as follows:

- **Manual self completion:** the student attains course completion by manually marking themselves as having completed the Moodle course.
- **Manual completion by others:** the student attains course completion by being manually marked by the teacher as having completed the Moodle course.

Course Completion Report

The *Course completion* report provides a visual representation of the progress which students who are enrolled on the Moodle course are making with respect to course completion, based upon the meeting of previously defined course completion criteria (outlined in the previous subsection), as well as whether they have, as yet, attained course completion in the course.

All participants: 13

First name **All** A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
Surname **All** A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Criteria group		Activities	Course
Aggregation method		All	All
Criteria		Course progress	Course complete
First name / Surname	Email address		
Angelica Buck	angelica.buck@example.com	<input type="checkbox"/>	<input type="checkbox"/>
Dave Danvers		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Melany Duke	melany.duke@example.com	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Daisy Dwyer	daisy.dwyer@example.com	<input type="checkbox"/>	<input type="checkbox"/>
Roselyn Giles	roselyn.giles@example.com	<input type="checkbox"/>	<input type="checkbox"/>
Francisco Heath	francisco.heath@example.com	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Colton Kidd	colton.kidd@example.com	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hailie Mckay	hailie.mckay@example.com	<input type="checkbox"/>	<input type="checkbox"/>
Anna Meadows		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Denis Minor	dctestminor@example.com	<input type="checkbox"/>	<input type="checkbox"/>
Nigel Russell	nigel.russell@example.com	<input type="checkbox"/>	<input type="checkbox"/>

The report includes a table which plots a list of course participants/learners on the Y axis against course progress and overall course completion on the X axis. The presence, or lack thereof, of checkmarks in the checkboxes represents what has, and has not, been completed.

The report can be filtered by first and surname initials.

It can also be downloaded in spreadsheet (UTF-8 .csv) or Excel (.csv) format.

If completion of the course is dependent upon completion of another Moodle course, or courses, whether the student has completed the other course(s) is displayed in the *Course completion* report too.

[END OF PAGE]

Logs and Live logs reports

Logs Report

The Logs report provides the teacher or site administrator with the ability to generate a report comprising a list of all learners on a particular Moodle course, or just one in particular, and details of their interactions with the activities and resources which constitute that course during a particular period of time.

Prior to generating the report, the following are some of the selections which can be made:

- A Moodle course from which the Logs report draws data must be selected from a dropdown list. Courses in this list are presented in alphabetical order.
 - When the Logs report is run via a particular Moodle course, as opposed to from the *Site administration* section external to a course, the Moodle course from which the report is accessed is selected in this dropdown list by default.
- From the second dropdown list, all participants or the name of one student in particular whose actions you wish to view the details of must be chosen. *All participants* is the default value present in this field.
- A period of time from which course logs are to be taken must be selected from the third dropdown list at the report page. Either all days since the course began or one of these days in particular can be chosen from this dropdown list. *All days* is the default value present in this field.
- Either all activities or one particular activity or resource must be selected from the fourth dropdown list. Activities and resources in this list are segregated by the topic in which they have been placed, i.e. the order in which they appear at the Moodle course page, as opposed to by name or by activity/resource type.
- The type of action it is desired to view log details of must be chosen from the next dropdown list. *All actions*, *Create*, *View*, *Update*, *Delete* and *All changes* are the options available from this list. By default, *All actions* is selected.

Course logs, as constrained by the above selection criteria, are then presented in reverse chronological order, i.e. the most recent appear at the top of the report.

» Courses » Analytics Tools » Reports » Logs

Analytics Tools ▾ All participants ▾ All days ▾ All activities ▾ All actions ▾

All sources ▾ All events ▾ ? Get these logs

« 1 ... 56 57 58 59 60 61 62 63 64 65 ... 66 »

Time	User full name	Affected user	Event context	Component	Event name	Description	Origin	IP address
27 February 2019, 1:05 PM	Dave Danvers	Dave Danvers	Course: Analytics Tools	System	User graded	The user with id '20' updated the grade with id '309' for the user with id '20' for the grade item with id '42'.	web	89.101.211.218
27 February 2019, 1:05 PM	Dave Danvers	Dave Danvers	Course: Analytics Tools	System	User graded	The user with id '20' updated the grade with id '305' for the user with id '20' for the grade item with id '41'.	web	89.101.211.218
27 February 2019, 1:05 PM	Dave Danvers	Dave Danvers	Course: Analytics Tools	System	User graded	The user with id '20' updated the grade with id '297' for the user with id '20' for the grade item with id '39'.	web	89.101.211.218
27 February 2019, 1:05 PM	Dave Danvers	Dave Danvers	Lesson: 5.0.1 - 5.0.5 Introduction	System	Course activity completion updated	The user with id '20' updated the completion state for the course module with id '174' for the user with id '20'.	web	89.101.211.218
27 February 2019, 1:05 PM	Dave Danvers	-	Lesson: 5.0.1 - 5.0.5 Introduction	Lesson	Lesson ended	The user with id '20' ended the lesson with course module id '174'.	web	89.101.211.218
27 February 2019, 1:05 PM	Dave Danvers	-	Lesson: 5.0.1 - 5.0.5 Introduction	Lesson	Content page viewed	The user with id '20' has viewed the content page with id '153' in the lesson activity with course module id '174'.	web	89.101.211.218

Live Logs Report

The *Live logs* report provides the teacher or site administrator with the ability to very simply and quickly view the recent course interactions (*Create*, *View*, *Update* and *Delete*) of learners within a particular Moodle course.

Log information displayed by this report is unfiltered, and it therefore displays all types of interactions by all learners with the Moodle course. As with the *Logs* report, live log information is displayed in reverse chronological order, so the most recent logs appear at the top of the report. The report is automatically refreshed as new interactions occur, but can be paused via a *Pause live updates* button.

» My courses » Analytics Tools » Reports » Live logs

Pause live updates

Time	User full name	Affected user	Event context	Component	Event name	Description	Origin	IP address
28 March 2019, 3:38 PM	Enovation Admin	-	Course: Analytics Tools	Logs	Log report viewed	The user with id '3' viewed the log report for the course with id '5'.	web	86.47.50.67
28 March 2019, 3:23 PM	Enovation Admin	-	Course: Analytics Tools	System	Course viewed	The user with id '3' viewed the course with id '5'.	web	86.47.50.67

[END OF PAGE]

(Learning Object #5.2.2.4 html page)
Activity report

Activity report

The Activity report comprises a list of all activities and resources which constitute a Moodle course page and, for each of these, the following two attributes:

1. **Views:** this represents the number of times the activity or resource has been viewed, and by how many different users.
2. **Last access:** this represents the most recent date and time at which the activity or resource has been viewed.

📁 > Courses > Analytics Tools > Reports > Activity report

Analytics Tools

▶ Filter

Computed from logs since Friday, 15 February 2019, 9:53 AM.

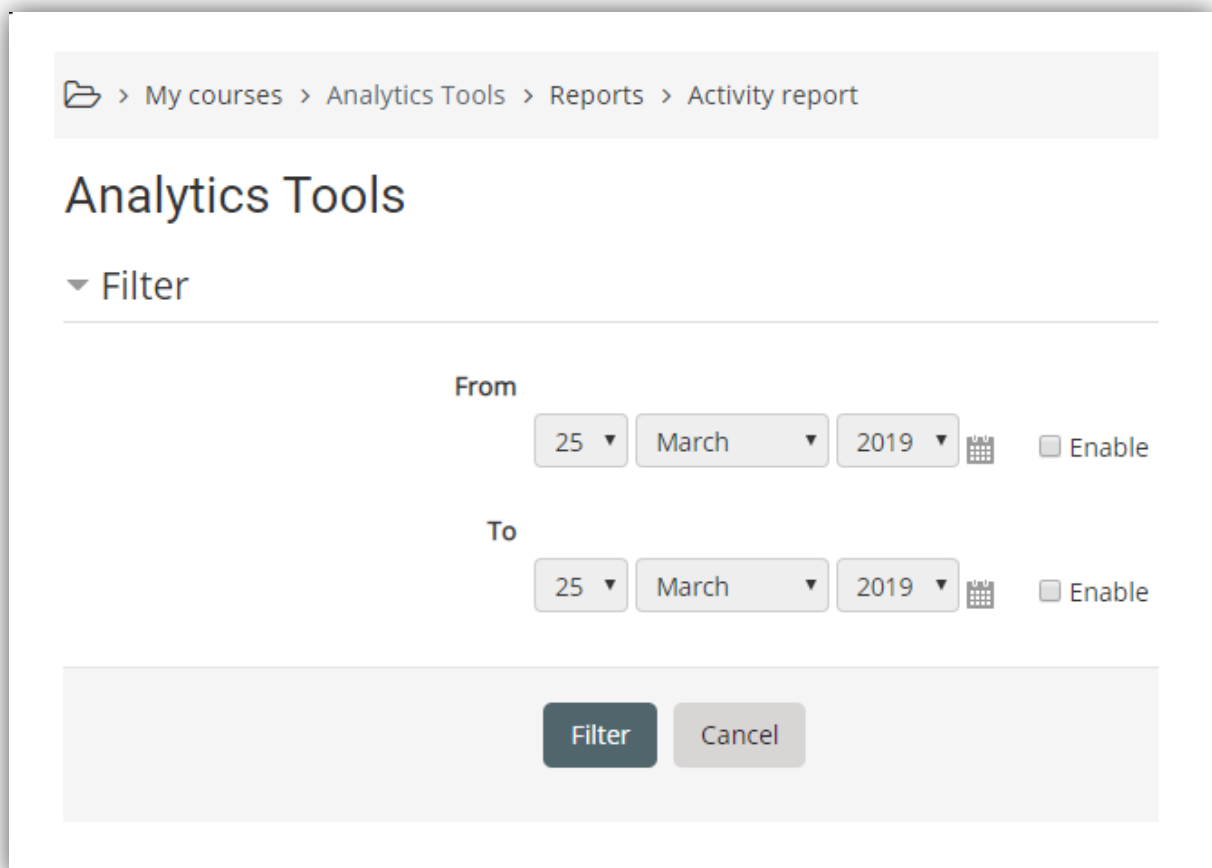
Activity	Views	Related blog entries	Last access
📢 Announcements	3 views by 1 users	-	Monday, 18 February 2019, 4:07 PM (99 days)
📋 Part 1 progress	26 views by 6 users	-	Friday, 15 March 2019, 6:10 PM (73 days 22 hours)
📋 Part 2 progress	7 views by 4 users	-	Thursday, 16 May 2019, 2:09 PM (12 days 3 hours)
📋 Part 3-6 progress	8 views by 3 users	-	Wednesday, 6 March 2019, 9:16 AM (83 days 6 hours)
📋 Course progress	48 views by 8 users	-	Thursday, 16 May 2019, 2:09 PM (12 days 3 hours)
📢 Module discussion forum	17 views by 8 users	-	Friday, 26 April 2019, 10:12 AM (32 days 7 hours)
💬 Discussion forums	17 views by 4 users	-	Monday, 29 April 2019, 3:02 PM (29 days 2 hours)

5.0 INTRODUCTION

📢 5.0.1 - 5.0.5 Introduction	464 views by 10 users	-	Monday, 20 May 2019, 2:32 PM (8 days 2 hours)
------------------------------	-----------------------	---	---

In the Activity report, constituent activities and resources of the Moodle course page are segregated by the topic in which they are included, consistent with how they are displayed at the course page.

The report can be filtered to only display details of the number of views and the last access date for each activity or resource during a particular date range. By default, details of all views (since the date specified in the *Course start date* field at the settings page of the Moodle course) are displayed.



The screenshot shows the Moodle 'Activity report' interface. At the top, a breadcrumb trail reads: 'My courses > Analytics Tools > Reports > Activity report'. Below this is the 'Analytics Tools' header. A 'Filter' section is expanded, showing date selection options. The 'From' date is set to '25 March 2019' with a calendar icon and an 'Enable' checkbox. The 'To' date is also set to '25 March 2019' with a calendar icon and an 'Enable' checkbox. At the bottom of the filter section are two buttons: 'Filter' and 'Cancel'.

The period of time covered by the Activity report can also be adjusted by the site administrator via the Moodle site administration settings page.

[END OF PAGE]

Course participation report

The *Course participation* report provides the teacher or site administrator with the ability to generate a report comprising a list of students who are enrolled on a particular Moodle course, as well as details of their interactions with a pre-selected activity or resource within that Moodle course, during a pre-selected period of time.

Prior to generating the report, the following selections must be made:

- An activity or resource must be selected from the *Activity module* dropdown list. Activities and resources in this list are segregated by type, as opposed to by name or by the topic in which they have been placed in the Moodle course.
- A period of time over which student participation in the chosen activity or resource can be looked back upon must be selected from the *Look back* dropdown list. The values in this list range from the date on which the *Course participation* report is run to a minimum duration of one day previously and a maximum duration of four weeks previously.
- The *Show actions* dropdown list allows the teacher or site administrator to choose whether the report will include student views only, student posts only or all actions (views and posts).

For example, a *Course participation* report which displays the views of students with respect to a particular activity within the Moodle course page over a particular duration of time could be run.

Courses > Analytics Tools > Reports > Course participation

Activity module
5.1.3 Analytics

Look back
3 months
Show only
Student
Show actions
View
Go

Groups: All participants
Lesson Views
Lesson Posts

13

First name / Surname	View	Select
Grace Teachly	Yes (47)	<input type="checkbox"/>
Leo Stein	Yes (13)	<input type="checkbox"/>
Nigel Russell	No	<input type="checkbox"/>
Denis Minor	No	<input type="checkbox"/>
Anna Meadows	Yes (8)	<input type="checkbox"/>
Hailie Mckay	No	<input type="checkbox"/>
Colton Kidd	No	<input type="checkbox"/>
Francisco Heath	No	<input type="checkbox"/>
Roselyn Giles	No	<input type="checkbox"/>
Daisy Dwyer	No	<input type="checkbox"/>
Melany Duke	Yes (6)	<input type="checkbox"/>
Dave Danvers	No	<input type="checkbox"/>
Angelica Buck	No	<input type="checkbox"/>

Select all
Deselect all
Select all 'No'

With selected users...
Choose...

After it has been run, the *Select all*, *Deselect all* and *Select all 'No'* buttons at the bottom of the report page give the teacher the ability to select one or more students from the displayed list and, via the *With selected users...* dropdown list below, send a message to the selected student(s).

In the example above, we can see that Grace has viewed this particular activity 47 times and Leo has viewed it 13 times. However, Nigel and Denis haven't viewed it at all. A message could be sent directly to these two learners to find out why this is.

[END OF PAGE]

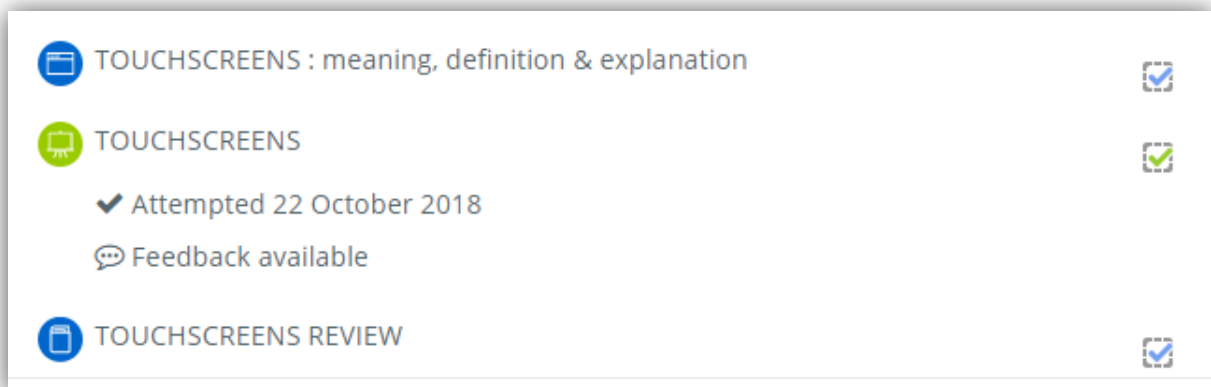
(Learning Object #5.2.2.6 html page)
Activity completion report

Activity completion report

Activity completion

Activity completion within a Moodle course provides the teacher or site administrator with the ability to specify a criterion or set of criteria which must be met by the student in order for the activity or resource to be deemed completed by that student.

For the student, a hollow checkbox is initially present to the right of the activity or resource, which indicates to the student that this particular activity or resource is being tracked by completion. Once the criterion or set of criteria necessary for completion of the activity or resource has been met by the student, a tick appear appears inside the checkbox.



The benefit of this to the student is that it provides them with a checklist of what they have and have yet to complete in terms of activities and resources on the Moodle course page. Completion of these activities and resources could lead to completion of the overall Moodle course, as outlined previously in the *Course completion* section.

Access to an activity or resource can also be restricted based upon completion of another (one or more) activity or resource in the same Moodle course page.

Once completion tracking has been enabled at the settings page of the Moodle course, the teacher or site administrator can choose, for each activity and resource which comprises the Moodle course page, one of three options in the *Activity completion* section of the settings page of the activity or resource:

1. **Do not indicate activity completion:** the activity or resource is not monitored by completion tracking and no checkbox, hollow or otherwise, is present to the right of the activity or resource at the Moodle course page.



2. **Students can manually mark the activity as completed:** the student possesses the ability to click on the initially hollow checkbox to the right of the activity or resource at the Moodle course page, so that a tick appears inside, and the activity is thereby marked as complete for that student.



3. **Show activity as complete when conditions are met:** the teacher or site administrator specifies a criterion or set of criteria which must be met by the student in order for the activity or resource to be deemed completed by that student, and only when this criterion or set of criteria has been met by the student does a tick appear in the checkbox to the right of the activity or resource at the Moodle course page.



Examples of the aforementioned activity completion criteria are as follows:

- **Require view:** the student must view the activity or resource in order to complete it.
- **Require grade:** the student must receive a grade as result of undertaking the activity in order to complete it.
 - This is only applicable to Moodle activities which output a grade (e.g. the Quiz activity) and not to any Moodle resource.
- **Require submission:** the student must provide a submission to the activity in order to complete it.
 - This is only applicable to Moodle activities to which submissions can be made (e.g. the Assignment activity) and not to any Moodle resource.
- **Require status:** the student must receive a status of *Passed* or *Completed* as result of undertaking the activity in order to complete it.
 - This is only applicable to the SCORM package activity.
- **Require end reached:** the student must reach the final page of the activity in order to complete it.
 - This is only applicable to the Lesson activity.

Activity completion report

The *Activity completion* report provides a visual representation of the progress students enrolled on the Moodle course are making with respect to activities and resources within the course which are monitored by completion tracking, based upon the meeting of previously defined activity completion criteria (outlined in the previous subsection).

Courses > Analytics Tools > Reports > Activity completion

First name: **All** A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
 Surname: **All** A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

First name / Surname	Email address	Part 1 progress	Part 2 progress	Part 3-6 progress	Course progress	5.0.1 - 5.0.5 Introduction	5.0.6 Pre-module survey	Pre-module poll	5.1.0 Intro to Topic 1...	5.1.1 Pre-topic survey - ...	5.1.2 Site reports	5.1.3 Analytics	5.1.4 GDPR features	5.1.5 Site level quiz	5.1.6 How To - Site Level	5.1.7 Post-topic survey - ...	5.2.0 Course Level ...	5.2.1 Course Level ...	5.2.2 Course Level ...	5.2.4 Course Level ...	5.2.5 Course Level ...
Angelica Buck	angelica.buck@example.com	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Dave Danvers	dc3@enovation.ie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Melany Duke	melany.duke@example.com	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Daisy Dwyer	daisy.dwyer@example.com	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Roselyn Giles	roselyn.giles@example.com	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Francisco Heath	francisco.heath@example.com	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Colton Kidd	colton.kidd@example.com	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Hailie Mckay	hailie.mckay@example.com	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Anna Meadows	dc2@enovation.ie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Denis Minor	dc2testminor@example.com	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Nigel Russell	nigel.russell@example.com	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Leo Stein	dc4@enovation.ie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Grace Teachly	dc1@enovation.ie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

[Download in spreadsheet format \(UTF-8 .csv\)](#)
[Download in Excel-compatible format \(.csv\)](#)

The report includes a table which plots a list of course participants/learners on the Y axis against activities and resources which are monitored by completion tracking on the X axis. The presence of, or lack thereof, checkmarks in the checkboxes represents what has, and has not, been completed by the students.

At both the Moodle course page and in the *Activity completion* report:

- An activity completion checkbox with a solid or unbroken border indicates that the corresponding activity or resource is one which the student can manually mark as complete.



- An activity completion checkbox with a broken border indicates that the activity completion settings of the corresponding activity or resource are automatic in nature, i.e. a criterion or set of criteria has been set by the teacher or site administrator which must be met by the student in order for them to attain activity completion for that activity or resource.



The report can be filtered by first and surname initials.

It can also be downloaded in spreadsheet (UTF-8 .csv) or Excel (.csv) format.

[END OF PAGE]

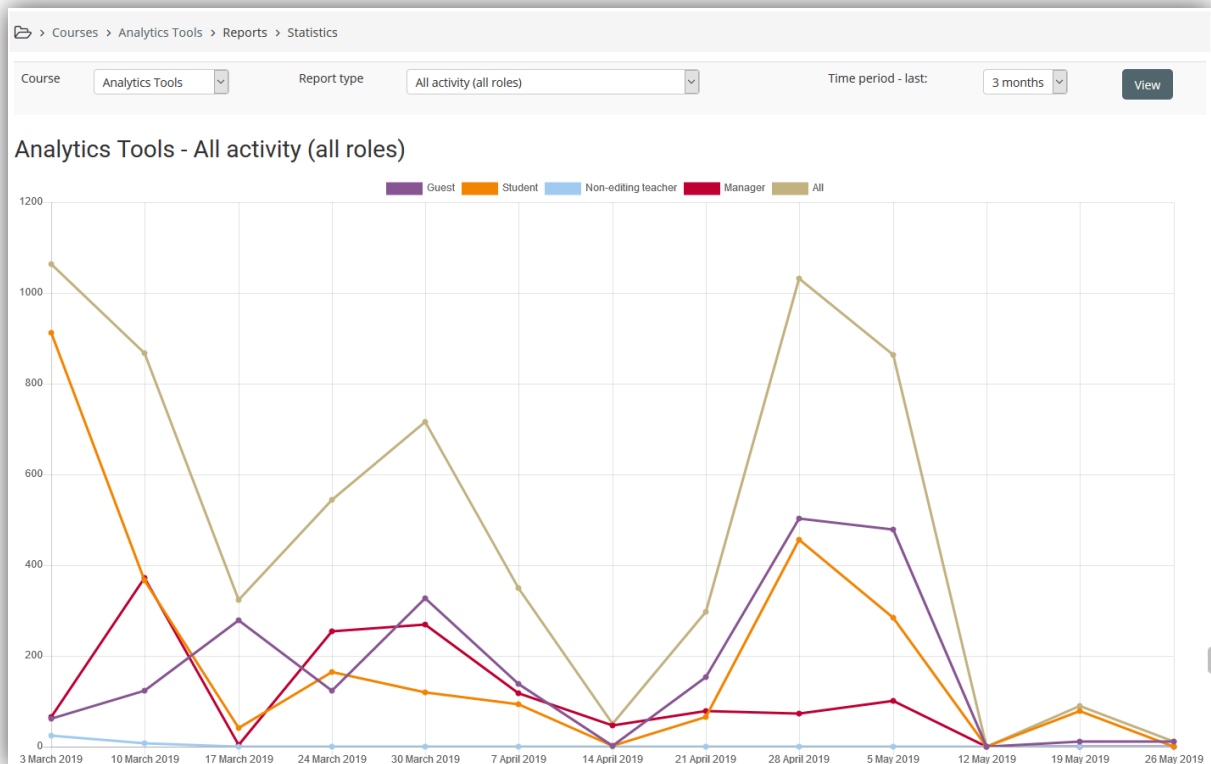
Statistics report

The *Statistics* report provides the teacher or site administrator with the ability to generate graphs, tables, etc. based upon the interactions of both the student and the teacher in a particular Moodle course.

Prior to generating the report, the following selections must be made:

- A Moodle course from which the *Statistics* report draws data must be selected from the *Course* dropdown list. Courses in this list are presented in alphabetical order.
 - When the *Statistics* report is run via a particular Moodle course, as opposed to from the *Site administration* section external to a Moodle course, the course from which the report is accessed is selected in the *Course* dropdown list by default.
- The type of course data which it is desired for the report to present in statistical format must be chosen from the *Report type* dropdown list.
 - Options available from this field include all views and posts from all students and teachers, all views only, all posts only, views from the students only, views from the teachers only, posts from the students only or posts from the teachers only.
- A period of time from which course data is to be drawn must be selected from the *Time period - last:* dropdown list. The values in this list range from the past week up to the past four weeks, in increments of one week.

For example, a *Statistics* report which displays all views and posts from all students and teachers over the past four weeks could be run.



The report comprises a graph which illustrates the number of “hits” (the views and posts of students and teachers enrolled on the Moodle course) on the Y axis and the dates which comprise the previously selected time period on the X axis.

Period ending (Week)	Guest	Student	Non-editing teacher	Manager	All	Logs
26 May 2019	11	0	0	0	11	Course Logs
19 May 2019	11	79	0	0	90	Course Logs
12 May 2019	0	0	0	0	0	Course Logs
5 May 2019	478	284	0	101	863	Course Logs
28 April 2019	503	456	0	72	1031	Course Logs
21 April 2019	154	65	0	78	297	Course Logs
14 April 2019	2	1	0	47	50	Course Logs
7 April 2019	139	93	0	117	349	Course Logs
30 March 2019	327	119	0	269	715	Course Logs
24 March 2019	124	164	0	255	543	Course Logs
17 March 2019	279	42	0	3	324	Course Logs
10 March 2019	123	366	7	372	868	Course Logs
3 March 2019	62	913	24	65	1064	Course Logs

Similar information is presented again, below the graph, this time in a tabular format comprising rows (the dates displayed on the X axis in the graph) and columns (the type of Moodle user, e.g. student or teacher, and the number of “hits”).

[END OF PAGE]

(Learning Object #5.2.2.8 html page)
Event monitoring

Event monitoring

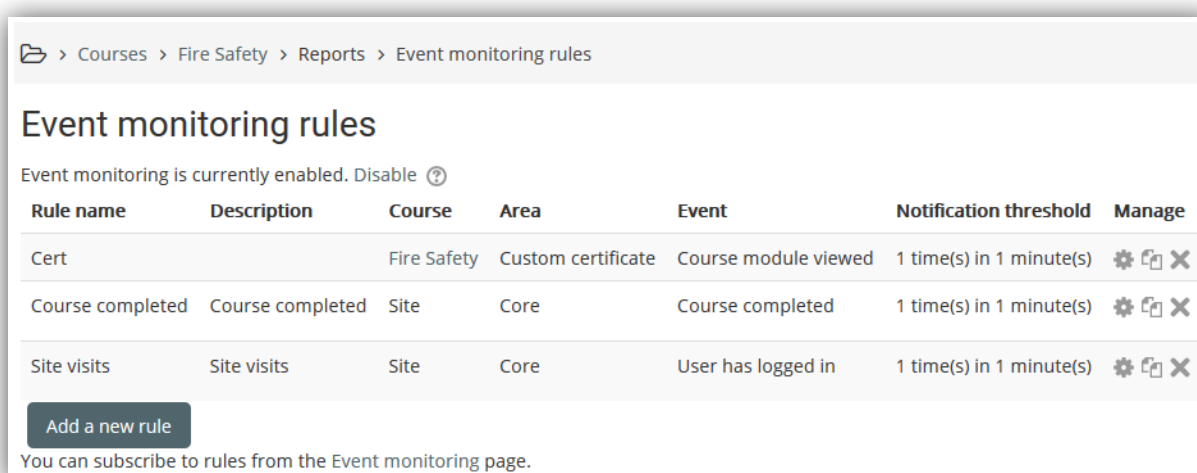
Event monitoring provides the teacher or site administrator with the ability to generate automatic notifications when a particular event occurs in the context of a Moodle course. This is done by creating a rule, which generates the aforementioned notification when the event occurs.

In order to receive a notification in relation to an *Event monitoring* rule, the teacher or site administrator must subscribe to it after it has been created.

Rules can be created based upon events which occur with respect to Moodle course activities and resources, plugins, reports, etc. Examples of events around which *Event monitoring* rules could be created in order to generate a notification to the teacher or site administrator are as follows:

- An assignment is submitted. (Moodle *Assignment* activity)
- A certificate is viewed/downloaded. (Moodle *Certificate* activity)
- Feedback is submitted. (Moodle *Feedback* activity)
- A discussion is started. (Moodle *Forum* activity)
- A quiz has been attempted. (Moodle *Quiz* activity)
- A Moodle course has been completed.
- A Moodle report has been viewed.

A list of current *Event monitoring* rules is displayed at the *Event monitoring rules* page. From here, these existing *Event monitoring* rules can be edited, duplicated (and then edited) or deleted.



> Courses > Fire Safety > Reports > Event monitoring rules

Event monitoring rules

Event monitoring is currently enabled. Disable ⓘ

Rule name	Description	Course	Area	Event	Notification threshold	Manage
Cert		Fire Safety	Custom certificate	Course module viewed	1 time(s) in 1 minute(s)	⚙️ 📄 ✕
Course completed	Course completed	Site	Core	Course completed	1 time(s) in 1 minute(s)	⚙️ 📄 ✕
Site visits	Site visits	Site	Core	User has logged in	1 time(s) in 1 minute(s)	⚙️ 📄 ✕

Add a new rule

You can subscribe to rules from the Event monitoring page.

A new *Event monitoring* rule can also be created via the *Add a new rule* button at the bottom of the list.

These new rules are created using the form shown below.

The resource, activity, report, etc you would like to monitor is selected under *Area to monitor*. The specific event such as message sent, assignment feedback viewed, quiz attempted, user tour started etc can be selected under *Event*.

The number of times the specific event must occur in a specified time period before a notification is sent is defined in *Notification threshold* while that specific time period is defined under *in minutes*.

The notification message can be personalised with images and HTML as well as any of the following placeholders :

- Link to the location of the event {link}
- Link to the area monitored {modulelink}
- Rule name {rulename}
- Description {description}
- Event {eventname}

The screenshot shows a web form for creating a new rule. It contains the following fields and controls:

- Rule name ***: A text input field.
- Area to monitor ***: A dropdown menu with "Choose..." selected.
- Event ***: A dropdown menu with "Choose..." selected.
- Description**: A rich text editor with a toolbar containing icons for text color, bold, italic, bulleted list, numbered list, link, unlink, and image.
- Notification threshold ***: A dropdown menu with "1" selected, accompanied by a help icon (?).
- in minutes ***: A dropdown menu with "1" selected.
- Notification message ***: A rich text editor with a toolbar similar to the one above. Below the toolbar, the following placeholders are displayed:
Rule name: {rulename}
Description: {description}
Event name: {eventname}

[END OF PAGE]

(Learning Object #5.2.2.9 html page)
Conclusion

Throughout this section, we have examined Moodle's reporting features at course level, with which the teacher or site administrator can track and monitor the progress of the student. These features include the following:

- The ability to set criteria which must be met by the student in order to attain a status of complete with respect to each activity and resource which constitutes the Moodle course (*Activity completion*)
 - The ability to monitor the student's progress with respect to this (*Activity completion report*)
- The ability to set criteria which must be met by the student in order to attain a status of complete with respect to the overall Moodle course, typically achieved by completing some or all of the activities and resources in that course (*Course completion*)
 - The ability to monitor the student's progress with respect to this (*Course completion report*)
- The ability to view details of the various interactions and engagements of the student with the Moodle course (*Logs report, Live logs report, Activity report, Course participation report*)
- The ability to generate illustrative graphs and tables based upon the interactions of both the student and teacher with the Moodle course (*Statistics report*)
- The ability to generate automatic notifications to the teacher or site administrator when certain events occur in the context of the Moodle course (*Event monitoring*)

[END OF PAGE]

(#5.2.3 sub-topic)

5.2.3 Activity level analytics

(Learning Object #5.2.3.1 html page)

Introduction

Introduction

This section provides an outline of the reporting capabilities of Moodle at activity level, i.e. reports which form part of the individual activities which constitute Moodle courses.

Throughout this section, we will examine how the teacher or site administrator can track and monitor the progress of the student in the context of the Moodle *Assignment*, *Lesson*, *Quiz* and *SCORM package* activities.

These reports provide the ability to view details of the student's submission, attempt and/or grade with respect to each of these four Moodle activities.

[END OF PAGE]

(Learning Object #5.2.3.2 html page)
Assignment

Grading Summary

The Moodle Assignment activity grading summary provides the teacher or site administrator with the ability to view the grading status of a particular Assignment activity with respect to the students enrolled on that Moodle course.

The screenshot shows the Moodle Assignment activity grading summary page. At the top, there is a breadcrumb trail: > Courses > Innovations > Expert > End of Work-Based Learning Phase Reflective Log. Below this is the title 'End of Work-Based Learning Phase Reflective Log'. A text box with the placeholder 'Please upload your reflective logs here.' is present. Under 'Visible groups', there is a dropdown menu set to 'All participants'. The 'Grading summary' section contains a table with the following data:

Hidden from students	No
Participants	9
Submitted	2
Needs grading	0
Due date	Tuesday, 30 April 2019, 12:00 AM
Time remaining	Assignment is due

At the bottom of the summary section, there are two buttons: 'View all submissions' (in teal) and 'Grade' (in dark grey).

The grading summary comprises the number of students the assignment is hidden from, the number of students enrolled on the course, the number of students who have provided submissions to the assignment, the number of assignment submissions which have yet to be graded, the assignment due date and the time remaining until this due date.

From this page, via the *View all submissions* button, the main grading report page can be accessed.

Grading Report

The main grading report page comprises a table which plots rows of enrolled students on the Y axis against, on the X axis, the following:

- The student's profile picture
- The student's name (first and surname)
- The student's email address
- The grading status of the student's assignment submission
- A *Grade* button, which links directly to the grading page for the student's assignment submission
- The date on which the student last modified/submitted their assignment
- A link to the file which the student uploaded as their assignment submission
- Comments which the teacher or site administrator has provided to the student in relation their assignment submission
- The date on which the teacher or site administrator last modified/graded the student's assignment submission
- Comments/feedback which the teacher or site administrator has provided to the student in relation their assignment grade
- The file which the student uploaded as their assignment submission which has subsequently been annotated by the teacher or site administrator
- The final grade which the teacher or site administrator has awarded the student for the assignment submission

Assignment

Grading action: choose...

First name: All A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Surname: All A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Select	User picture	First name / Surname	Email address	Status	Grade	Edit	Last modified (submission)	File submissions	Submission comments	Last modified (grade)	Feedback comments	Annotate PDF	Final grade
<input type="checkbox"/>		Grace Teachly	dct1@novation.ie	No submission	Grade	Edit							
<input type="checkbox"/>		Roselyn Giles	roselyn.giles@example.com	Submitted for grading	Grade 90.00 / 100.00	Edit	Thursday, 18 April 2019, 3:47 PM	Assignment Submission.pdf 18 April 2019, 3:47 PM	Comments (0)	Thursday, 18 April 2019, 3:47 PM	Excellent work!		90.00 / 100.00
<input type="checkbox"/>		Nigel Russell	nigel.russell@example.com	No submission	Grade	Edit							

For viewing ease, any of the columns can be hidden and a *Reset table preferences* option appears as well as *Show* links at the top of each hidden column. In the following report the *Email address*, *Last modified (submission)*, *Edit*, *Submission comments* and *Final grade* columns have all been hidden in order to make the information we need in this case much easier to see.

Here, Hailie was the first person to submit to this assignment but she received a low grade and a feedback comment of 'Very weak'. Perhaps the issue is with the effort Hailie is making but it could be with the assignment activity itself. The deadline might be too short for weaker students or the instructions might not be clear enough.





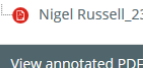





Courses > Innovations > Expert > End of Work-Based Learning Phase Reflective Log > Grading

End of Work-Based Learning Phase Reflective Log

Grading action: Choose...

Visible groups: All participants

Reset table preferences

Select	User picture	First name / Surname	Status	Grade	File submissions	Last modified (grade)	Feedback comments	Annotate PDF
<input type="checkbox"/>		Roselyn Giles	No submission Graded	Grade 80.00 / 100.00		Wednesday, 29 May 2019, 10:28 AM	Submitted offline. Very good work	
<input type="checkbox"/>		Nigel Russell	Submitted for grading Graded	Grade 85.00 / 100.00		Wednesday, 24 April 2019, 10:28 AM	excellent	 View annotated PDF
<input type="checkbox"/>		Hailie Mckay	No submission Graded	Grade 35.00 / 100.00		Tuesday, 23 April 2019, 11:52 PM	Submitted offline. Very weak	
<input type="checkbox"/>		Francisco Heath	No submission Graded	Grade 100.00 / 100.00		Tuesday, 23 April 2019, 11:53 PM	Submitted offline.	
<input type="checkbox"/>		Colton Kidd	Submitted for grading 29 days 10 hours late	Grade -		-		
<input type="checkbox"/>		Angelica Buck	No submission Assignment is overdue	Grade -		-		

The report can be filtered by *first name, surname, status, grade* etc.

[END OF PAGE]

(Learning Object #5.2.3.3 html page)
Lesson

Overview Report

The Overview report within the Moodle Lesson activity provides the teacher or site administrator with the ability to view the attempt status of a particular Lesson activity with respect to the students enrolled on that Moodle course.

Attempt statuses include the date on which the attempt was completed (or not completed) and the duration of the student's attempt of that Lesson activity, as well as the student's name and email address.

Courses > Analytics Tools > 5.1 PART 1 : SITE LEVEL > 5.1.3 Analytics > Reports > Overview > Reports > Overview

5.1.3 Analytics ?

Preview

Edit

Reports

Grade essays

Overview

Detailed statistics

See all course grades

Name	Email address	Attempts
Dave Danvers		<input type="checkbox"/> Wednesday, 27 February 2019, 1:08 PM, (10 secs)
Melany Duke	melany.duke@example.com	<input type="checkbox"/> Wednesday, 27 February 2019, 2:03 PM, (9 secs) <input type="checkbox"/> Not completed Tuesday, 5 March 2019, 1:29 PM
Francisco Heath	francisco.heath@example.com	<input type="checkbox"/> Friday, 22 February 2019, 12:08 PM, (11 secs) <input type="checkbox"/> Wednesday, 27 February 2019, 4:11 PM, (14 secs)
Colton Kidd	colton.kidd@example.com	<input type="checkbox"/> Wednesday, 27 February 2019, 2:24 PM, (9 secs)
Anna Meadows		<input type="checkbox"/> Wednesday, 13 February 2019, 11:25 AM, (15 secs) <input type="checkbox"/> Not completed Monday, 25 February 2019, 9:55 AM <input type="checkbox"/> Thursday, 28 February 2019, 11:11 AM, (21 secs) <input type="checkbox"/> Not completed Tuesday, 12 March 2019, 10:58 AM <input type="checkbox"/> Not completed Tuesday, 2 April 2019, 8:18 PM
Leo Stein		<input type="checkbox"/> Thursday, 21 February 2019, 1:27 PM, (15 secs) <input type="checkbox"/> Friday, 8 March 2019, 11:17 AM, (6 mins 39 secs) <input type="checkbox"/> Tuesday, 19 March 2019, 12:20 PM, (20 secs)
Grace Teachly		<input type="checkbox"/> Saturday, 30 March 2019, 3:24 PM, (1 min 51 secs) <input type="checkbox"/> Friday, 26 April 2019, 10:24 AM, (15 mins 12 secs) <input type="checkbox"/> Friday, 26 April 2019, 12:00 PM, (2 mins 24 secs) <input type="checkbox"/> Friday, 26 April 2019, 12:03 PM, (11 mins 11 secs)

Select all / Deselect all

Choose... ▼

Lesson statistics

Average time	High time	Low time
2 mins 49 secs	15 mins 12 secs	9 secs

Student attempts can be deleted at this page via the *Delete selected* option in the *Select all / Deselect all* dropdown list.

Lesson statistics—comprising *Average time*, *High time* and *Low time*—are displayed at the bottom of the report page.

Detailed Statistics Report

The *Detailed statistics* report within the Moodle *Lesson* activity provides the teacher or site administrator with the ability to view, on a question page, what percentage of students selected each answer.

Multiple Choice: Quiz - 16		Class statistics
Question:		
Which answer will you select?		
Answer:		
<input checked="" type="checkbox"/> \$600,000		90% checked this one.
<input type="checkbox"/> \$100,000		10% checked this one.
<input type="checkbox"/> \$300,000		No one checked this.
<input type="checkbox"/> \$1,800,000		No one checked this.

[END OF PAGE]

(Learning Object #5.2.3.4 html page) Quiz

The Moodle Quiz activity report provides the teacher or site administrator with the ability to generate a report comprising a list of students who are enrolled on a particular Moodle course, as well as details of attempts they have made, or have not made, at a particular Quiz activity.

Prior to generating the report, the following selections can be made from the *What to include in the report* section:

- The category of students who have attempted the quiz may be chosen from the *Attempts from* dropdown list. Options available from this list include students who have attempted the quiz, students who have not attempted the quiz or students who have or have not attempted the quiz.
- The state of the quiz attempts can be selected via checkboxes in the *Attempts that are* field. One, multiple, all or none of these checkboxes can be selected, which include *In progress*, *Overdue*, *Finished* and *Never submitted*.

> Courses > Innovations > Advanced > PRE-LESSON KNOWLEDGE QUIZ > Results > Grades

PRE-LESSON KNOWLEDGE QUIZ

Attempts: 5 ▼ Collapse all

▼ What to include in the report

Attempts from enrolled users who have attempted the quiz

Attempts that are

☒ In progress ☒ Overdue ☒ Finished ☒ Never submitted

☐ Show at most one finished attempt per user (Highest grade)

Show only attempts ☐ that have been regraded / are marked as needing regrading

▼ Display options

Page size 30





Marks for each question Yes

[Show report](#)

[Regrade all](#) [Dry run a full regrade](#)

Showing graded and ungraded attempts for each user. The one attempt for each user that is graded is highlighted. The grading method for this quiz is Highest grade. [Reset table preferences](#)

Download table data as Comma separated values (.csv) [Download](#)

	First name / Surname	Email address	State	Started on	Completed	Time taken	Grade/20.00	Q. 1 /1.00	Q. 2 /6.00	Q. 3 /5.00	Q. 4 /2.00	Q. 5 /6.00
<input type="checkbox"/>	 Anna Meadows Review attempt		Finished	8 January 2018 4:43 PM	8 January 2018 4:44 PM	1 min 6 secs	15.00	✓ 1.00	✓ 4.00	✓ 2.00	✓ 2.00	✓ 6.00
<input type="checkbox"/>	 Anna Meadows Review attempt		Finished	8 January 2018 4:46 PM	8 January 2018 4:47 PM	1 min 22 secs	19.00	✓ 1.00	✓ 6.00	✓ 4.00	✓ 2.00	✓ 6.00
<input type="checkbox"/>	 Colton Kidd Review attempt	colton.kidd@example.com	Finished	22 February 2019 12:12 PM	22 February 2019 12:13 PM	48 secs	18.00	✗ -	✓ 6.00	✓ 4.00	✓ 2.00	✓ 6.00
<input type="checkbox"/>	 Nigel Russell Review attempt	nigel.russell@example.com	Finished	22 February 2019 12:31 PM	22 February 2019 12:32 PM	1 min 3 secs	19.00	✓ 1.00	✓ 6.00	✓ 4.00	✓ 2.00	✓ 6.00
	Overall average						17.75 (4)	0.75 (4)	5.50 (4)	3.50 (4)	2.00 (4)	6.00 (4)

[Select all / Deselect all](#) [Regrade selected attempts](#) [Delete selected attempts](#)

The report comprises a table which plots rows of enrolled students on the Y axis against, on the X axis, the following:

- The student's email address
- The state of the student's attempt (*In progress, Overdue, Finished or Never submitted*)
- The date and time on which the student's attempt was started

- The date and time on which the student's attempt was completed
- How long the student's attempt took
- The overall grade for the student's attempt
- The student's grade for each individual question which constitutes that particular Moodle Quiz activity

The report can be downloaded in CSV (.csv), Excel (.xlsx), HTML, Javascript Object Notation (.json) or OpenDocument (.ods) format.

[END OF PAGE]

(Learning Object #5.2.3.5 html page)
SCORM

Basic Report









Courses > Analytics Tools > 5.2 TOPIC 2: COURSE LEVEL REPORTING > SCORM > Report

SCORM

Info Reports

Basic report Graph report Interactions report Objectives report

7 attempts for 9 users, out of 10 results

	First name / Surname	Email address	Attempt	Started on	Last accessed on	Score
<input type="checkbox"/>	 Colton Kidd	colton.kidd@example.com	1	Friday, 31 May 2019, 10:36 AM	Friday, 31 May 2019, 10:36 AM	40
<input type="checkbox"/>			2	Friday, 31 May 2019, 10:36 AM	Friday, 31 May 2019, 10:37 AM	100
<input type="checkbox"/>	 Angelica Buck	angelica.buck@example.com	1	Friday, 31 May 2019, 10:25 AM	Friday, 31 May 2019, 10:25 AM	80
<input type="checkbox"/>	 Melany Duke	melany.duke@example.com	1	Friday, 31 May 2019, 10:26 AM	Friday, 31 May 2019, 10:26 AM	60
<input type="checkbox"/>	 Anna Meadows		1	Friday, 31 May 2019, 10:21 AM	Friday, 31 May 2019, 10:22 AM	100
	 Dave Danvers		-	-	-	-
<input type="checkbox"/>	 Grace Teachly		1	Friday, 31 May 2019, 10:24 AM	Friday, 31 May 2019, 10:29 AM	20
	 Roselyn Giles	roselyn.giles@example.com	-	-	-	-
<input type="checkbox"/>	 Daisy Dwyer	daisy.dwyer@example.com	1	Friday, 31 May 2019, 10:29 AM	Friday, 31 May 2019, 10:29 AM	0

Select all / Deselect all Delete selected attempts

Download in ODS format Download in Excel format Download in text format

The *Basic* report within the Moodle SCORM package activity plots rows of enrolled students on the Y axis against, on the X axis, the following:


- The student's profile picture
- The student's name (first and surname)


- The student's email address
- The attempt number
 - Clicking on the number in this column displays further details of the student's attempt, including the status (sent from the SCORM package to Moodle, e.g. *Passed*, *Failed*, *Complete* or *Incomplete*) and duration of the attempt.

[Courses](#) >
 [Analytics Tools](#) >
 5.2 TOPIC 2: COURSE LEVEL REPORTING >
 SCORM >
 Report >
 Anna Meadows - Attempt 1

SCORM

[Learning objects](#)
[Interactions](#)


Anna Meadows

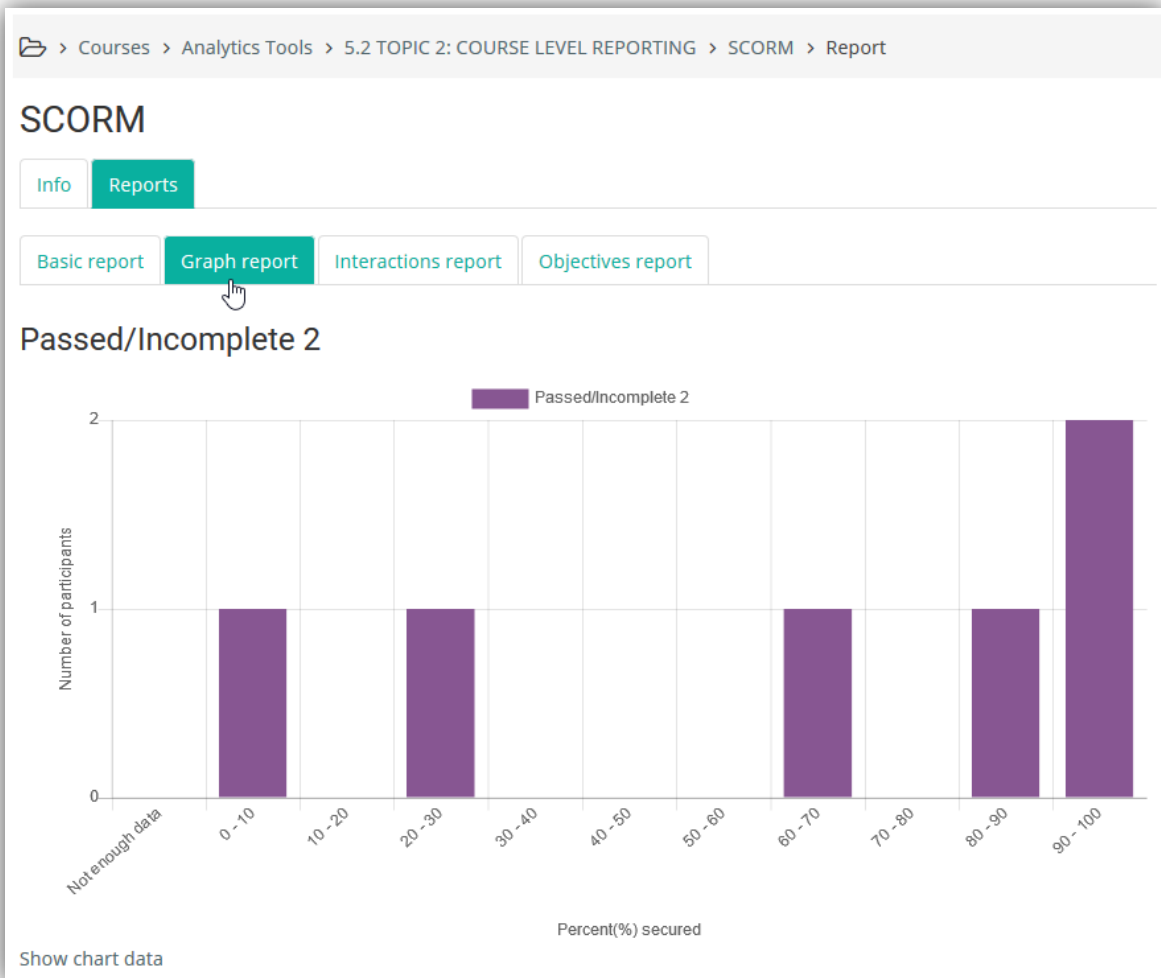
Title	Status	Time	Score
Passed/Incomplete 2			
 Passed/Incomplete 2	Passed	1 minutes 6.91 seconds	100 Track details

- The date on which the student's *SCORM package* activity attempt was started
- The date on which the *SCORM package* activity was last accessed by the student
- The score which the student attained in the *SCORM package* activity
 - If the *SCORM package* activity does not send a score to Moodle, then this column is will be blank.

The *Delete selected attempts* button provides the teacher or site administrator with the ability to do just that, and the report can also be downloaded in either ODS, Excel or text format.

Graph Report

The *Graph* report within the Moodle *SCORM package* activity comprises a bar chart which plots the number of participants (users enrolled on the Moodle course) on the Y axis against their percentage scored as a result of attempting of the *SCORM package* activity on the X axis.



Clicking on *Show chart data* at the lower left of the bar chart expands a vertical list of these percentage values, with the number of participants who attained this score displayed to the right of each percentage value.

Hide chart data	
	Passed/Incomplete 2
Not enough data	0
0 - 10	1
10 - 20	0
20 - 30	1
30 - 40	0
40 - 50	0
50 - 60	0
60 - 70	1
70 - 80	0
80 - 90	1
90 - 100	2

Clicking on *Hide chart data* collapses this list.

Interactions Report

Courses > Analytics Tools > 5.2 TOPIC 2: COURSE LEVEL REPORTING > SCORM > Report

SCORM

Info

Reports










Basic report

Graph report

Interactions report



Objectives report

7 attempts for 9 users, out of 10 results

	First name / Surname	Email address	Attempt	Started on	Last accessed on	Score	Passed/Incomplete 2	Response 0	Response 1	Response 2
<input type="checkbox"/>	 Colton Kidd	colton.kidd@example.com	1	Friday, 31 May 2019, 10:36 AM	Friday, 31 May 2019, 10:36 AM	40	 40	f	f	f
<input type="checkbox"/>			2	Friday, 31 May 2019, 10:36 AM	Friday, 31 May 2019, 10:37 AM	100	 100	f	f	f
<input type="checkbox"/>	 Angelica Buck	angelica.buck@example.com	1	Friday, 31 May 2019, 10:25 AM	Friday, 31 May 2019, 10:25 AM	80	 80	f	f	f
<input type="checkbox"/>	 Melany Duke	melany.duke@example.com	1	Friday, 31 May 2019, 10:26 AM	Friday, 31 May 2019, 11:16 AM	60	 60	f	f	f
<input type="checkbox"/>	 Anna Meadows		1	Friday, 31 May 2019, 10:21 AM	Friday, 31 May 2019, 10:22 AM	100	 100	f	f	f

The *Interactions* report within the Moodle SCORM *package* activity plots rows of enrolled students on the Y axis against, on the X axis, the following:

- The student's profile picture
- The student's name (first and surname)
- The student's email address
- The attempt number
 - Clicking on the number in this column displays details of the student's attempt, including the status (sent from the SCORM package to Moodle, e.g. *Passed*, *Failed*, *Complete* or *Incomplete*) and duration of the attempt.

SCORM			
Learning objects Interactions			
 Anna Meadows			
Title	Status	Time	Score
Passed/Incomplete 2			
 Passed/Incomplete 2	Passed	1 minutes 6.91 seconds	100 Track details

- The date on which the student's SCORM *package* activity attempt was started
- The date on which the SCORM *package* activity was last accessed by the student
- The score which the student attained in the SCORM *package* activity
 - If the SCORM *package* activity does not send a score to Moodle, then this column is will be blank.
- The attempt status (sent from the SCORM package to Moodle, e.g. *Passed*, *Failed*, *Complete* or *Incomplete*)
- Details of the individual responses provided by the student to each individual question within the SCORM package

The *Delete selected attempts* button provides the teacher or site administrator with the ability to do just that, and the report can also be downloaded in either ODS, Excel or text format.

By clicking on *Track details* within a student's attempt it is possible to see full details of that attempt including the answers given, the correct answers, the time spent per question and the weighting of each question towards the overall score.

[Courses](#) >
 [Analytics Tools](#) >
 5.2 TOPIC 2: COURSE LEVEL REPORTING >
 SCORM >
 Report >
 /

SCORM

[Learning objects](#)
[Interactions](#)

Attempt 1 - Angelica Buck: Passed/Incomplete 2 - Track details

Element	Value
cmi.core.exit	suspend
cmi.core.lesson_status	passed
cmi.core.score.max ?	100
cmi.core.score.min ?	0
cmi.core.score.raw ?	80
cmi.core.total_time	26.95 seconds
cmi.interactions_0.correct_responses_0.pattern ?	f
cmi.interactions_0.id ?	Scene1_Slide1_TrueFalse_0_0
cmi.interactions_0.latency ?	0000:00:05.27
cmi.interactions_0.result ?	correct
cmi.interactions_0.student_response ?	f
cmi.interactions_0.time ?	10:25:34
cmi.interactions_0.type ?	true-false
cmi.interactions_0.weighting ?	1
cmi.interactions_1.correct_responses_0.pattern ?	f
cmi.interactions_1.id ?	Scene1_Slide2_TrueFalse_0_0

Objectives Report

















[Courses](#) > [Analytics Tools](#) > [5.2 TOPIC 2: COURSE LEVEL REPORTING](#) > [SCORM](#) > [Report](#)

SCORM

Info Reports

Basic report Graph report Interactions report Objectives report

7 attempts for 9 users, out of 10 results

	First name / Surname	Email address	Attempt	Started on	Last accessed on	Score	Passed/Incomplete
<input type="checkbox"/>	 Colton Kidd	colton.kidd@example.com	1	Friday, 31 May 2019, 10:36 AM	Friday, 31 May 2019, 10:36 AM	40	 40
<input type="checkbox"/>			2	Friday, 31 May 2019, 10:36 AM	Friday, 31 May 2019, 10:37 AM	100	 100
<input type="checkbox"/>	 Angelica Buck	angelica.buck@example.com	1	Friday, 31 May 2019, 10:25 AM	Friday, 31 May 2019, 10:25 AM	80	 80
<input type="checkbox"/>	 Melany Duke	melany.duke@example.com	1	Friday, 31 May 2019, 10:26 AM	Friday, 31 May 2019, 11:16 AM	60	 60
<input type="checkbox"/>	 Anna Meadows		1	Friday, 31 May 2019, 10:21 AM	Friday, 31 May 2019, 10:22 AM	100	 100
	 Dave Danvers		-	-	-	-	<input type="checkbox"/> Not attempted
			-	-	-	-	<input type="checkbox"/> Not attempted
<input type="checkbox"/>	 Grace Teachly		1	Friday, 31 May 2019, 10:24 AM	Friday, 31 May 2019, 11:17 AM	20	 20
	 Roselyn Giles	roselyn.giles@example.com	-	-	-	-	<input type="checkbox"/> Not attempted
<input type="checkbox"/>	 Daisy Dwyer	daisy.dwyer@example.com	1	Friday, 31 May 2019, 10:29 AM	Friday, 31 May 2019, 10:29 AM	0	 Incomplete

Select all / Deselect all [Delete selected attempts](#)

[Download in ODS format](#)
[Download in Excel format](#)
[Download in text format](#)

The *Objectives* report within the Moodle SCORM package activity plots rows of enrolled students on the Y axis against, on the X axis, the following:

- The student's profile picture
- The student's name (first and surname)
- The student's email address
- The attempt number
 - Clicking on the number in this column displays details of the student's attempt, including the status (sent from the SCORM package to Moodle) and duration of the attempt as seen in the previous reports.
- The date on which the student's SCORM package activity attempt was started
- The date on which the SCORM package activity was last accessed by the student
- The score which the student attained in the SCORM package activity
 - If the SCORM package activity does not send a score to Moodle, then this column is will be blank.
- The attempt status (sent from the SCORM package to Moodle, e.g. *Passed*, *Failed*, *Complete* or *Incomplete*)

The *Delete selected attempts* button provides the teacher or site administrator with the ability to do just that, and the report can also be downloaded in either ODS, Excel or text format.

As outlined, the *Interactions* and *Objectives* reports are identical, with the exception of the fact that the latter will also report the status and score of any objectives which have been set up to be sent back to Moodle.

[END OF PAGE]

(Learning Object #5.2.3.6 html page)
Conclusion

Throughout this section, we have examined Moodle's reporting features at activity level, with which the teacher or site administrator can track and monitor the progress of the student. These features include the following:

- The ability to view a summary and generate a report which comprises details of the student's submission to the *Assignment* activity, specifically, the assignment due date, whether an assignment submission has been provided by the student, and if so, whether the assignment submission has been graded, and any feedback which has been provided to the student
- The ability to view the student's attempt status of the *Lesson* activity, specifically, the date and duration of the lesson attempt
- The ability to view the student's attempt status of the *Quiz* activity, specifically, the state of the attempt (*In progress*, *Overdue*, *Finished* or *Never submitted*), and if finished, the overall grade which the student attained in the quiz
- The ability to view details of the student's attempt of the *SCORM package* activity, specifically, the attempt status (sent from the SCORM package to Moodle, e.g. *Passed*, *Failed*, *Complete* or *Incomplete*), the duration of the attempt and score the student attained (if the SCORM package sends a score to Moodle)

[END OF PAGE]

(Learning Object #5.2.4 activity)
Course Level Reporting Quiz

Correct answer

1. Which of these is not a means of attaining Moodle course completion?

Completion of another course

Course activity completion

Course activity attempt

2. Which report does not provide the teacher or site administrator with the ability to view the grading status of assignment submissions?

Grading report

Grading summary

Overview report

3. Which of the following details is not displayed on the Quiz report?

A graphical representation of the student's attempt

The overall grade for the student's attempt

The state of the student's attempt

4. A unique feature of the Live logs report, in comparison to other course reports, is the following:

Automatically refreshes

Displays graphs

Displays activity completion status

5. Which type of report provides the teacher or site administrator with the ability to view the progress students are making with respect to the completion of individual activities and resources within the Moodle course?

Activity report

Activity completion report

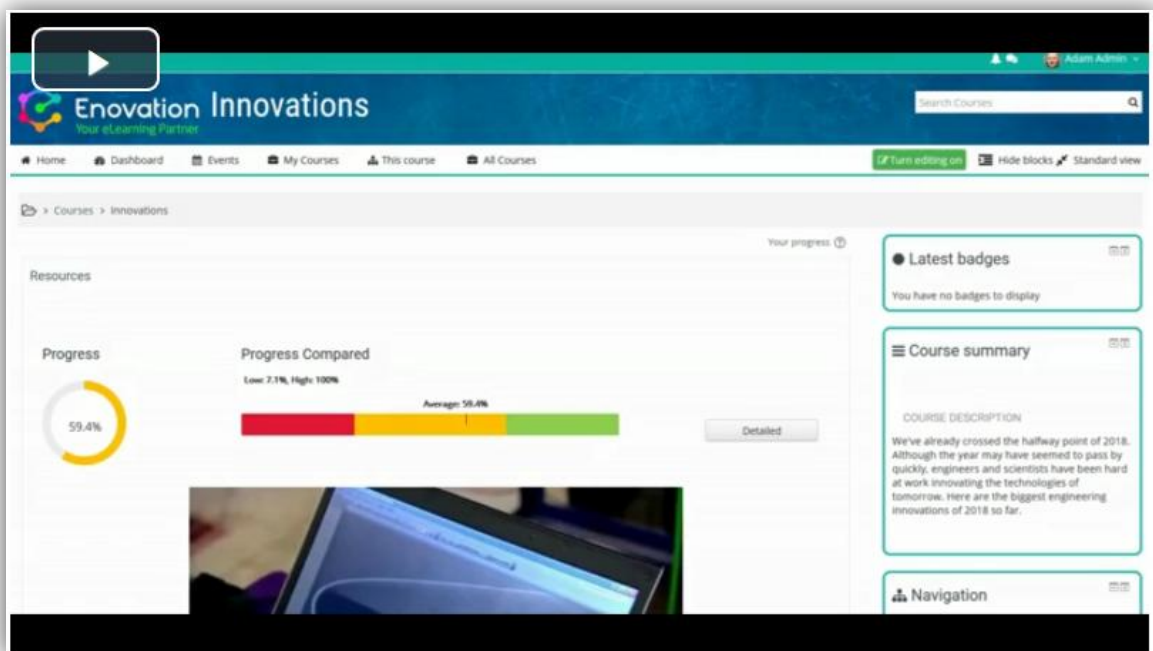
Course completion report

[END OF PAGE]

(Learning Object #5.2.5 html page with video)
How To - Course Level Reporting

How To - Course Level Reporting

The following videos will give you a walk-through in finding each of the functionalities we have seen for course and activity level reporting.



Internal Video: [How To Find Course Level Reporting Tools \[10:34\]](#)

Home Dashboard Events My Courses This course All Courses

Showing graded and ungraded attempts for each user. The one attempt for each user that is graded is highlighted. The grading method for this quiz is **Highest grade**.
 Download table data as Comma separated values (.csv) Download

	First name / Surname	Email address	Status	Started on	Completed	Time taken	Grade/20.00	Q. 1 /1.00	Q. 2 /6.00	Q. 3 /5.00	Q. 4 /2.00	Q. 5 /6.00
<input type="checkbox"/>	Anna Meadows Review attempt	dk2@renovation.ie	Finished	8 January 2018 4:43 PM	8 January 2018 4:44 PM	1 min 6 secs	15.00	✓ 1.00	✓ 4.00	✓ 2.00	✓ 2.00	✓ 6.00
<input type="checkbox"/>	Anna Meadows Review attempt		Finished	8 January 2018 4:46 PM	8 January 2018 4:47 PM	1 min 22 secs	19.00	✓ 1.00	✓ 6.00	✓ 4.00	✓ 2.00	✓ 6.00
<input type="checkbox"/>	Colton Kidd Review attempt	colton.kidd@example.com	Finished	22 February 2019 12:12 PM	22 February 2019 12:13 PM	48 secs	18.00	✗ 0.00	✓ 6.00	✓ 4.00	✓ 2.00	✓ 6.00
<input type="checkbox"/>	Nigel Russell Review attempt	nigel.russell@example.com	Finished	22 February 2019 12:31 PM	22 February 2019 12:32 PM	1 min 3 secs	19.00	✓ 1.00	✓ 6.00	✓ 4.00	✓ 2.00	✓ 6.00
	Overall average						17.75 (4)	0.75 (4)	5.50 (4)	3.50 (4)	2.00 (4)	6.00 (4)

Select all / Deselect all Regrade selected attempts Delete selected attempts

OPTIONAL ACTIVITIES - lithium ion batteries boeing...

PRE-LESSON KNOWLEDGE QUIZ

LESSON PASS

LESSON FAIL

REVIEW

Expert:

Learner Dashboard

Administration

Quiz administration

- Edit settings
- Group overrides
- User overrides

Edit quiz

Preview

Results

- Grades
- Responses
- Statistics
- Manual grading

Internal Video: How To Find Activity Level Reporting Tools [12:17]

[END OF PAGE]

(Learning Object #5.2.6 activity)
Course Level Reporting Post-topic Poll

Please rate your current level of knowledge with respect to the following Moodle course level features:

Course completion report*

Poor Fair Good Very good Excellent

Logs and Live logs reports*

Poor Fair Good Very good Excellent

Activity report*

Poor Fair Good Very good Excellent

Course participation report*

Poor Fair Good Very good Excellent

Activity completion report*

Poor Fair Good Very good Excellent

Statistics report*

Poor Fair Good Very good Excellent

Event monitoring*

Poor Fair Good Very good Excellent

Assignment reporting*

Poor Fair Good Very good Excellent

Lesson reporting*

Poor Fair Good Very good Excellent

Quiz reporting*

Poor Fair Good Very good Excellent

SCORM reporting*

Poor Fair Good Very good Excellent

There are required fields in this form marked *.

[END OF PAGE]

5.3 TOPIC 3 : USER LEVEL REPORTING

[\(Learning Object #5.3.0 html page\)](#)
[User Level Reporting Introduction](#)

In this topic, we will present a number of different reporting tools that can be utilized to extract and display the Moodle data for an individual Moodle User. We will demonstrate how this information can be very useful for Moodle Site administrators, course eTutors and student Mentors.

[END OF PAGE]

(Learning Object #5.3.1 activity)
User level Reporting Pre-topic Poll

Please rate your current level of knowledge with respect to the following Moodle user level features:

User Logs report*

Poor Fair Good Very good Excellent

User Complete Report*

Poor Fair Good Very good Excellent

User Statistics report*

Poor Fair Good Very good Excellent

User Grades Overview & Grade reports*

Poor Fair Good Very good Excellent

My Team report*

Poor Fair Good Very good Excellent

There are required fields in this form marked *.

[END OF PAGE]

(#5.3.2 sub-topic)

5.3.2 User Level Analytics

(Learning Object #5.3.2.1 html page)

Introduction

Introduction

Data specific to an individual Moodle user can be easily collected via the built-in User Reporting tools. Through these tools, information such as grades, forum visits and posts, certificates received and much more can be used to gauge a learner's progress and engagement with their courses.

Moodle provides the following User reports

- Log Reports
- Complete Report
- Statistics Report
- Grades Overview & Grades Reports

All these reports can be accessed from the *Reports* section of a user's *Profile page*. The site administrator will always have access to these reports, and role permissions can be configured to give access to other users (such as Manager, Teacher, Non-Editing Teacher etc.) as is deemed appropriate.

Tip: Using a mentee block (the My Team block in our example seen in the How To video at the end of this topic) mentors see a list of their mentees and can be given quick access to view the Grades Overview and Grade reports for the learners they manage.

User details

[Edit profile](#)

Email address

nigel.russell@example.com

managersemail

roselyn.giles@example.com

manager

☐

All

All

Team Leader

No

Which topic would you like to learn about?

Lesson

Course details

Course profiles

Mountain Climbing

Fire Safety

Analytics Tools

Innovations

Adaptive Learning

Miscellaneous

[View all blog entries](#)

[Notes](#)

[My certificates](#)

[Forum posts](#)

[Forum discussions](#)

[Learning plans](#)

Reports

[Today's logs](#)

[All logs](#)

[Outline report](#)

[Complete report](#)

[Statistics](#)

[Grades overview](#)

[Grade](#)

Administration

[Preferences](#)

[Log in as](#)

Login activity

First access to site

Tuesday, 2 August 2016, 12:35 PM (2 years 273 days)

Last access to site

Tuesday, 23 April 2019, 11:21 PM (9 days 11 hours)

Last IP address

109.77.69.194

Badges

Badges from Learn 2 Analyze:



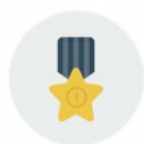
Starter level badge



Expert level badge



Advanced level badge





Intermediate level badge

Privacy and policies

[Data retention summary](#)

[Policies and agreements](#)

Team Leader, or mentor, view of the reports available to them in the user profile of one of their team members, or mentees.

Team Leader No Which topic would you like to learn about? Lesson	Miscellaneous View all blog entries My certificates Forum posts Forum discussions
Badges Badges from Learn 2 Analyze:  Starter level badge  Expert level badge	Reports Grades overview Grade Administration

[END OF PAGE]

(Learning Object #5.3.2.2 html page)
Log reports

Log reports

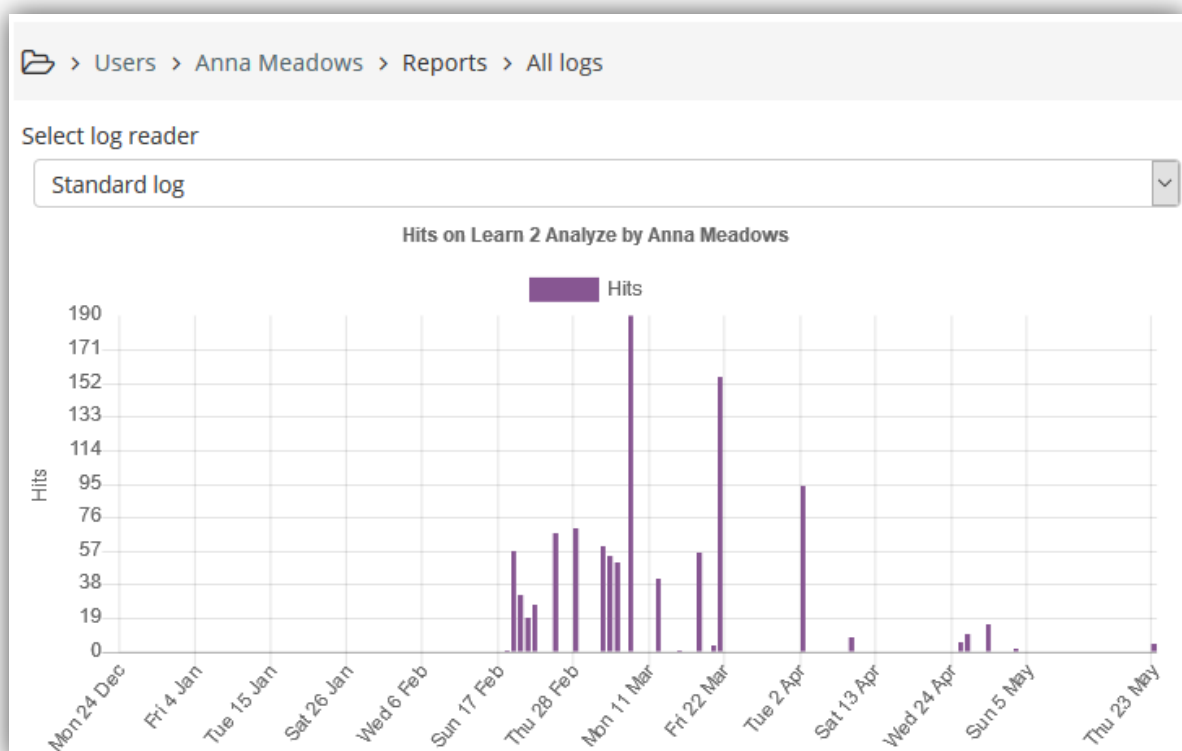
There are two User log reports available in Moodle; Today's Logs and All Logs. Both reports show similar information, with Today's Logs only reporting on the learner's Moodle actions since midnight on the current day. The data for both reports is presented both in a graphical and in a tabular format.

All Logs Report

A bar chart displays a count of the number of 'hits' by this user for each day and this is followed by a table which contains the details of all log records for the user.

If the report is accessed at a site level then the information here will be the complete logs for the learner.

If the report is accessed from within a course, then only those logs relating to the selected course will be displayed.



Today's logs Report

This is presented in a similar format to the All Logs report as described above.

A bar chart displays a count of the number of 'hits' by this user for each hour of the current day and this is followed by a table which contains the details of all log records for the user for the current day only.

If the report is accessed at a site level then the information here will be the complete logs for the learner for the current day.

If the report is accessed from within a course, then only those logs for the current day relating to the selected course will be displayed.

16 March 2019, 4:07 PM	Dave Danvers	-	Course: Fire Safety	System	Course viewed	The user with id '20' viewed the course with id '6'.
16 March 2019, 4:07 PM	Dave Danvers	-	Course: Innovations	System	Course viewed	The user with id '20' viewed the course with id '4'.
16 March 2019, 4:06 PM	Dave Danvers	Dave Danvers	Course: Innovations	System	Badge awarded	The user with id '20' has been awarded the badge with id '4'.
16 March 2019, 4:06 PM	Dave Danvers	Dave Danvers	Book: TOUCHSCREENS REVIEW	System	Course activity completion updated	The user with id '20' updated the completion state for the course module with id '56' for the user with id '20'.
16 March 2019, 4:06 PM	Dave Danvers	Dave Danvers	Book: TOUCHSCREENS REVIEW	System	Course activity completion updated	The user with id '20' updated the completion state for the course module with id '56' for the user with id '20'.
16 March 2019, 4:06 PM	Dave Danvers	-	Book: TOUCHSCREENS REVIEW	Book	Chapter viewed	The user with id '20' viewed the chapter with id '15' for the book with course module id '56'.


[END OF PAGE]

(Learning Object #5.3.2.3 html page)
Complete report

Complete Report

This is a course specific report and displays a very detailed view of the progress of an individual learner through the selected course. It displays a list of the course activities and resources and how often and when the user has accessed them. It may also include details of forum posts, quiz attempts, assignments submitted with grades received etc. all grouped in a clear and easy to read layout.

Using this report, a Teacher or Mentor can obtain very precise information on a learner's progress through and engagement with their course.



Anna Meadows

MessageAdd to contacts

Required activities

- Label: Fire Safety
Never seen
- Forum: General Forum
No posts

1st Certificate

- Custom certificate: 1st Certificate - Fire Safety
Awarded on: Wednesday, 23 January 2019, 12:04 PM

2nd Certificate

- Custom certificate: 2nd Certificate - Fire Safety
Awarded on: Monday, 28 January 2019, 11:43 AM

3rd Certificate

Quiz: PRE-LESSON KNOWLEDGE QUIZ

Grade: 20.00 / 20.00

Attempt 1: 15.00/20.00 - Monday, 8 January 2018, 4:44 PM

Attempt 2: 19.00/20.00 - Monday, 8 January 2018, 4:47 PM

Attempt 3: 20.00/20.00 - Tuesday, 23 October 2018, 11:13 AM

Lesson: LESSON PASS

Lesson has been started, but not yet completed

Attempt	Number of pages viewed	Number of questions answered	Number of correct answers	Time
1	11	6	2	Wednesday, 24 October 2018, 10:22 AM

Lesson: HISTORY OF ENGINEERING

Grade: 100.00 / 100.00

Attempt	Number of pages viewed	Number of questions answered	Number of correct answers	Time
1	7	2	2	Thursday, 21 February 2019, 1:21 PM

Quiz: AUDIO QUIZ

Grade: 10.00 / 10.00

Attempt 1: 2.00/2.00 - Thursday, 21 February 2019, 1:21 PM

Lesson: TOUCHSCREENS

Grade: 100.00 / 100.00

Attempt	Number of pages viewed	Number of questions answered	Number of correct answers	Time
1	10	4	4	Saturday, 16 March 2019, 4:06 PM

Book: TOUCHSCREENS REVIEW

4 views - most recently Saturday, 16 March 2019, 4:06 PM

[END OF PAGE]

(Learning Object #5.3.2.4 html page)
Statistics

Statistics

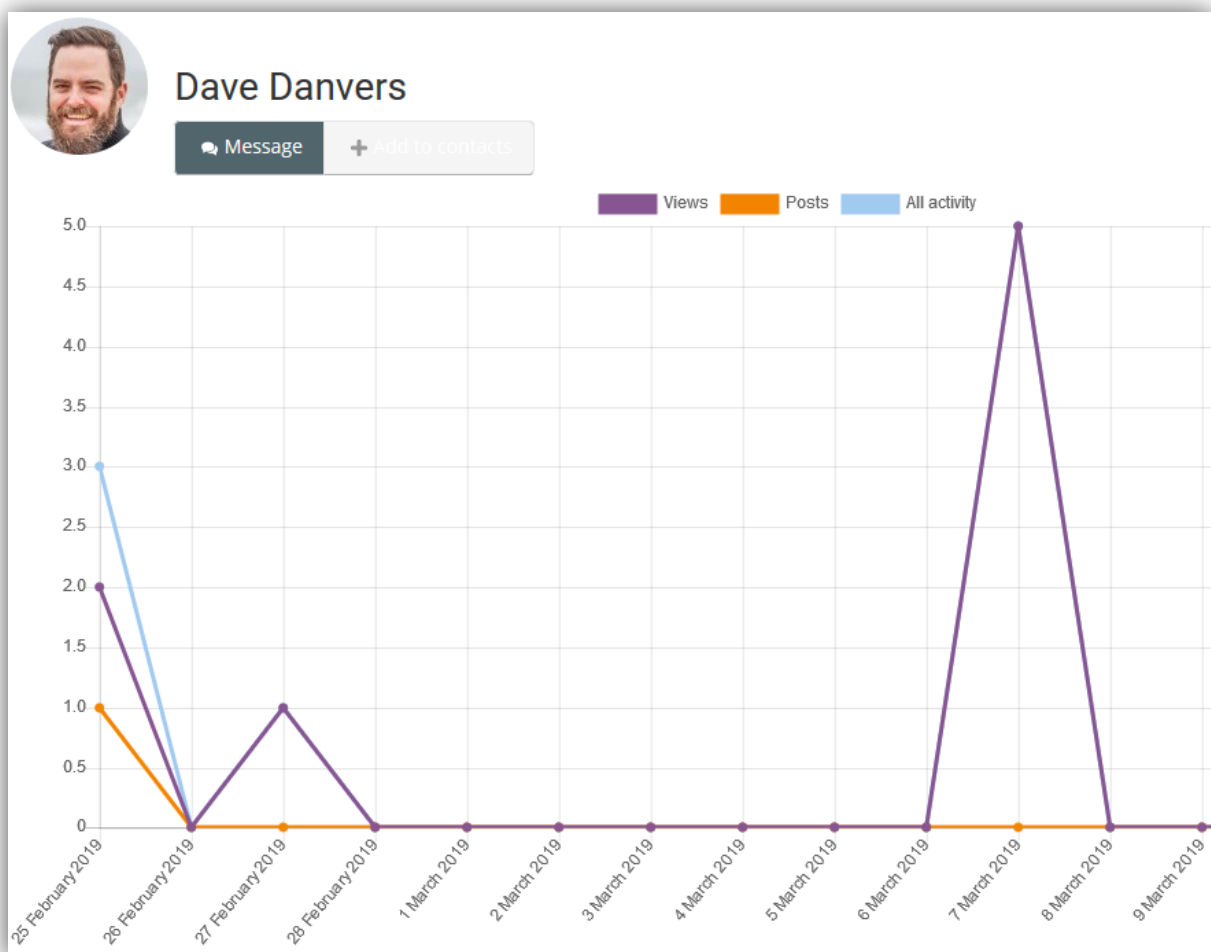
The Statistics Report gives a very general overview of the level of a learner's Moodle activity

A graph displays a count of the number of user views, posts, and both, for each day. This is followed by a table summarising the same information.

Note: Views are passive actions (e.g. looking at a page or scrolling through a forum), whereas posts are more active interactions (e.g. submitting an assignment, completing a quiz or posting to a forum).

If the report is accessed at a site level then the full learner information will be included.

If the report is accessed from within a course, then only views and posts for that specific course will be included.



Period ending (day)	Views	Posts	All activity
7 March 2019	5	0	5
27 February 2019	1	0	1
25 February 2019	2	1	3

[END OF PAGE]

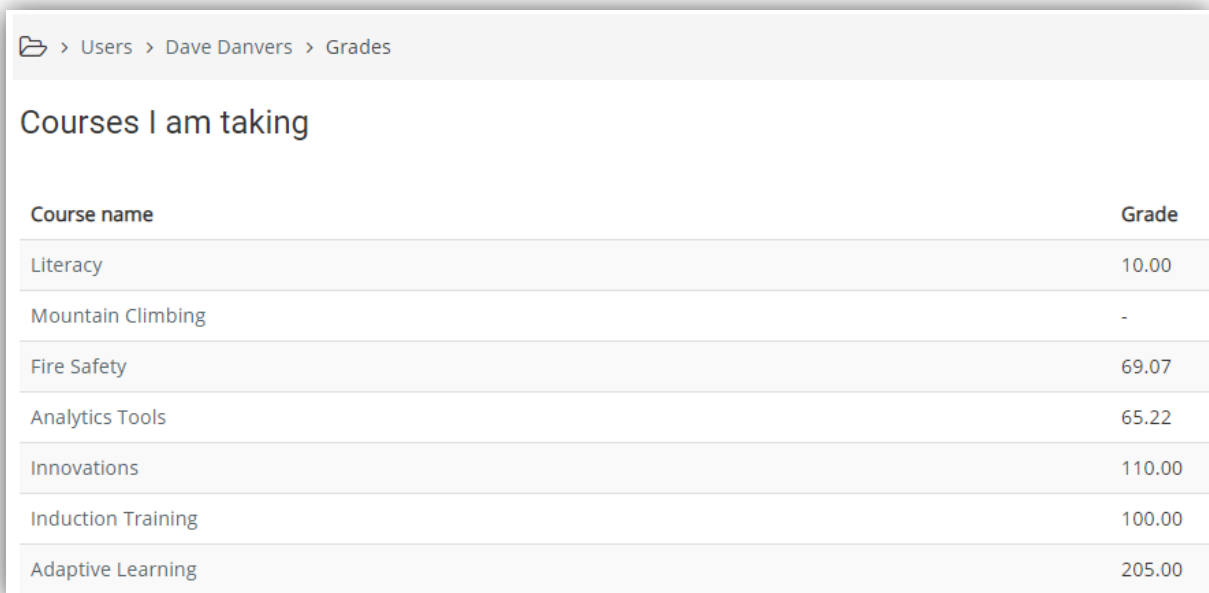
Grades Overview & Grade Reports

The grade report gives full details of all grades within a specific course.

Grades Overview Report

The grades overview report is a Site Level report. It displays a list of the overall grade obtained by the learner for every course they are currently taking or have taken in the past.

This report could be a very useful summary for progress meetings with a mentor, for example.



Courses I am taking	
Course name	Grade
Literacy	10.00
Mountain Climbing	-
Fire Safety	69.07
Analytics Tools	65.22
Innovations	110.00
Induction Training	100.00
Adaptive Learning	205.00

Clicking on a course name from this list will display the Grades report for this course.

Grades Report

The Grades Report is a Course Level report which displays the grades received by the user for all the graded activities for a selected course. It shows the calculated weight and contribution to course total percentages for each activity as well as the actual score obtained by the user.

📁 > Courses > Adaptive Learning > Participants > Dave Danvers > Report > Grades

Grade item	Calculated weight	Grade	Range	Percentage	Feedback	Contribution to course total
📁 Adaptive Learning						
🟢 LESSON PASS	43.48 %	100.00	0-100	100.00 %		43.48 %
🟢 LESSON FAIL	0.00 % (Empty)	-	0-100	-		0.00 %
🔴 PRE-LESSON KNOWLEDGE QUIZ	8.70 %	20.00	0-20	100.00 %		8.70 %
🟢 TOUCHSCREENS	43.48 %	75.00	0-100	75.00 %		32.61 %
🔴 Random quiz	4.35 %	10.00	0-10	100.00 %		4.35 %
🔵 Part 1	0.00 % (Empty)	-	0-100	-		0.00 %
🔵 Part 2	0.00 % (Empty)	-	0-100	-		0.00 %
🔵 Part 3	0.00 % (Empty)	-	0-100	-		0.00 %
📊 Course total	-	205.00	0-230	89.13 %		-

[END OF PAGE]

Conclusion

Moodle Administrators, eTutors and Mentors have access to several built-in User level reports that can be used to assess an individual learner's performance in their Moodle courses. Accessed from the Reports section on the User's Profile page, they provide quick access to information on a user's courses, grades and level of participation.

As with all analytical tools, the user level reports are best used in combination to get a fully rounded impression of a learner's progress. Armed with these tools, the eTutor or Mentor can be confident that they have all the required information in order to guide and advise a learner in the most appropriate manner.

[END OF PAGE]

(Learning Object #5.3.3 activity)
User Level Reporting Quiz

Correct answer

1. How much detail does the Complete Report at a course level in a user profile show for a Moodle quiz?

Grade and attempt number

Grade and completion date

Grade, attempt number, completion date and time

2. Which user report gives a breakdown of each grade in a course and its contribution to the overall total grade of a course?

Grades overview

Grade

Complete Report

3. What can be seen in the 'My Team' list of the Mentee block?

The list of students in a class.

Members of all mentee teams on the site.

Team members, or mentees, of the specific team leader, or mentor, currently logged in.

4. In the user statistics report what would be considered a 'view'?

scrolling through forum posts

submitting a quiz attempt

sending a forum post

5. What can be seen in the Grades Overview report?

A list of the overall grades of a user for each of their courses.

A list of the grades for each activity the user has completed.

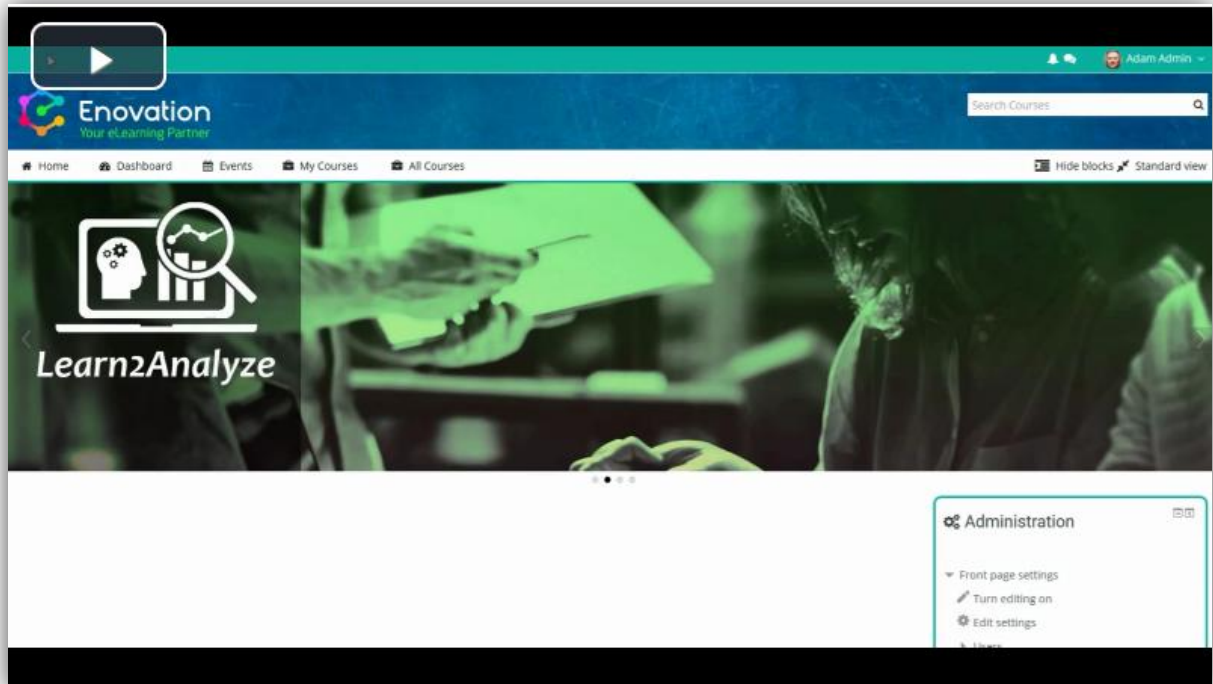
A list of the maximum grades possible in each course a user is taking.

[END OF PAGE]

(Learning Object #5.3.4 html page with video)
How To - User Level Reporting

How To - User Level Reporting

Below you'll find a video that gives a walk-through of where each of the functionalities we have seen for user level reporting can be found.



Internal video: [How To Find User Level Reporting Tools \[10:03\]](#)

[END OF PAGE]

(Learning Object #5.3.5 activity)
User Level Reporting Post-topic Poll

Please rate your current level of knowledge with respect to the following Moodle user level features:

User Logs report*

Poor Fair Good Very good Excellent

User Complete Report*

Poor Fair Good Very good Excellent

User Statistics report*

Poor Fair Good Very good Excellent

User Grades Overview & Grade reports*

Poor Fair Good Very good Excellent

My Team report*

Poor Fair Good Very good Excellent

There are required fields in this form marked *.

[END OF PAGE]

5.4 TOPIC 4 : 3RD PARTY TOOLS REPORTING

([Learning Object #5.4.0 html page](#))

3rd Party Reporting Tools in Moodle Introduction

In addition to the built-in reporting tools that we have covered in depth in the previous topics, there is also a wealth of other reporting tools, developed by 3rd parties, that can be integrated very easily into the Moodle Learning Management System. Some are available free of charge; others may incur a licensing fee. Adding these additional 'plugins' can provide a richer reporting and analytical experience to Moodle.

We have selected the following reporting tools as good exemplars of the range of 3rd party plugins available for the Moodle LMS:

IntelliBoard : IntelliBoard is a reporting & analytics tool that can be purchased and integrated into Moodle to provide expanded reporting and analytics capabilities. Data is extracted from Moodle and presented to the user through the IntelliBoard Intelligent dashboard in the form of printable charts, graphs and analytics.

Configurable reports : The configurable reports plugin allows for the creation of custom reports based on SQL queries but without the need for SQL knowledge. Users can create their own reports or download reports freely available from a number of repositories. Reports can be configured so that they can only be viewed by certain users or classes of user.

Other 3rd party plugins : There are many other 3rd party plugins that are very interesting to review in relation to data reporting and analysis. We will take a quick look at a few popular tools including Engagement Dashboard, Re-engagement and Checklist.

[END OF PAGE]

(Learning Object #5.4.1 activity)
3rd Party Reporting Tools in Moodle Pre-topic Poll

Please rate your current level of knowledge with respect to the following Moodle 3rd party tools:

IntelliBoard*

Poor Fair Good Very good Excellent

Configurable reports*

Poor Fair Good Very good Excellent

Engagement dashboard*

Poor Fair Good Very good Excellent

Re-engagement*

Poor Fair Good Very good Excellent

Checklist*

Poor Fair Good Very good Excellent

There are required fields in this form marked *.

[END OF PAGE]

(#5.4.2 sub-topic)

5.4.2 IntelliBoard

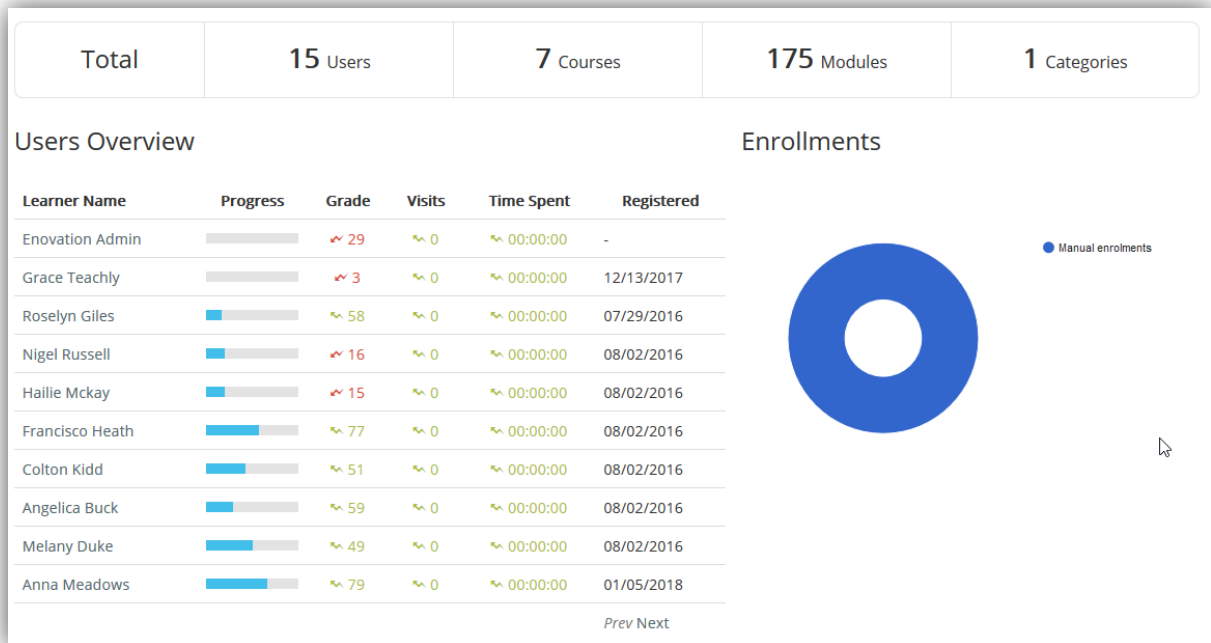
(Learning Object #5.4.2.1 html page with video)
Introduction

Introduction

IntelliBoard brings you more advanced learning analytics and reporting functionalities. It is built to work with any LMS designed in Moodle with the goal of helping the user to extract the statistical data gathered and deliver data analytics to a single intelligent dashboard instantly in the form of printable charts, graphs, and multiple formatted reports. IntelliBoard is widely used by companies and educational institutions worldwide to inform their educational business decisions.

The IntelliBoard dashboard can be used to:

- Track and improve learner engagement by providing multiple reports, analytics and notifications that keep learners focused, and provide data that can impact your learning methodologies.
- Identify At-Risk Learners. Learner retention is a key focus for many organisations. IntelliBoard provides data from several points of focus to provide a clear picture of learners in jeopardy.
- Empower learners. Learners can have their own personal dashboard of their grades and activity directly within the LMS to enable Learner Self-Management.



Please watch the following video for a brief overview of the Intelliboard platform.



External video: Introducing IntelliBoard <https://youtu.be/LimkbhWFMS4> [1:34]

[END OF PAGE]

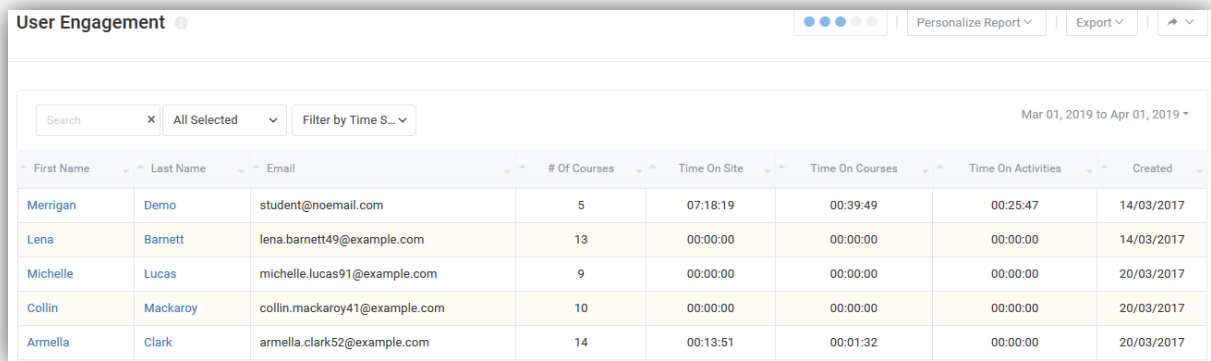
(Learning Object #5.4.2.2 html page)
Most active users

Most active users

All Users Reports display a variety of users' information about their course activity, grades, enrolment methods, time spent, number of visits, etc. Reports can be filtered by different indicators, i.e., filtering by course, enrolment date, roles or cohorts.

The following sample of All User Reports give information on the most active users at a site level and at a course level.

The **User Engagement** report can be used to evaluate learner engagement through time spent in the site, courses, and activities (weighted against the total number of courses).



First Name	Last Name	Email	# Of Courses	Time On Site	Time On Courses	Time On Activities	Created
Merrigan	Demo	student@noemail.com	5	07:18:19	00:39:49	00:25:47	14/03/2017
Lena	Barnett	lena.barnett49@example.com	13	00:00:00	00:00:00	00:00:00	14/03/2017
Michelle	Lucas	michelle.lucas91@example.com	9	00:00:00	00:00:00	00:00:00	20/03/2017
Collin	Mackaroy	collin.mackaroy41@example.com	10	00:00:00	00:00:00	00:00:00	20/03/2017
Armella	Clark	armella.clark52@example.com	14	00:13:51	00:01:32	00:00:00	20/03/2017

The **Time Tracking Table** report displays the total length of time a user has spent on the Moodle Site or on a specific course, the number of discrete visits to the site or course, and details on the first and last dates they accessed Moodle.

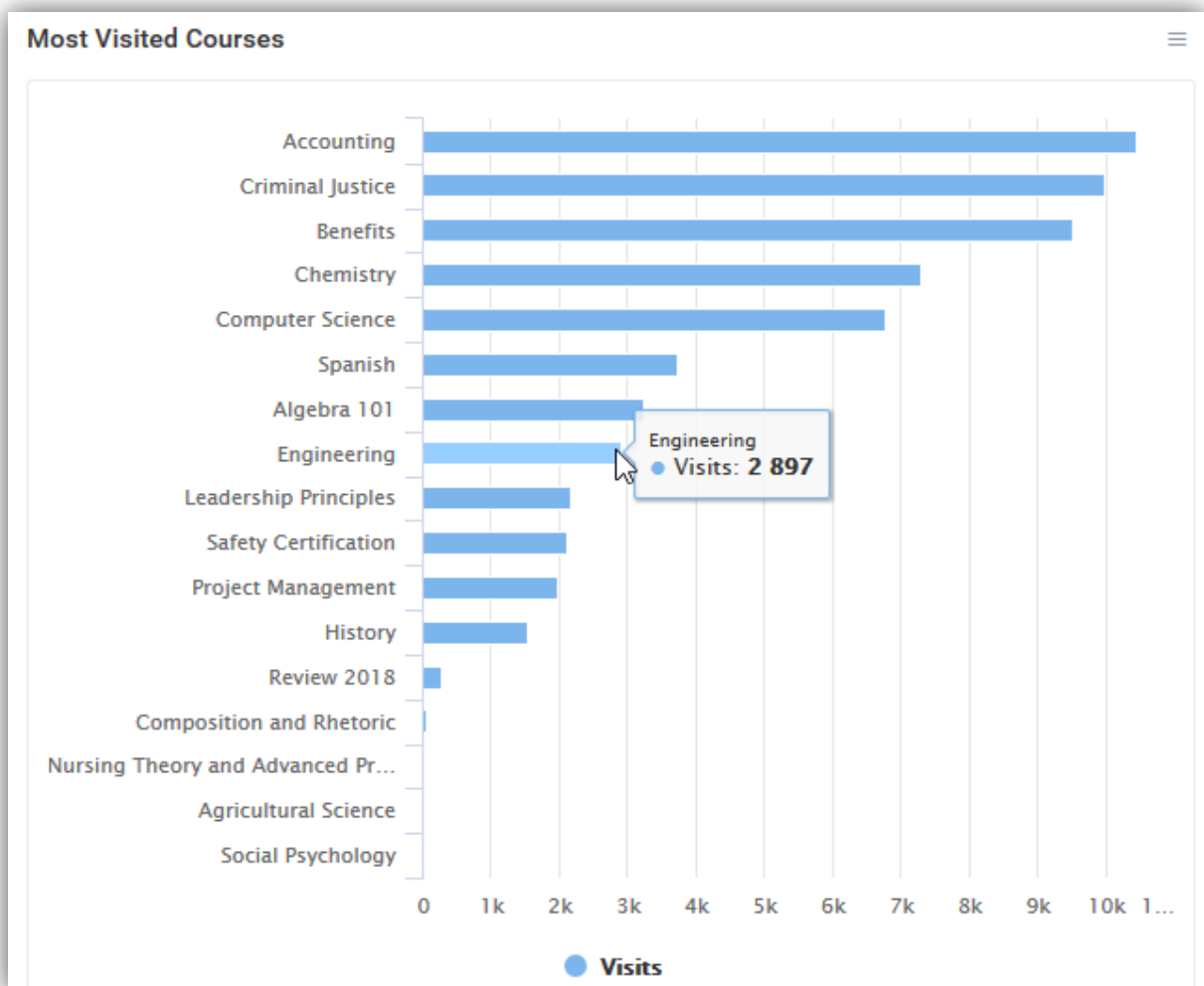
First Name	Last Name	Email	Page	Parameter	Course Name	Visits	Time Spent	First Access	Last Access	User Browser	User Operating System	User Language
Manager	Demo	manager@noemail.com	Site	0		40526	383:04:11	14/03/2017	18/04/2019	Firefox	Windows 10	en
Merrigan	Demo	student@noemail.com	Course	21	Nursing Theory and Advanced Practice	2	00:00:18	14/03/2017	15/11/2018	Chrome	Windows 7	en
Merrigan	Demo	student@noemail.com	Site	0		6512	87:06:23	14/03/2017	18/04/2019	Chrome	Windows 10	en
Teacher	Demo	teacher@noemail.com	Site	0		14879	176:17:46	14/03/2017	17/04/2019	Chrome	Windows 10	es
Merrigan	Demo	student@noemail.com	Course	2	Accounting	383	02:54:34	14/03/2017	15/04/2019	Safari	Mac OS X 10	en
Merrigan	Demo	student@noemail.com	Module	4	Accounting	34	00:12:30	14/03/2017	30/08/2018	Chrome	Windows 10	en

[END OF PAGE]

(Learning Object #5.4.2.3 html page)
Most visited courses

Most visited courses

The **Most Visited Courses** report displays the total number of user visits per course in the form of a bar chart. Moving the cursor to hover over a bar will cause the exact number of visits to be shown.



[END OF PAGE]

(Learning Object #5.4.2.4 html page)
Time spent on site / courses / activities

Time spent on site / courses / activities

IntelliBoard provides numerous Course Reports & Monitors, some of which can be used to obtain details of the time learners spend on courses or activities, or to highlight which are the busiest times of the day for the site. A number of examples are shown below.

The **Course Information** monitor displays aggregate course information

Visits			Time Spent		
196.550	85.680	61.048	1544 h	278:10:19	158:22:49
Total	On Courses	On Modules	On Site	On Courses	On Activities

59	17	788
Users	Courses	Modules

Total Courses			Course Activity		
17	6	788	59	3	85
Visible	Hidden	Modules	Learners	Instructors	Completed Learners

The **Access Stats By Course** report displays the most active times of the day as well as the amount of access time per weekday organised by course.

Access Stats by Course														
<div> <div>Search</div> <div>x</div> <div>Corporate cate...</div> </div>														
Course	Course Category	Most Active Day	Time Of Day	Sunday (Hours)	Sunday (% Of Total)	Monday (Hours)	Monday (% Of Total)	Tuesday (Hours)	Tuesday (% Of Total)	Wednesday (Hours)	Wednesday (% Of Total)	Thursday (Hours)	Thursday (% Of Total)	Friday (Hours)
Accounting	Corporate	Monday	Late Night (12am - 6am)	00:00:00	0.00%	13.20 Minutes	12.16%	26.25 Minutes	24.08%	43.1 Minutes	39.22%	13.5 Minutes	11.93%	2.42 Minutes
Accounting	Corporate	Monday	Early Morning (6am-9am)	1.30 Minute	0.96%	12.41 Minutes	8.09%	23.41 Minutes	15.12%	23.31 Minutes	15.01%	17.14 Minutes	11.00%	1.13 hour
Accounting	Corporate	Monday	Morning (9am-12pm)	42 Seconds	0.09%	4.19 hours	32.46%	3.23 hours	25.44%	1.32 hour	11.54%	1.52 hour	14.03%	2.4 hours
Accounting	Corporate	Monday	Midday (12pm-3pm)	29.30 Minutes	4.19%	2.33 hours	21.85%	2.47 hours	23.78%	1.27 hour	12.45%	2.15 hours	19.22%	1.47 hour
Accounting	Corporate	Monday	Afternoon (3pm-6pm)	27.23 Minutes	5.29%	2.16 hours	26.28%	1.6 hour	12.83%	1.54 hour	22.11%	1.33 hour	18.11%	1.7 hour
Accounting	Corporate	Monday	Evening (6pm-9pm)	10.50 Minutes	9.60%	27.41 Minutes	24.54%	23.54 Minutes	21.18%	19.34 Minutes	17.34%	16.45 Minutes	14.85%	7.37 Minutes

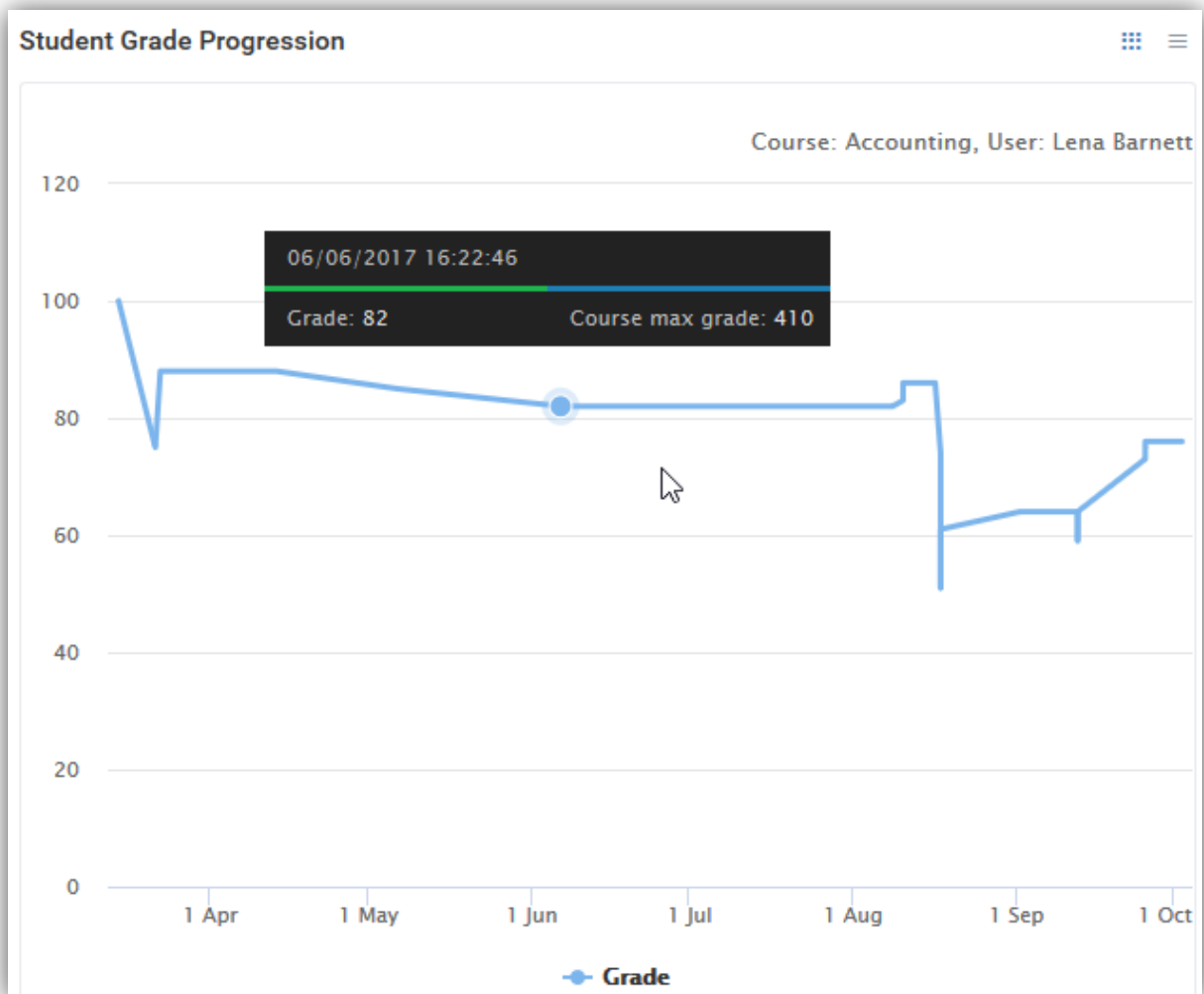
[END OF PAGE]

([Learning Object #5.4.2.5 html page](#))
Learning progress

Learning progress

Student Grade Progression monitor is a line chart that displays learner's progress in obtaining grades. If you hover over the line, additional information about the date and time, student's grade, and course max grade will be shown.

To get the monitor data click dots square in the top right corner of the monitor and select the Course and User in this course.



Student Grade Progression



Course: Accounting, User: Michelle Lucas



[END OF PAGE]

(Learning Object #5.4.2.6 html page)
Overdue users

Overdue users

The Overdue Users report displays overdue learners by course, completion date and completion status. The report also allows a user to enter a completion date not captured intrinsically within the LMS itself.

Overdue Users									
Search		All Cohorts	[Corporate cate...	All roles	Course Due Date				
First Name	Last Name	Course Name	Email	Enrolled On	Completed On	Score	Status	Cohort Name	Academic Program
Tomas	Letsgo	Accounting	taras.leshko@gmail.com	08/12/2018		13	Not Complete		
Merrigan	Demo	Accounting	student@noemail.com	27/08/2018	05/11/2018	100	Complete		
Manager	Demo	Accounting	manager@noemail.com	10/05/2017		0	Not Complete		N/A
Lena	Barnett	Accounting	lena.barnett49@example.com	13/03/2019		0	Not Complete		Criminal Justice
Michelle	Lucas	Accounting	michelle.lucas91@example.com	21/03/2017	05/11/2018	79	Complete		Art
Collin	Mackaroy	Accounting	collin.mackaroy41@example.com	21/03/2017	05/11/2018	70	Complete		Biology
Roan	Thompson	Accounting	roan.thompson92@example.com	21/03/2017	05/11/2018	78	Complete		Accounting

[END OF PAGE]

(Learning Object #5.4.2.7 html page with video)
Conclusion

Conclusion

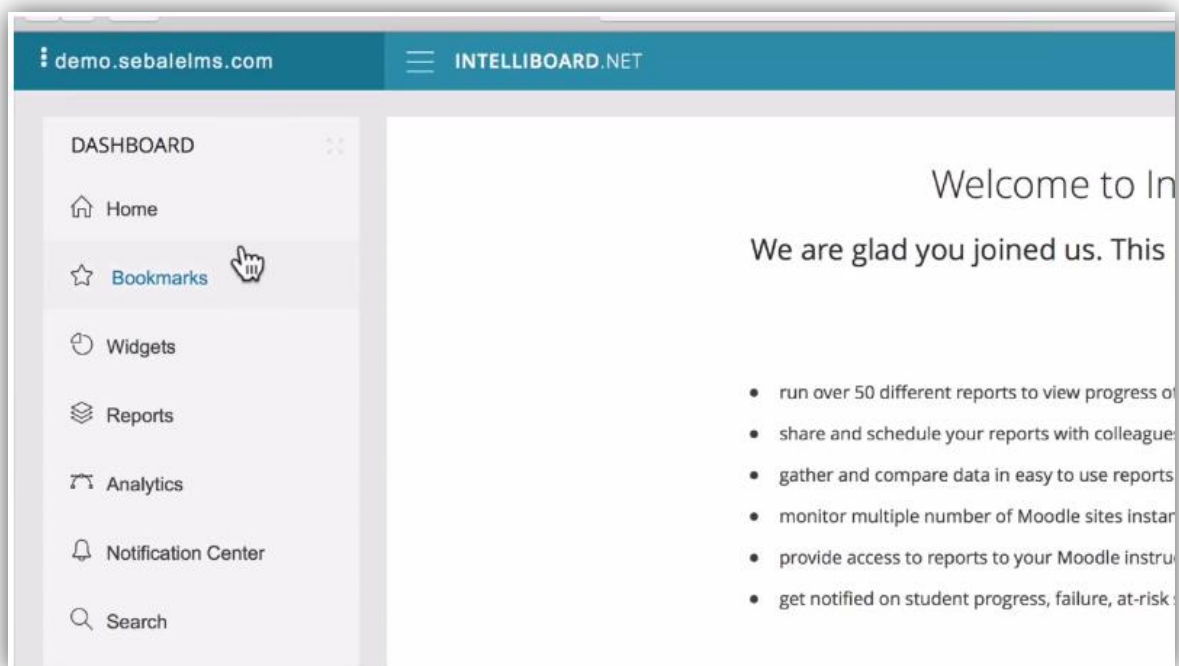
IntelliBoard is the most comprehensive reporting and analytics platform of any LMS on the market today empowering their clients to deliver better, more effective, more engaging learning informed by what their data is telling them.

To find out more about IntelliBoard click on the links below :

[IntelliBoard Demo Site](#)

[IntelliBoard Features](#)

Here's a quick refresh video of Intelliboard's main features.



External video: Enovation are IntelliBoard certified partners
<https://youtu.be/gJyRR4Jj3Xo> [1:57]

"Reporting is critical for MixTelematics."

"We currently have almost 10,000"

IntelliBoard articulates MixTel's data in visually appealing charts and graphs, making it EASY for Compliance Managers to extract their results quickly. We need to know which courses drive the greatest value, and which courses are well-designed (and which not)."

James Hamilton, MixTelematics

Volunteers and staff members in 64 countries around the world, and e-learning is quickly becoming our main method of disseminating training. IntelliBoard.net plugin is the best and most cost-effective method that I have found for interpreting data from Moodle. In just a minute or two I can give any teacher access to their student/course data via well-formed charts and graphs that are easily understandable."

**Christopher Dundy, LMS Administrator,
Peace Corps**

[END OF PAGE]

(#5.4.3 sub-topic)

5.4.3 Configurable Reports

([Learning Object #5.4.3.1 html page](#))

Introduction

Introduction

The Configurable Reports plugin allows Moodle users to create their own customised reports, based on the data in their Moodle LMS.

The main advantage of this reporting tool is that it allows Moodle users to build complex reports without the need for advanced SQL knowledge. 4 built-in report structures are provided (Courses report, Categories report, Users reports, Timeline reports) and, depending on the type selected, the user is prompted to select different information from the Moodle database for inclusion in the report. There is also an SQL option which allows more expert users to extract the report data directly using SQL.

Using the Configurable Reports tool, even a novice user can be guided and prompted to:

- specify the conditions under which data is selected
- add a filter to allow the end user to filter report results based
- specify how the report data should be sorted
- arrange how the report is laid out including headers and footers
- include summary calculations for data elements such as average, min, max, and sum
- add a graph to the report
- choose which users or classes of users are permitted to view the report

Report Repository

The Configurable Reports tool has links to a number of repositories which contain a library of pre-defined Moodle reports. These have been created by other Moodle users and uploaded to the repository for sharing across the Moodle community. Rather than create every new report from scratch, a user can search through the Report Repository to see if the required report has already been created by somebody else. Even if the exact report cannot be found in the repository, it is very likely that a similar report can be imported, used as a starting point, and modified to the exact format required.

View report
Columns
Conditions
Ordering
Filters
Template
Permissions
Calculations
Plot - Graphs
Report
Manage reports

This report shows the course dedication time of all the users in the course

▼ Filter

managersemail
dc4@enovation.ie

Apply
Cancel

Show
10
entries
Search:

Lastname	Firstname	Dedication time
Buck	Angelica	1 hour 59 mins
Danvers	Dave	1 hour 47 mins
Dwyer	Daisy	14 mins 37 secs
Heath	Francisco	1 hour 55 mins
Kidd	Colton	30 mins 21 secs
Meadows	Anna	8 hours 25 mins
Minor	Denis	30 mins 34 secs

Showing 1 to 7 of 7 entries
Total record count = 7
First
Previous
1
Next
Last

Execution time = 0 (Sec)

Download report: ODS XLS

[END OF PAGE]

Creating and assigning reports

Creating a report

To create a report, the user must first add the Configurable Reports block to the site or course page, select the “Manage Reports” option and click on “Add Report”.

The user then enters a name and description for the report and chooses one of the built in report types - Courses, Categories, Users, Timeline, or SQL report.

The tabs shown on the next screen will vary, depending on the report type selection. (The tabs described below are for the Courses and Users report types).

- **Columns:** choose the different columns for your report, the selection will vary depending on the report type selected previously (Course Name, User firstname et.)
- **Conditions:** specify the conditions for data to be included in the report (e.g. only courses from this category, only users from Spain)
- **Ordering:** specify which columns should be used to sort the report output.
- **Filters:** adding a filter will allow the end user to filter report results based on a value in a column
- **Template:** this tab allows the user to arrange the report layout, including headers and footers
- **Permissions:** select here which users or classes of users are permitted to view the report – see further details in the “Assigning a report” section below.
- **Calculations:** include summary calculations for data elements such as average, min, max, and sum
- **Plot:** add a graph to the report based on selected report rows and columns
- **View Report:** Display the completed report

Site level time dedication:

Manage reports > Users course time dedication

View report Columns Conditions Ordering Filters Template Permissions Calculations Plot - Graphs Report Manage reports

This report shows the course dedication time of all the users in the course

Show 10 entries Search:

Lastname	Firstname	Dedication time	Views	Posts	Course completion status
Buck	Angelica	1 hour 59 mins	221	110	Not yet started
Danvers	Dave	1 hour 47 mins	249	132	Not yet started
Duke	Melany	1 hour 40 mins	184	126	Not yet started
Dwyer	Daisy	14 mins 37 secs	15	9	Not yet started
Heath	Francisco	1 hour 57 mins	373	229	Not yet started
Kidd	Colton	34 mins	202	160	Not yet started
Mckay	Hailie	1 hour 27 mins	50	24	Not yet started
Meadows	Anna	9 hours 11 mins	467	93	Not yet started
Minor	Denis	40 mins 27 secs	0	0	Not yet started
Russell	Nigel	1 hour 59 mins	157	75	Not yet started

Showing 1 to 10 of 10 entries Total record count = 10 First Previous 1 Next Last

Reports can be created by importing sample SQL reports from a public shared repository. Custom SQL Reports with custom SQL queries can also be created. These require some SQL knowledge.

This link provides a comprehensive list of ad-hoc contributed reports :

https://docs.moodle.org/36/en/ad-hoc_contributed_reports

The following report has been created by importing a sample SQL report and editing the Custom SQL to include the users first and last names as extra columns.

Manage reports > User course completion

View report Custom SQL Filters Template Permissions Calculations Plot - Graphs Report Manage reports

SQL Query *

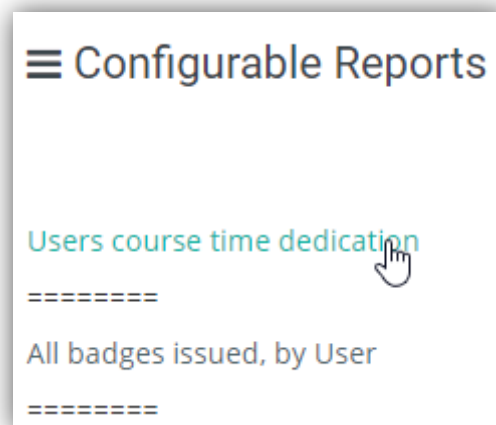
```
1 SELECT u.username, u.firstname, u.lastname, c.shortname,
2 DATE_FORMAT(FROM_UNIXTIME(p.timecompleted
3 ), '%Y-%m-%d')
4 AS completed
5 FROM prefix_course_completions AS p
6 JOIN prefix_course AS c ON p.course = c.id
7 JOIN prefix_user AS u ON p.userid = u.id
8 WHERE c.enablecompletion = 1
9 ORDER BY u.username
```

Assigning a report

Reports can be assigned to appropriate users via the Permissions tab. In this case we have allowed users with the role of Team Leader to view the report.

The screenshot shows the 'Permissions' tab for the report 'Users course time dedication'. The breadcrumb path is 'Manage reports > Users course time dedication'. The tabs include 'View report', 'Columns', 'Conditions', 'Ordering', 'Filters', 'Template', 'Permissions' (active), 'Calculations', 'Plot - Graphs', 'Report', and 'Manage reports'. Below the tabs is a table with columns: 'ID number', 'Name', 'Summary', and 'Edit'. The table contains one row with ID 'c1', Name 'User field value', and Summary 'Team Leader = Yes'. Below the table, there is an 'Add:' dropdown menu with a hand cursor pointing to it. The dropdown is open, showing options: 'Choose', 'Any user in the current report course', 'Anyone', 'Report Capabilities', and 'User with the selected role/s in the current report course'. To the left of the dropdown is a 'Condition' label with a help icon and a text input field with the placeholder 'Enter a valid condition'. At the bottom are 'Update' and 'Cancel' buttons.

Users with viewing permissions can see the particular report via the Configurable Reports block which can be added where required.



[END OF PAGE]

(Learning Object #5.4.3.3 html page)
Global reports

Global reports

Use the same report in different courses

If the “Global report” option has been selected during report creation, then the report can be made available across many different courses. By default, a Global report will appear in every Configurable Reports block across the site. But, if there are particular courses where this is not appropriate, then it is possible to edit the settings for individual Configurable Report block instances to exclude global reports completely.

Notice that these types of reports inherit the context of the course where they are displayed, so any condition related to course inside the report is calculated using the course where the report is being viewed.

We saw the report below previously, showing site level results. Here, we can see the same report run from the Configurable Reports block in the Innovations course. The results displayed are specific to that course.

This report shows the course dedication time of all the users in the course

Show entries Search:

Lastname	Firstname	Dedication time	Views	Posts	Course completion status
Buck	Angelica	1 min 53 secs	28	23	In progress
Danvers	Dave	4 mins 55 secs	60	28	In progress
Duke	Melany	2 mins 24 secs	58	23	In progress
Dwyer	Daisy	0	0	0	Not yet started
Heath	Francisco	2 mins 13 secs	46	18	In progress
Kidd	Colton	7 mins 51 secs	90	41	In progress
Mckay	Hailie	0	0	0	Not yet started
Meadows	Anna	25 mins 54 secs	11	0	In progress
Minor	Denis	0	0	0	Not yet started
Russell	Nigel	20 mins 24 secs	80	45	Complete

Showing 1 to 10 of 10 entries Total record count = 10

First Previous 1 Next Last

[END OF PAGE]

(Learning Object #5.4.3.4 html page)
Site reports

Site reports

Site level reports can provide administrators with an overview of the general performance and completion rates for all of the courses and users on the site.

The following report shows all course completions and can be organised by user, by course or by completion date as required.

By user:

This report shows user course completion of all the users in all courses

Show entries

Search:

username	firstname	lastname	shortname	completed
dc02	Anna	Meadows	Innovations	
dc02	Anna	Meadows	Mountain Climbing	
dc02	Anna	Meadows	Induction Training	2018-11-12
dc03	Dave	Danvers	Fire Safety	2019-02-06
dc03	Dave	Danvers	Innovations	
dc03	Dave	Danvers	Mountain Climbing	2019-02-21
dc03	Dave	Danvers	Literacy	
dc03	Dave	Danvers	Induction Training	2018-07-20
dc03	Dave	Danvers	Analytics Tools	2019-02-27
dc03	Dave	Danvers	Adaptive Learning	

Showing 11 to 20 of 88 entries (filtered from 157 total entries)

Total record count = 157

First Previous 1 2 3 4 5 Next Last

By course:

username	firstname	lastname	shortname	completed
dc02	Anna	Meadows	Induction Training	2018-11-12
dc03	Dave	Danvers	Induction Training	2018-07-20
dc04	Leo	Stein	Induction Training	
dc05	Daisy	Dwyer	Induction Training	
dc06	Angelica	Buck	Induction Training	
dc07	Melany	Duke	Induction Training	2019-02-27
dc08	Colton	Kidd	Induction Training	2019-02-27
dc09	Francisco	Heath	Induction Training	2019-02-22
dc10	Hallie	Mckay	Induction Training	
dc11	Nigel	Russell	Induction Training	

Showing 41 to 50 of 88 entries (filtered from 157 total entries)

Total record count = 157

First Previous 3 4 5 6 7 Next Last

By date:

username	firstname	lastname	shortname	completed
dc07	Melany	Duke	Induction Training	2019-02-27
dc08	Colton	Kidd	Induction Training	2019-02-27
dc07	Melany	Duke	Fire Safety	2019-02-22
dc08	Colton	Kidd	Fire Safety	2019-02-22
dc09	Francisco	Heath	Fire Safety	2019-02-22
dc09	Francisco	Heath	Induction Training	2019-02-22
dc09	Francisco	Heath	Mountain Climbing	2019-02-22
dc12	Roselyn	Giles	Mountain Climbing	2019-02-22
dc04	Leo	Stein	Analytics Tools	2019-02-21
dc03	Dave	Danvers	Mountain Climbing	2019-02-21

Showing 11 to 20 of 88 entries (filtered from 157 total entries) Total record count = 157

First Previous 1 2 3 4 5 Next Last

Aside from course completion, user progress and interactivity can be monitored through the use of badges awarded at different stages of a course. This report also provides a link to view each badge that has been awarded along with completion criteria required to receive it.

Show

10

▼

entries

Search:

username ▲	badgename ▼	context ▼	criteriatype ▼	dateissued ▼	details ▼
dc02	Starter level badge	Innovations	Activity Completion (Any)	2019-02-20	link
dc02	Starter	Adaptive Learning	Activity Completion (All)	2019-02-20	link
dc03	Starter level badge	Innovations	Activity Completion (Any)	2019-03-16	link
dc03	Starter	Adaptive Learning	Activity Completion (All)	2019-02-21	link
dc03	Intermediate	Adaptive Learning	Activity Completion (Any)	2019-02-21	link
dc03	Advanced	Adaptive Learning	Activity Completion (Any)	2019-02-21	link
dc06	Intermediate level badge	Innovations	Activity Completion (Any)	2019-02-22	link
dc08	Starter level badge	Innovations	Activity Completion (Any)	2019-02-22	link
dc08	Intermediate level badge	Innovations	Activity Completion (Any)	2019-02-22	link
dc09	Starter	Adaptive Learning	Activity Completion (All)	2019-02-28	link

Showing 1 to 10 of 14 entries

Total record count = 14

First

Previous

1

2

Next

Last

Execution time = 0.001 (Sec)

Download report:

ODS

XLS

Print report

[END OF PAGE]

(Learning Object #5.4.3.5 html page with video)
Conclusion

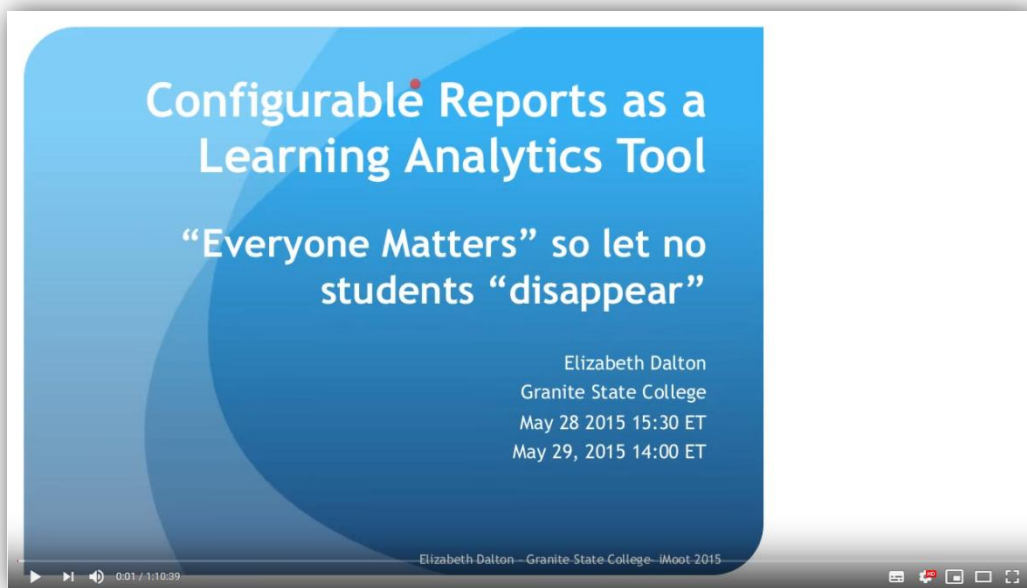
Conclusion

Configurable Reports is a very popular plugin for Moodle that allows administrators to create custom reports and make them available to their users.

The creation of reports has three tiers of difficulty level adapting to the capacities of the user.

1. Categories, report types, filters, conditions, permissions etc can be selected from dropdown menus.
2. Pre-made SQL reports can be imported from repositories and then customised if necessary.
3. Fully customised SQL reports can be created from scratch.

The following video is an iMoot talk by Elizabeth Dalton on using Configurable Reports as a Learning Analytics Tool.



External Video: Extract from - Elizabeth Dalton - Configurable Reports as a Learning Analytics Tool - iMoot 2015 [9:06]

If you would like to view the full video it is available here:
<https://youtu.be/IF6CuY2Qiwo> [1:10:39]

[END OF PAGE]

(#5.4.4 sub-topic)

5.4.4 Other 3rd Party Tools

(Learning Object #5.4.4.1 html page)
Introduction

Introduction

Aside from IntelliBoard and Configurable Reports, there are many 3rd party tools that can be integrated into Moodle for a richer reporting and analytical experience. We will take a look at a sample of some of the more interesting tools.

The tools we will take a look at are :

- Engagement Dashboard : Students can compare themselves against the course average.
- Re-engagement : Encourage students to continue progressing through the course.
- Checklist : Check off course activities to monitor progress.
- Course Check Block : Check your course is well developed.
- Learning Analytics Enriched Rubric : Interaction and behaviour criteria-based advanced grading method.
- Level up! : Engagement and participation gamification to motivate users.
- Analytics and Recommendations : Colour-coded graphics showing participation and grade improvement recommendations.
- Adaptive Quiz : Question difficulty level adjusts to the users ability level for accurate grading.
- Events Graphic : Pie, bar and line charts to visually display user activity in courses.

[END OF PAGE]

Engagement Dashboard

Over the years, Enovation has developed many plugins for their clients to augment existing functionality or to meet specific requirements. The Dashboard is one such plugin developed for the Royal College of Surgeons in Ireland. This powerful tool lets students compare their activity against the course average and for tutors to see the same information for all users in a course.

The Engagement dashboard is a plugin designed as an aid in the analysis of engagement by tutors and students in a course. It can be accessed through the engagement dashboard block which can be enabled on courses.

Course Dashboard

- The course dashboard lists all of the monitored courses and displays an overall status of the course (red, amber or green).
- Clicking on a specific course will link to the Manager dashboard and display details for that course.

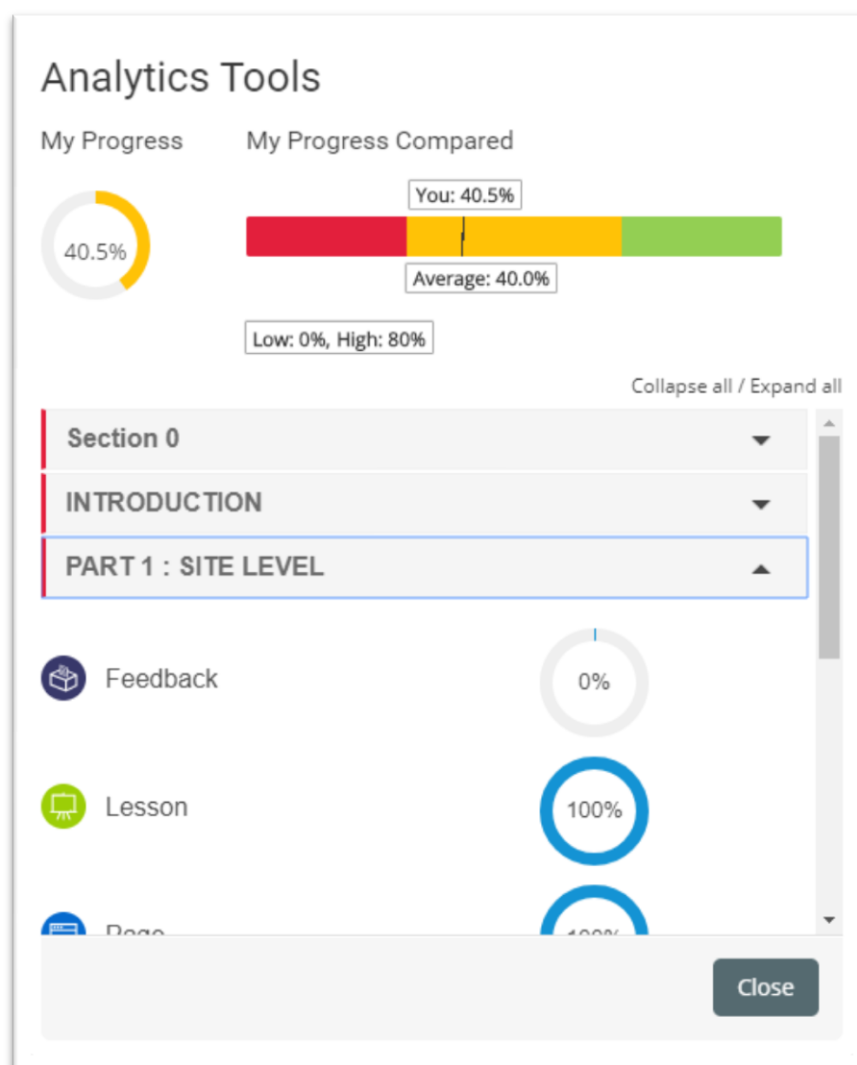
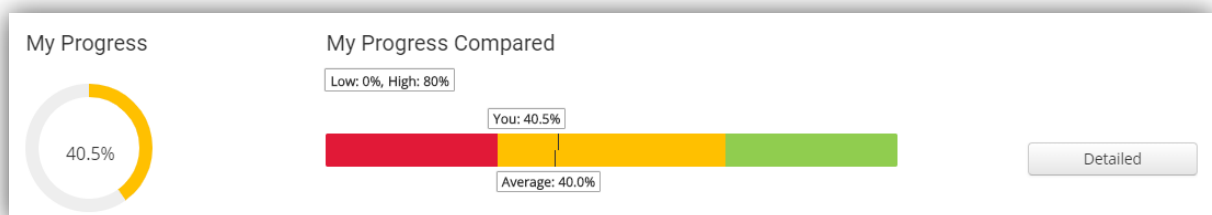
Manager Dashboard

- Administrators (Managers) can access this dashboard and can click into individual tutors to access a tutors details page.
- This page shows a list of all tutors found in monitored courses.
- Tutors can be filtered based on:
 - Course
 - Surname
 - First name
- For each tutor the following information is displayed:
 - Tutor Name
 - Course name
 - Number of Non-activated students check with red, amber and green breakdown.
 - Number of Activated students.
 - Number of assignments to be graded which have a red status.
 - Engagement check
 - Active engagement check

Tutor Dashboard

- Tutors/Administrators can access this dashboard and can click into individual students to access a student's details page.
- This page shows a list of all students found in monitored courses for that tutor.
- Students can be filtered based on:
 - Courses

- Activated (If a student is activated or not).
 - Surname
 - First name
- For each student the following information is displayed:
 - Student name
 - Course name
 - Start Date
 - Progress check
 - Engagement check
 - Active check
 - Number of flags



[END OF PAGE]

(Learning Object #5.4.4.3 html page with video)
Re-engagement

Re-engagement

The re-engagement plugin provides a way for you to remind students to return to the course and complete activities via email notifications.

The email is sent a specified period of time after a starting event, which may be enrolment in the course, or completing an earlier activity.

If the user has already completed the target activity, no email is sent.

You can also use this plugin to selectively release timed content in a course.

Access Restrictions

The Email delay can be based on the user enrolment date or a previous activity completion. If you want to use the enrolment date then don't set up any access restrictions on this Re-engagement; each user's timer will start after they enrol in the course. If you want the delay to be based on a previous activity completion you should set that activity as an access restriction to this Re-engagement activity; each user's timer will start after they complete the dependencies.

Email User setting

Set "Notify User" to "After Delay" and set the "Notification delay" period. The notification delay determines when the e-mail reminder will be sent based on the previous event (enrolment or activity completion)

Target Activity

Set "Target Activity" - this is the activity that you want to remind the user they must complete - if this activity is flagged as complete within the course then no e-mail reminder will be sent.

Timed release

If you want to release a quiz within your course to individual users after a set period (e.g. 1 week after assignment completion) you use the "Activity completion" settings within the course :

1. set the re-engagement duration to the time period you want e.g. 1 week
2. set access restrictions to the re-engagement to allow access after the assignment is complete (or no access restrictions means start timer after enrolment)
3. set access restrictions to the quiz so that it is available only after the re-engagement is complete.

Updating: Reengagement

[Expand all](#)

▼ General

Reengagement Name*

▼ Reengagement details

Email User ?

Email Delay ?

Reminder count ?

Email Subject (User) ?

Email Content (User) ?

Hi %userfirstname%.

Great work on completing activity 1, it's now time for you to complete your next activity.

Suppress email if target activity complete ☒



External video: Re-Engagement plugin <https://youtu.be/j45TOiollMU> [2:22]

END OF PAGE]

(Learning Object #5.4.4.4 html page with video) Checklist

Checklist

This is a Moodle activity module that allows a teacher to create a checklist / todo list / task list for their students to work through. The teacher can monitor all the students' progress, as they tick off each of the items in the list. Items can be indented and marked as optional. Students are presented with a simple bar showing how far they have progressed through the required/optional items and can add their own, private, items to the list.

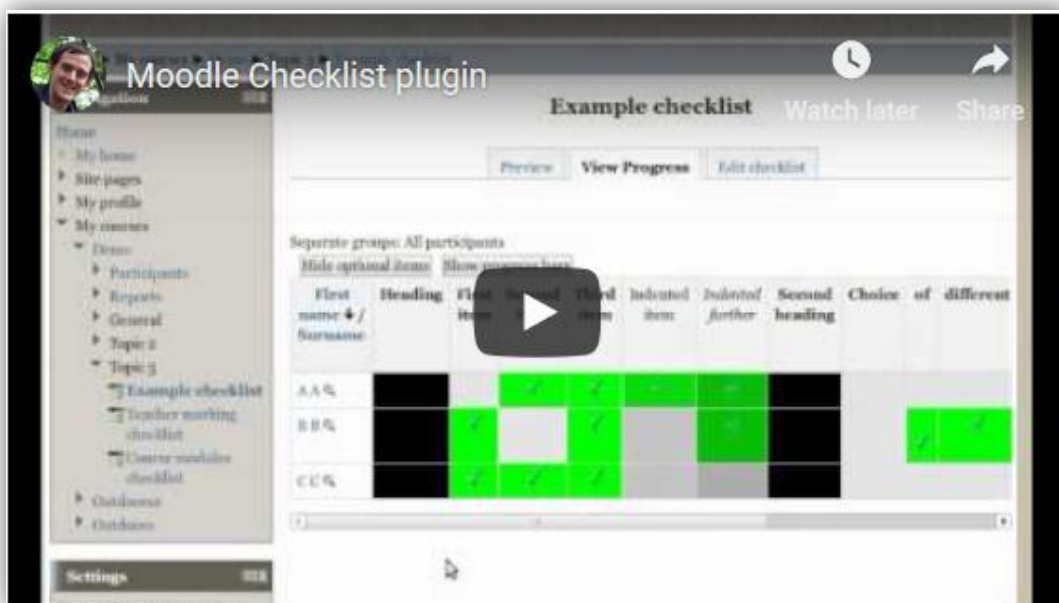
Features include:

- Choose whether students or teachers can check-off items
- Students can add their own notes to their checklist
- Dates can be added to items (and exported to the calendar)
- Teachers can comment on an individual student's items
- Progress is exported to the gradebook
- Choice of colours for each checklist item
- Heading items (without checkboxes)
- (Optional) Import list of current course activities and automatically check-off as activities completed

There are two other plugins that further enhance this activity:

- [Checklist block](#)
- [Checklist grade export](#)

Video overview of this plugin:



External video: Moodle Checklist plugin https://youtu.be/wlpGuW_-sVg [3:45]

[END OF PAGE]

([Learning Object #5.4.4.5 html page](#))
Course Check Block

Course Check Block

This block carries out a number of automated checks on a course, that are all user configurable. The checks were designed to encourage a minimum standard of course quality and highlight possible opportunities for improvement.

The block also has the option to allow users to "clear down" a course, simply removing any sections that don't have content. It won't delete any sections that have content and/or a summary.

Course Checks

Clean Course

This course is hidden.

Essentials

Set course summary?

Set a course image?

Is guest access disabled?

Section checks

Renamed

Summary

Content

Visible

1				
2				
3				

Assignments

Assignment 1

Tuesday, 4 February 2014, 12:00 AM

Assignment 2

Tuesday, 4 February 2014, 12:00 AM

Course Checks

Clean Course

Your course has been cleaned up,
1 sections have been removed.

Essentials

Section checks

Assignments

Configuring a Course Checks block

Check that course summary isn't empty?

☒

Check that course image is set?

☒

Check if the course is visible to students?

☒

Check that guest access is disabled for the course

☒

Should all sections be renamed?

☒

Should all sections have a summary?

☒

Should all sections have content?

☒

Should all sections be visible?

☒

Check if assignments are due before the course starts?

☒

Where this block appears

Original block location

Course: Moodle Help for Staff

Display on page types

Any type of course main page

Default region

Right

Default weight

2

On this page

Visible

Yes

Region

Right

Weight

2

Save changes

Cancel

[END OF PAGE]

138

(Learning Object #5.4.4.6 html page)
Learning analytics enriched rubric

Learning Analytics Enriched Rubric

The Learning Analytics Enriched Rubric (LA e-Rubric) is an advanced grading method used for criteria-based assessment. As a rubric, it consists of a set of criteria. For each criterion, several descriptive levels are provided. A numerical grade is assigned to each of these levels.














An enriched rubric contains some criteria and related grading levels that are associated with data from the analysis of learners' interaction and learning behaviour in a Moodle course, such as the number of post messages, times of accessing learning material, assignments grades and so on.

Using learning analytics from log data that concern collaborative interactions, past grading performance and inquiries of course resources, the LA e-Rubric can automatically calculate the score of the various levels per criterion. The total rubric score is calculated as a sum of the scores per each criterion.

eTutor view:

Students interacted	Minimal <i>0 points</i>	Enough <i>1 points</i>	More than enough <i>2 points</i>	<i>Nice to communicate with all your classmates.</i>
Check: collaboration Type: people interacted In: General forum To know us better Instant sharing Share phase forum Is: more than (\geq) Related to: student	0 people	3 people	5 people	Enrichement benchmark: 6
Performance on other assignments	Poor <i>0 points</i>	Good <i>1 points</i>	Very good <i>2 points</i>	<i>Well done!</i>
Check: grade In: Pair phase assesment Think phase assesment... Is: more than (\geq) Related to: students	0 percent	25 percent	100 percent	Students average: 33 Student: 50

Learner view:

Number of distinct students that you have interacted with, in the activities below	Minimal 0 points	Enough 1 points	More than enough 2 points	
Check: collaboration Type: people interacted In:  Share phase forum  Pair phase forum  Instant sharing Is: more than (\geq) Related to: student	0 people	2 people	5 people	 → 2 
Your performance on the assignments below, according to class average on the same assignments	Poor 0 points	Good 1 points	Very good 2 points	
Check: grade In:  Pair phase asses...  Think phase asse... Is: more than (\geq) Related to: students	0 percent	50 percent	100 percent	 → 100   → 66  ↓  → 153% 

[END OF PAGE]

Level up! - Gamification

The Level up! plugin is an easy way to add gamification to a Moodle site. It is a customisable block which a teacher can add to a course to give experience points to students as they progress through a course.

The aim of gamifying the learning experience with this plugin is to increase engagement and participation by motivating students to progress towards the next level.

Features





- Automatically attributes points to students for their actions
- Block that displays current level and progress towards the next level
- Report for teachers to get an overview of their students' levels
- Notifications to congratulate students as they level up
- A leaderboard to display the ranking of the students
- Ability to customise the number of levels, the points they require and their appearance
- Total control over the points earned per action
- Unlock content when a certain level is reached
- Experience points earned per course, or for the entire site
- Support for shortcodes to include in content
- GDPR compliant

In order to gather experience points from all the courses a student is participating in, the admin setting *Where are experience points used?* must be set to 'For the whole site'. This setting is located under "Site administration > Plugins > Blocks > Level up! > General settings". Once set, any block newly or previously added will display the total experience points of your students.

Level up! comes with shortcodes to display the learner's level badge, their progress bar, or even the leaderboard anywhere you like. Shortcodes can also be used to conditionally display content according to a learner's current level. For a list of available shortcodes and their documentation, refer to [Level up! documentation](#).



Group ladder

Rank	Group name	Total
1	 Gryffindor	353 ^{XP}
2	 Slytherin	103 ^{XP}
3	 Ravenclaw	83 ^{XP}
4	 Hufflepuff	0 ^{XP}

Your own rules

+ Add a rule

+ 15 experience points are earned when: ✕

ALL of the conditions are true

- + The activity or resource is ✕
- + ANY of the conditions are true ✕
 - + The event is ✕
 - + The event is ✕
 - + Add a condition
- + Add a condition

"My students absolutely love this and it's nurturing engagement levels that I could never have imagined. The students are doing twice as much work, and powering through content."

Jesse H.
Source: Moodle.org

[END OF PAGE]

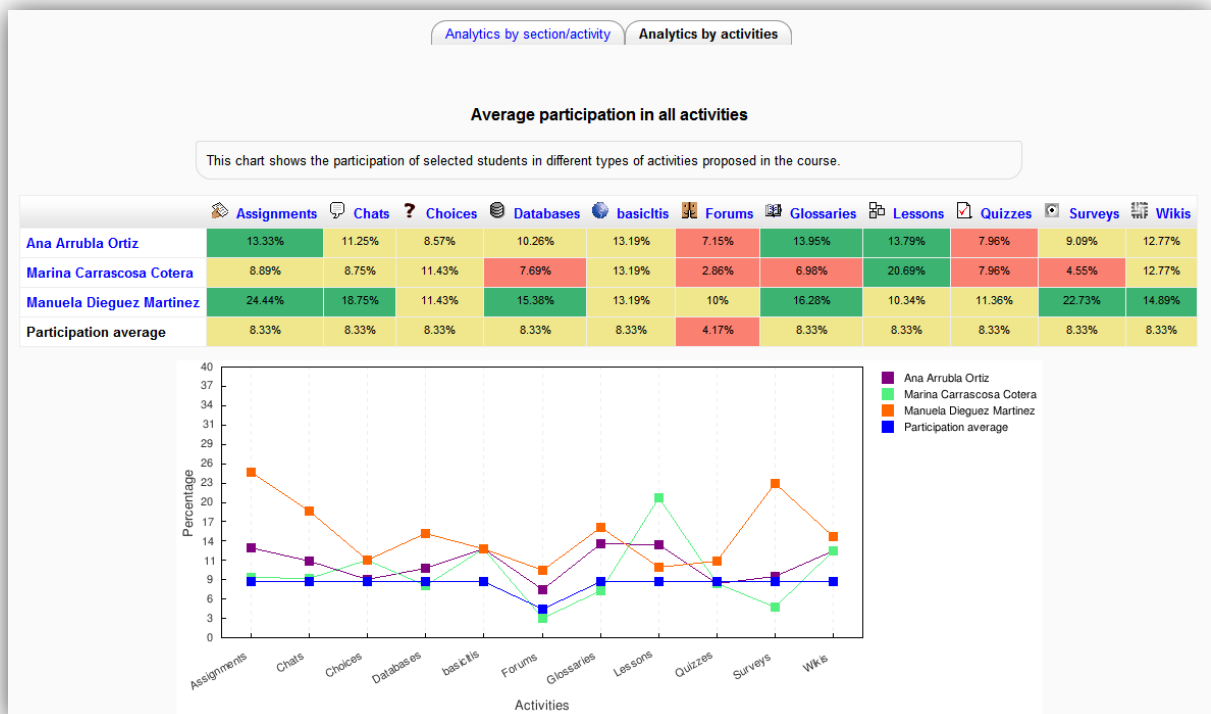
(Learning Object #5.4.4.8 html page)
Analytics and recommendations

Analytics and Recommendations

Analytics and Recommendations block uses charts and tables which are colour coded so students can quickly see their participation.

Students can see single analytics about their participation in the course. Teachers can see single, comparative and global analytics (all students together) too.

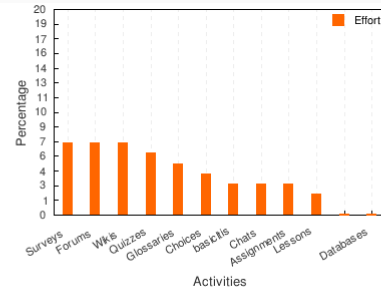
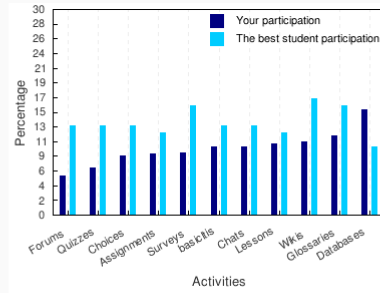
Moreover, the block shows recommendations for students about what activities they should work on to improve their final grade. It also shows an estimated final grade for the reference course.



If you want to get the best grade ...

The left graph shows your participation in each type of activity compared with the necessary participation to get the best grade.
 The right graph shows the estimated effort required in each activity to get the best grade.

	Forums	Quizzes	Choices	Assignments	Surveys	basicitis	Chats	Lessons	Wikis	Glossaries	Databases
Alejandro Desiderio Casado	6%	7%	9%	9%	9%	10%	10%	10%	11%	12%	15%
The best student participation	13%	13%	13%	12%	16%	13%	13%	12%	17%	16%	10%
Effort	7%	6%	4%	3%	7%	3%	3%	2%	7%	5%	0%



Reference course: Aplicaciones ofimáticas (AO)

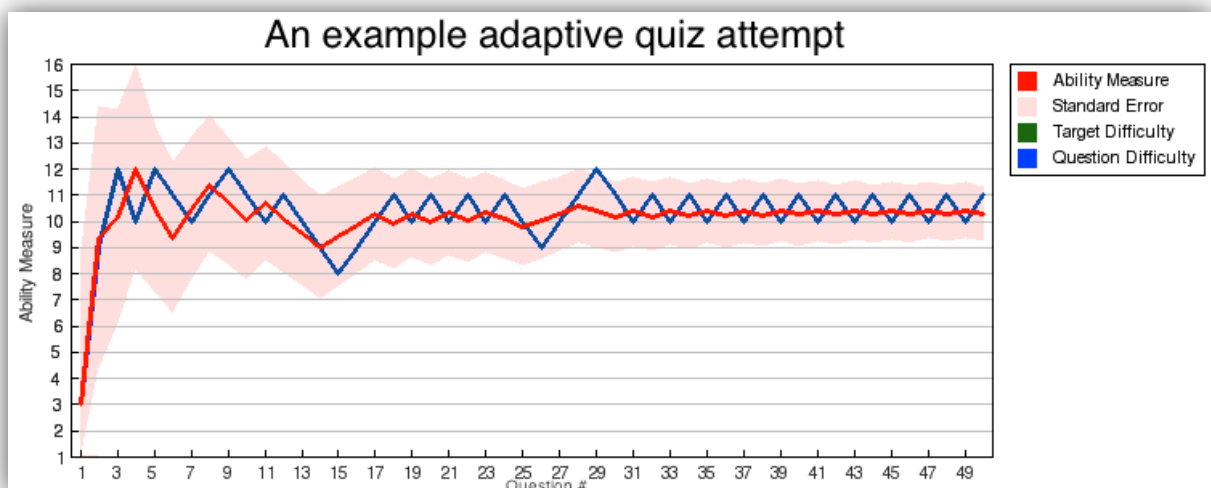
[END OF PAGE]

Adaptive Quiz

The Adaptive Quiz activity enables a teacher to create tests that efficiently measure the takers' abilities.

Adaptive tests are comprised of questions selected from the question bank that are tagged with a score of their difficulty. The questions are chosen to match the estimated ability level of the current test-taker. If the test-taker succeeds on a question, a more challenging question is presented next. If the test-taker answers a question incorrectly, a less-challenging question is presented next.

This technique will develop into a sequence of questions converging on the test-taker's effective ability level. The test stops when the test-taker's ability is determined to the required accuracy.



[END OF PAGE]

Events Graphic

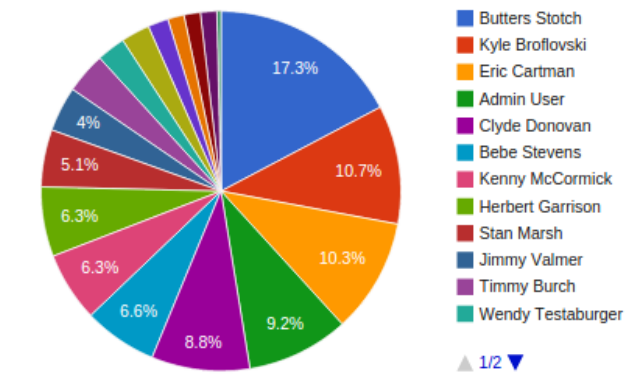
Event graphic plugin provides graphics about what's happening on a Moodle site. Graphics can be browsed by course and information can be seen such as what events are most triggered, user activity, and more.

An easy way to see what's happening on a moodle site, this plugin has been created to provide nice graphic reports using the rich information provided by the event system (See #5.1.2.6 & #5.2.2.8) and logging (See #5.1.2.4 & #5.2.2.3), both seen previously in this module.

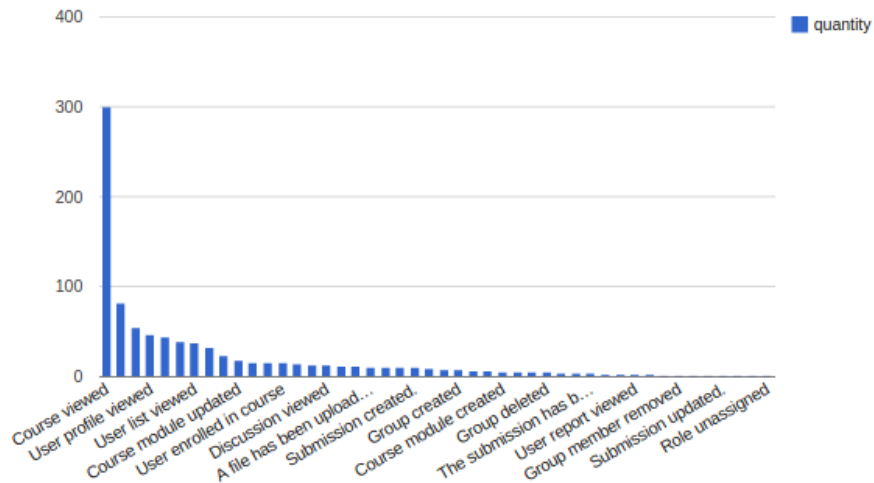
Features

- Course activity - displays a pie chart with the quantity of events grouped by course.
- User activity (Events by user) - displays a pie chart of the percentage and quantity of events triggered events by a user in a given course.
- Most triggered events - displays a bar chart with the quantity of events, grouped by event name.
- Events by month - displays a line chart with the quantity of events that each user triggered monthly in the current year.
- Filter by course – allows selection of a specific course to browse the event graphic reports.

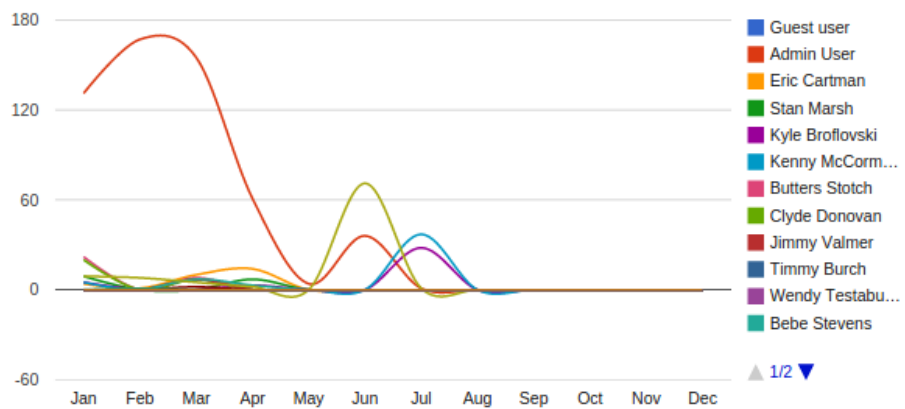
User activity (Events by user)



Most triggered events



Events by month (2015)



[END OF PAGE]

Conclusion

There are many different 3rd party reporting tools available at all levels that can be very useful in very different ways.

The Course Check Block can help eTutors to ensure their courses are well designed and organised. Other tools including Engagement Dashboard, Checklist, Analytics and Recommendations and Events Graphic monitor and display learner progress in different ways and encourage participation and completion of all activities. Re-engagement and Level up! also encourage and motivate learners but in a more interactive way while Learning Analytics Enriched Rubric and Adaptive Quiz both offer more direct interactivity and personalisation for the learners.

[END OF PAGE]

(Learning Object #5.4.5 activity)
3rd Party Reporting Tools in Moodle Quiz

Correct answer

1. What does the Course Check Block 3rd party plugin look at?

Course quality and opportunities for improvement.

Course quality.

Opportunities for improvement.

2. Which tab is used to assign a report to appropriate users in Configurable Reports?

Permissions

Rules

Filters

3. How do you make a site level Configurable Report available to use at a course level?

By setting the Global Report option to Yes.

By setting the Sitewide Report option to Yes.

By setting the Course Report option to Yes.

4. What does the Intellibaord User Engagement report show?

Time spent on site

Time spent on courses

Time spent on site, courses and activities

5. What does the Level up! 3rd party plugin block display?

The learner's current level and progress towards next level.

The learner's current level in a star.

The learner's current number of progress points.

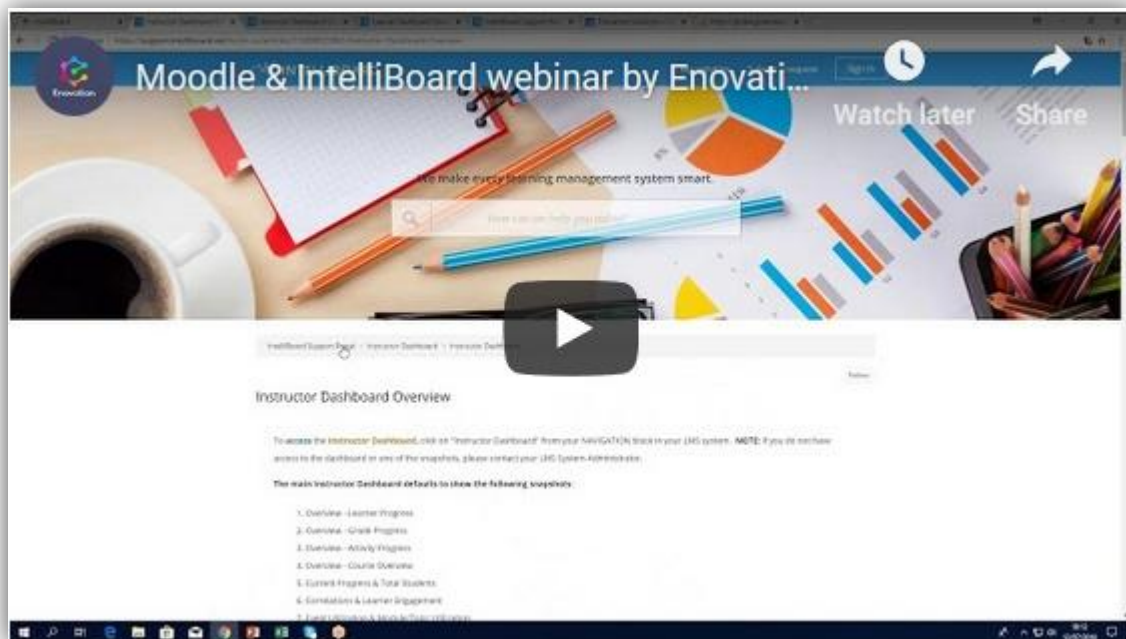
[END OF PAGE]

Webinar: Using IntelliBoard's Analytics within Moodle to Increase Learners' Engagement

IntelliBoard's Learning Analytics plugin for Moodle will help you measure and understand course engagement data in your LMS to help you to make directional changes that align with your goals. With over 120 reports, monitors and analytics, you will be able to analyse your data the way you want to see it.

Find out about the following key features:

- Create role-based dashboards to navigate quickly through course completion, course traffic, retention reports, etc.
- Track and improve learner engagement thanks to powerful reports, monitors and notifications
- Display a summary of total course activities with the course progress report
- Identify at-risk learners and how they compare to the course average
- 'Ask Lisa' questions and get answers instantly
- Manage role-based access to reports
- View your data through IntelliBoard.net or within Moodle



External video: Moodle & IntelliBoard webinar by Enovation
<https://youtu.be/f4VtlZpmWEo> [35:02]

IntelliBoard provides analytic and reporting services to education communities and institutions that use Moodle as their Learning Management System (LMS). To find out more about using IntelliBoard within Moodle, visit https://enovation.ie/IntelliBoard_advanced_analytics/

“Enovation have been our Moodle technical partner since 2010. Since then, their service has been exemplary. We have never had any issues in being able to use the site – it has been available whenever we have needed it and users have been spread globally in that time. Maintenance is appropriately timetabled and whenever we have needed support or a response from them, it has been forthcoming very quickly.”

ROBIN NASH
 Training & Development Manager

[END OF PAGE]

(Learning Object #5.4.7 activity)
3rd Party Reporting Tools in Moodle Post-topic Poll

Please rate your current level of knowledge with respect to the following Moodle 3rd party tools:

IntelliBoard*

Poor Fair Good Very good Excellent

Configurable reports*

Poor Fair Good Very good Excellent

Engagement dashboard*

Poor Fair Good Very good Excellent

Re-engagement*

Poor Fair Good Very good Excellent

Checklist*

Poor Fair Good Very good Excellent

There are required fields in this form marked *.

[END OF PAGE]

5.5 MODULE SUMMARY AND CONCLUSION

([Learning Object #5.5.1 html page with video](#))
[Summary of Topics Learnt](#)

Here is an overview of the topics we have covered in this module. Each of the native Moodle reporting areas plays an important role in analysing and improving the performance of a learning site while the 3rd party tools each build on that in their own way.

TOPIC 1 : SITE LEVEL REPORTING

[Sub-topic 1 : Site Level Analytics](#)

[Sub-topic 2 : Inspire Analytics](#)

[Sub-topic 3 : GDPR Features](#)

TOPIC 2 : COURSE LEVEL REPORTING

[Sub-topic 1 : Course Level Analytics](#)

[Sub-topic 2 : Activity level analytics](#)

TOPIC 3 : USER LEVEL REPORTING

[Sub-topic 1 : User Level Analytics](#)

TOPIC 4 : 3RD PARTY TOOLS REPORTING

[Sub-topic 1 : IntelliBoard](#)

[Sub-topic 2 : Configurable Reports](#)

[Sub-topic 3 : Other 3rd Party Tools](#)

Site level reporting can tell you about site accessibility and general usage. This might guide the administrator towards researching better communication methods with learners such as altering notifications or forum use.

Course level reporting can tell you about participation and completion levels of all learners in each course and for each activity. The results could perhaps guide eTutors to alter activity access and visibility to improve interaction levels or to add self-help forums if we witness large ability difference amongst learners fostering a mentoring atmosphere.

User level reporting gives course by course analysis for individual learners. If we have noticed from the course reports that a particular learner is either consistently performing very well or very badly or performing erratically we can then check their individual user reports so see if all of their courses show the same pattern. There could be many reasons for their unexpected results, which would need to be investigated in order to provide them with the best possible learning experience.

Although Moodle has all the above built-in reporting and analytical tools, there is a large selection of 3rd Party tools available to complement this functionality. **IntelliBoard** in particular provides over 120 easy to read graphical reports & monitors. The **Configurable Reports** plugin provides the ability to generate highly customised reports without needing to be an SQL expert.

The **other 3rd party tools** presented have been carefully selected for their unique offerings. Course Check Block helps eTutors in their initial course design. Engagement Dashboard, Checklist, Analytics and Recommendations and Events Graphic allow learners and eTutors to monitor progress. Re-engagement and Level up! encourage and motivate learners. Learning Analytics Enriched Rubric and Adaptive Quiz can both be added after course quality analysis to improve personalisation and learner interaction.

Moodle is too often used as a repository instead of using the higher level functionality. We can use learning analytics get insights into what we could do better for course design by studying learner behaviour. Most analytics consists of identifying students at risk whereas learning analytics for course design can help prevent students from getting into risk in the first place.

In the following video John Whitmer talks about the relationship between LMS use and course grade for various different course designs.



External video: Moodle Learning Analytics @ Scale for Course Design | John Whitmer at #MootUS17-NewOrleans <https://youtu.be/e8K1US3ojLM> [19:01]

Inspiring better teaching everywhere

For free four-week courses for teachers see [Learn Moodle MOOC](#)

For more information on Moodle here is a link to the [Moodle documentation](#)

[END OF PAGE]

(#5.5.2 sub-topic)

5.5.2 Use case

(Learning Object #5.5.2.1 html page)

Background story – frame of reference

Alice – a school teacher in K12 blended learning courses

Background Story – frame of reference

Alice is an enthusiastic English Language teacher who has just been appointed in an Experimental High School, in Athens, Greece.

She will be responsible for the English Language Course of class1 and class2 of the 9th Grade (14 to 15 years students). Alice is very excited about her new role. Nevertheless, the school's principle, Alex, is concerned about the relatively low performance of last year's 8th graders compared to other experimental schools in the region. Alex encourages Alice to use student data to gain insights and plan her teaching activities accordingly, so as to improve this year's Grade 9 students' academic performance. The principal also informs Alice about the Learning Management System (Moodle) used by the school to facilitate teaching and learning, pointing out that the previous teacher has already created some online activities there.

Alice decides to apply the flipped classroom strategy to her new students using the school's LMS. For this purpose, she designs and develops online teaching resources for Class1 and Class2. Students of these classes enrol in the respective group and study the lecture material at home (prior to classroom meeting). The material is in the form of video, text, small activities with automatic feedback (such as online quizzes), and forum discussions. During the classroom sessions, students are performing more complex activities, typically in small groups, with the benefit of Alice's scaffolding, guidance and feedback. Then, they can undertake some additional homework online to further check their understanding and extend their learning through appropriately designed individual and group assignments. Alice is confident with the flipped classroom approach, as she has used it before with great results. However, she is lacking data literacy competences. The principle encourages her to enrol in the Learn2Analyse MOOC before the school year starts - it is only an 8 week course and it is free.

[END OF PAGE]

(Learning Object #5.5.2.2 html page)
Data Collection & Data Ethics

Alice starts posing questions to identify and **collect** the appropriate educational data. She asks herself “Why do I need the data?”, “What data are needed?” “Where are data located?” “How will data be collected?”

Alice decides to gather a variety of students’ data, including demographics, perception data, past academic performance, last year’s academic performance and summative assessments for English Language course and other relevant courses, as well as the regional performance data over the past 5 years.

To retrieve the needed data she has to access diverse sources: school’s internal data sources like the student information system as well as external data sources, like the district’s databases.

Refer to sections #5.1.2, site reporting, and #5.2.2, course reporting, for various data sources that can be used.

To this end, she contacts the colleague responsible, appointed as school’s Data Protection Officer (DPO), to secure all necessary approvals for the sources handled by her school or by the corresponding district. As soon as Alice signs the required data protection consent form, she gets permission and downloads the datasets from the several sources.

Alice also requests to grant her access to the LMS used by the school (a new teacher account is created by the LMS administrator). Before implementing her flipped classroom strategy, she contacts the school’s DPO again to discuss any legal and ethical issues she needs to pay attention to. As advised by the DPO, she accesses the LMS and via the “User agreements page” she reviews the existing user agreements and confirms that **signed informed consent** has been given for all participating students (either parental consent on behalf of minors or directly by the students, as defined by [National Data Protection Authority](#)).

Alice imports all retrieved datasets into her spreadsheet software to further process them.

Alice gets informed by the DPO on school's policy and guidelines to protect students' **data privacy, confidentiality, integrity and security**.

She becomes aware of the appropriate technical and organisational measures taken by the school, so as to secure data protection. Such measures include use of anonymisation and pseudonymisation to remove personally identifiable information, encryption, limited accessibility as well as short storage period.

Alice needs to pay extra attention to **sensitive** data, a special category of personal data, e.g. Ethnic Origin and Health-related data, since the school can only process this data under specific conditions.

Alice also gets informed about the school's **LMS GDPR compliance** functionality, which is designed to assist in ensuring that the online course is fully compliant with the General Data Protection Regulation (GDPR) requirements. Some key features include an age check for the new LMS users, management of the user agreements to privacy policies, data export and deletion requests, definition and maintenance of a data registry, as well as the ability to give consent on behalf of minors.

Refer to sections #5.1.4 for information on how Moodle can help with GDPR.

After running the online course for three weeks, Alice checks the data about students' activity which have been tracked by the online learning environment so far.. Thus, she also **collects** data related to students engagement, behavior and performance within the LMS, e.g. time spent in the platform, the videos her students watched, their progress in the online elements of the course, the downloaded files, their online quiz scores, their participation in the forum as well as interaction between peers.

Refer to sections #5.2.2, course reporting, #5.2.3, activity reporting, and 5.3.2, user reporting, for various data sources that can be used to gather the required information.

[END OF PAGE]

(Learning Object #5.5.2.3 html page)
Data Analysis

Now that the data is ready to yield powerful insights, Alice proceeds with analysis and modeling methods.

Initially, she applies **descriptive statistics** for the last year's Class1 and Class2 8th graders.

Alice calculates the **total mean, median** and **standard deviation** of her students' last year's final scores, so as to get a measure of their general performance.

She is also interested in learning whether there is a correlation between time spent in the LMS and student's performance on quizzes (**inferential statistics**).

Refer to sections #5.4.2 and #5.4.3 to see how the Intelliboard and Configurable Reports plugins can compare statistics and present data correlations.

To gain a better understanding of the data on hand, Alice proceeds with its **pictorial visualization**. This will also assist her for the upcoming meeting with the school's principal in order to present her findings.

Firstly, Alice decides to graphically present the last year's overall students' academic performance. Thus, she plots a *histogram* to visualize the underlying *frequency distribution*. This helps her ascertain the number of students who are performing to a particular standard. To further enhance her understanding of spread, Alice also utilises a *boxplot*, which includes minimum, maximum, median, first and third quartile.

Based on the gathered LMS access data, Alice also produces a *scatter plot* that shows the relationship between students' activity time in the LMS and their performance on quizzes.

Refer to sections #5.4.2, Intelliboard, to see pictorial representations of student performance and #5.2.3, activity reporting, to see detailed statistics on student performance per activity.

[END OF PAGE]

**([Learning Object #5.5.2.4 html page](#))
Data Comprehension & Interpretation**

Alice learns that her school's LMS (Moodle) provides a number of useful Learning Analytics tools. She decides to leverage them and implement more complex analyses and statistical models.

To this end, Alice implements *Descriptive Learning Analytics* by using the “[Learning Analytics Enriched Rubric](#)” tool, an advanced grading method used for criteria-based assessment. Grading levels are associated to data from the analysis of learners’ interaction and learning behaviour within the online elements of her course, such as the number of post messages, times of accessing learning material, assignments’ grades and so on.

She also decides to use “Moodle Inspire Analytics”, a tool for *Predictive Learning Analytics*, which provides feedback about student’s progress against a range of indicators and activities identified to have an impact on student success in the online course.

In order for Alice to examine further the quizzes’ results, she generates a respective “[Quiz Statistics Report](#)” for each one including details of the attempts of the enrolled students (how long the student’s attempt took, the student’s grade for each individual question). She focuses on two of her students, Ann and David, who do not perform well.

For these 2 students, she also retrieves a “[Complete Report](#)” that displays a very detailed view of the progress of the individual learner throughout the online elements of her course (a list of the course activities and resources and how often and when the user has accessed them). Using this report, Alice can obtain more accurate information on students’ progress and engagement. She confirms that Ann and David struggle with content comprehension.

Refer to sections #5.4.4.6, Learning Analytics Enriched Rubric, #5.1.3, Inspire Analytics, #5.2.3.4, Quiz reporting, and #5.3.2.3, Complete report, to see how each of these tools can be leveraged for more complex data analysis.

Using learning analytics, Alice is self-reflecting to improve the design and the delivery of her course. She uses Learning Analytics to monitor their learning process, to discover patterns, to identify problems early, to find indicators for success and indicators for poor marks or drop-out.

Using Prescriptive Learning Analytics, Alice applies the “[Analytics and Recommendations](#)” tool, so as to get a visual color-coded presentation of the student's participation in each online course activity, as well as some initial recommendations about what activities students could work to improve their final grade.

She realizes that some students like John do not participate in the forums at all. This behavior reflects his low interaction in class activities, as well. And then, there is Peter whose performance is remarkable though he does not seem interested in the online activities, as he goes right from the homepage of the online course to assignments/quizzes without additional navigation.

Refer to sections #5.4.4.8, Analytics and Recommendations, for guidance on how to advise students.

[END OF PAGE]

(Learning Object #5.5.2.5 html page)
Data Application

Based on the results of her data analysis, Alice decides to revise the course's online learning activities and educational resources. Thus, she uses the course level "Activity report" to investigate how her students engaged with the different elements of the course and which activities were the most appealing. The Activity report provides aggregate reports highlighting which elements of the course have more or less student activity.

To support students who are struggling, like Ann and David, Alice decides to include "[Lesson Activities](#)" to incorporate conditional branching and create differentiated learning paths by sequencing learning activities throughout a series of web pages. In the event that a student answers a question incorrectly, conditional branching makes it possible to direct the student to additional content pages to help them reach the correct answer. Each question response could "jump" the student to various areas of content within the same lesson activity.

Moreover, she includes additional **graded discussion forums** to facilitate a higher participation and support further the students when they study on their own, allowing them to ask questions and receive support. To drive motivation for students like Peter, she also assigns optional challenging activities.

To further increase students' engagement and participation, she also decides to add [Level up! - Gamification](#), an easy way to gamify students' learning experience by motivating them to progress towards the next level of the course.

Refer to sections #5.2.2.4, Activity report, #5.2.3.3, Lesson activity, #5.4.4.7, Level up!, for ideas on how to incorporate interactive and motivating elements to courses.

[END OF PAGE]

([Learning Object #5.5.4 html page](#))
Next Up

Next up :

Applying Educational Data Analytics with eXact Suite

In the following module you will learn about delivering e-learning and training via the eXact Suite and how to use the eXact suite learning analytics tools to monitor the progress of your students and find out how to better support them in formal and non formal training scenarios.

[END OF PAGE]

(Learning Object #5.5.5 html page)
Reminder

Don't forget to complete the quiz at the end of this module.

You will be given instructions before starting the quiz.

[END OF PAGE]

5.6 REFERENCES AND READING

(Learning Object #5.6.1 html page)
References, Suggested Reading and Videos

REFERENCES

Moodle

Moodle. (n.d.). Moodle LMS - Online Learning with the World's Most Popular LMS. Retrieved from <https://moodle.com/>

Moodle in action

Moodle. (n.d.). Moodle demo. Retrieved from <https://moodle.org/demo>

Moodle cloud

Moodle. (n.d.). Moodle hosting from the people that make Moodle. Retrieved from <https://moodlecloud.com/>

Moodle community

Moodle. (n.d.). Moodle - Open-source learning platform. Retrieved from <https://moodle.org/>

Case study

Enovation. (2017, June 12). Case studies: CLL. Retrieved from <https://enovation.ie/case-studies/ctl/>

Inspire Analytics tool

Moodle. (n.d.). Analytics. Retrieved from <https://docs.moodle.org/36/en/Analytics>

Learning Analytics Overview

Dalton, E. (2018, August 14). Learning Analytics Working Group Overview For Developers. Retrieved from <https://www.youtube.com/watch?v=6FVYgJl-79w>

IntelliBoard Demo

Intelliboard. (n.d.). Welcome to IntelliBoard.net! Retrieved from <https://demo.intelliboard.net/signin>

IntelliBoard Features

Intelliboard. (n.d.). We make every learning management system smart. Retrieved from <https://intelliboard.net/features>

Moodle ad-hoc reports

Moodle. (n.d.). ad-hoc contributed reports. Retrieved from https://docs.moodle.org/36/en/ad-hoc_contributed_reports

Moodle configurable reports

Moodle. (n.d.). Configurable reports. Retrieved from https://docs.moodle.org/37/en/Configurable_reports

Engagement Dashboard

Enovation. (n.d.). Moodle LMS: Enovation: Official Moodle & Totara LMS Partners. Retrieved from <https://enovation.ie/moodle/>

3rd Party Plugins

Moodle. (n.d.). Plugins. Retrieved from <https://moodle.org/plugins/>

IntelliBoard within Moodle

Enovation. (n.d.). IntelliBoard: Advanced Moodle & Totara Learning Analytics: Our Partners. Retrieved from <https://enovation.ie/intelliboard-advanced-analytics/>

SUGGESTED READING

Flipped classroom model

Wikipedia. (2019, June 27). Flipped classroom. Retrieved from https://en.wikipedia.org/wiki/Flipped_classroom

API

Wikipedia. (2019, August 5). Application programming interface. Retrieved from https://en.wikipedia.org/wiki/Application_programming_interface

Community of Inquiry theoretical framework

Wikipedia. (2019, August 8). Community of inquiry. Retrieved from https://en.wikipedia.org/wiki/Community_of_inquiry

Mentees block

Moodle. (n.d.). Mentees block. Retrieved from https://docs.moodle.org/36/en/Mentees_block

Parent role

Moodle. (n.d.). Parent role. Retrieved from https://docs.moodle.org/36/en/Parent_role

Assign roles

Moodle. (n.d.). Assign roles. Retrieved from https://docs.moodle.org/36/en/Assign_roles#User_context

External links to Moodle docs

Moodle. (n.d.). Main page. Retrieved from https://docs.moodle.org/36/en/Main_page

Learn Moodle MOOC

Moodle. (n.d.). Inspiring better teaching everywhere. Retrieved from <https://learn.moodle.net/>

General Data Protection Regulation (GDPR)

European Parliament, Council of the European Union. (2016, May 4). General Data Protection Regulation, Regulation 2016/679. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R0679&from=EN>

VIDEOS

Learning Analytics

Rienties, B. (2018, July 30). What is Learning Analytics – Bart Rienties. Retrieved from <https://youtu.be/6jlf9jOjPU>

What is Moodle?

Enovation. (2015, December 17). What is Moodle – Enovation Solution Partner. Retrieved from <https://youtu.be/cDoqpZZ7-sc>

Moodle Event Monitor

Moodle. (2014, November 9). Moodle 2.8 Release Highlight: Event Monitor. Retrieved from <https://youtu.be/YkuK2w1Jnk>

Inspire Analytics tool

Moodle. (2017, November 12). Inspire Analytics In Moodle 3.4. Retrieved from <https://youtu.be/MS1lqKsrXAI>

Learning Analytics through Machine Learning

Henrick, G. (2017, May 11). Learning Analytics through Machine Learning: Project Inspire. Retrieved from https://youtu.be/_-PPp1LdE5c

Moodle 3.5 & GDPR Compliance

Couedelo, D. (2018, July 19). Moodle 3.5 & GDPR webinar by Enovation. Retrieved from https://youtu.be/foB_JoOrivo

GDPR Compliance features

Moodle. (2018, May 16). GDPR compliance features in Moodle 3.5. Retrieved from https://youtu.be/bl_h4FX2WDI

Moodle Course Reports

Moodle. (2019, January 7). 36 Course reports. Retrieved from <https://youtu.be/VR91YcB3tCw>

IntelliBoard

Enovation. (2017, November 24). Enovation are IntelliBoard certified partners. Retrieved from <https://youtu.be/gJyRR4Jj3Xo>

IntelliBoard

IntelliBoard. (2018, August 22). Introducing IntelliBoard. Retrieved from <https://youtu.be/LimkbhWFMS4>

Configurable Reports for Learning Analytics

Dalton, E. (2015, October 27). Configurable Reports as a Learning Analytics Tool - iMoot 2015. Retrieved from <https://youtu.be/IF6CuY2Qiwo>

Re-Engagement Plugin

RCC Distance Learning. (2017, June 15). Re-Engagement Activity. Retrieved from <https://youtu.be/j45TOiollMU>

Checklist Plugin

Smith, D. (2011, February 21). Moodle Checklist plugin. Retrieved from https://youtu.be/wlpGuW_-sVg

Moodle & IntelliBoard

Enovation. (2018, July 13). Moodle & IntelliBoard webinar by Enovation. Retrieved from <https://youtu.be/f4VtIZpmWEo>

Learning Analytics for Course Design

Whitmer, J. (2017, October 4). Learning Analytics @ Scale for Course Design. Retrieved from <https://youtu.be/e8K1US3ojLM>

[END OF PAGE]

Module 5:

MULTIPLE CHOICE QUIZ

This quiz contributes to the final assessment for receiving the Learn2Analyse MOOC **Certificate of Achievement**. Your grade in the course is calculated based on your replies to **100 multiple choice quizzes** distributed to the 6 core modules. In order to successfully complete this course and gain your Certificate of Achievement you must gain a mark of **60% or greater** overall to all 100 quizzes.

The quiz of Module 5 consists of **25 questions**, including:

- multiple choice with one correct answer;
- multiple choice with more than one correct answer; and
- true/false questions.

It is "open book" and there is no set time limit.

You will have **two attempts** to answer all quiz questions except for the "true/false" questions. When you click "Check", it will register as your first attempt. If your answer is incorrect, try again and then click "Final Check".

It should take less than **60 minutes** of your time to complete this quiz.

Question 5.1: What is a notification threshold when creating an event monitoring rule?

1. The number of times an event occurs before we get notified.
2. The maximum number of times an event is allowed to occur.
3. The number of times an event can occur before notifications stop being sent.
4. None of the above

Question 5.2: How can the teacher or site administrator generate automatic notifications when a particular event occurs in the context of a Moodle course?

1. Activity completion report
2. Course participation report
3. Event monitoring rules
4. None of the above

Question 5.3: Which of the following can be seen in the All Logs user report?

1. When activity completion records were updated.
2. When a learner viewed a course.
3. Both of these actions.
4. None of the above

Question 5.4: How does the Adaptive Quiz 3rd party plugin select which question to offer learners next if they answer a question correctly?

1. A question tagged with a higher score is presented.
2. A question tagged with a lower score is presented.
3. A similar question is presented.
4. None of the above

Question 5.5: How is the information presented in the Most Active Courses site level report?

1. In a bar chart and a table.
2. In a pie chart and a table.
3. In a line graph and a table.
4. None of the above

Question 5.6: Which report provides the teacher or site administrator with the ability to view the attempt status of a particular Lesson activity?

1. Graph report
2. Objectives report
3. Overview report
4. None of the above

Question 5.7: Which report gives detailed data on a learner's most recent activity on a Moodle site?

1. Today's Logs
2. All Logs
3. Statistics
4. None of the above

Question 5.8: Which of the following tabs would you not see when creating a course or user Configurable Report?

1. Conditions
2. Rules
3. Permissions
4. None of the above

Question 5.9: What does 'Social presence' mean in learning analytics?

1. Interactivity with other participants in an activity.
2. Viewing feedback from an instructor.
3. Reading forum posts.
4. None of the above

Question 5.10: Which SCORM report does not include the attempt status (sent from the SCORM package to Moodle)?

1. Basic report
2. Graph report
3. Interactions report
4. None of the above

Question 5.11: Where can an admin user easily access all reports relating to a particular user?

1. Via the users profile page.
2. Via the user logs.
3. Via the grades report.
4. None of the above

Question 5.12: In the Engagement Dashboard what information is shown in the My Progress Compared bar?

1. The learner's course grade and the average course grade.
2. The learner's course grade.
3. The learner's course grade and the highest course grade.
4. None of the above

Question 5.13: Which type of report provides the site administrator with the ability to view immediate feedback from the student?

1. Comments
2. Statistics
3. Logs
4. None of the above

Question 5.14: Which reports can a Team Leader see in their team members, or mentees, user profiles?

1. Grades Overview and Grade.
2. All reports.
3. Complete Report and Statistics.
4. None of the above

Question 5.15: In the Engagement Dashboard what information is shown in the My Progress Compared bar?

1. The learner's course grade and the average course grade.
2. The learner's course grade.
3. The learner's course grade and the highest course grade.
4. None of the above

Question 5.16: What do you see if you hover over the bars in the IntelliBoard Most Visited Courses chart?

1. The number of page visits

- 2. The number of enrolled users
- 3. The number of clicks
- 4. None of the above

Question 5.17: Which type of report provides the site administrator with the ability to generate a report comprising a list of all users at the Moodle site and details of their interactions with the site during a particular period of time?

1. Logs report

- 2. Course overview report
- 3. Statistics report
- 4. None of the above

Question 5.18: How is completion of an activity or resource in a Moodle course represented?

1. By a checkbox

- 2. By a radio button
- 3. Either of the above
- 4. None of the above

Question 5.19: At a course level in a user profile, what does the complete report show?

1. A detailed view of their progress including views, attempts and grades for all activities.

- 2. An overview of activities that have been attempted.
- 3. A complete list of grades for the user.
- 4. None of the above

Question 5.20: Which IntelliBoard report shows the users score and completion status per course?

1. Overdue Users

- 2. Learning Progress
- 3. User Engagement
- 4. None of the above

Question 5.21: For each activity and resource in a Moodle course, the Activity report displays the following information:

1. Last access

2. Last access and Views

- 3. Views
- 4. None of the above

Question 5.22. Which of the following is a column heading in the Data Requests report?

1. **Message**
2. Date submitted
3. Sent by
4. None of the above

Question 5.23. Information displayed by the course Logs report can be filtered by the following:

1. **All actions, Create, View, Update, Delete or All changes**
2. Create or View
3. Update or Delete
4. None of the above

Question 5.24. Which Configurable Report would you use to see the most recent course completions and how would you organise the results?

1. **User course completions organised by date.**
2. User course completions organised by course.
3. Most active courses organised by date.
4. None of the above

Question 5.25. Which two SCORM reports are almost identical?

1. Graph report and Interactions report
2. Graph report and Objectives report
3. **Interactions report and Objectives report**
4. None of the above

[END OF PAGE]

Learn2Analyze

Knowledge Alliances (Key Action 2)

AGREEMENT NUMBER: 2017 - 2733 / 001 – 001

PROJECT NUMBER: 588067-EPP-1-2017-1-EL-EPPKA2-KA

WP3. Learn2Analyse MOOC Design and Development

Result 6a Learn2Analyze MOOC version 1 Learning Materials

Module 6: Educational Data Analytics with eXact Suite

Module 6

Educational Data Analytics with eXact Suite

Estimated Effort to complete: **10** hours

Assessment Multiple Choice Questions: **10**

6.0 Introduction	
6.0.1 Welcome	LO#6.0.1.1 VIDEO: Welcome to Module 6
6.0.2 Introduction	LO #6.0.2.1 HTML page: eXact Suite Overview
6.0.3 Learning Objectives	LO #6.0.3.1 HTML page: Module 6 Learning Objectives
6.0.4 eXact Suite Intro	LO #6.0.4.1 VIDEO: eXact Suite Intro LO #6.0.4.2 VIDEO: What is an LCMS? LO #6.0.4.3 VIDEO: eXact learning LCMS in 2 minutes
6.1 Understanding and supporting course progress in eXact LMS via learning reports	
6.1.1 eXact LMS intro	LO #6.1.1.1 VIDEO: Intro to eXact LMS LO #6.1.1.2 ACTIVITY: Poll & Discussion: You and LMS LO #6.1.1.3 VIDEO: eXact LMS Use Case LO #6.1.1.4 HTML page: e-learning formats LO #6.1.1.5 HTML page: Focus on formats LO #6.1.1.6 ACTIVITY: Fill in the blanks: e-learning Formats LO #6.1.1.7 HTML page: Playing learning objects via eXact LMS: the SCORM player LO #6.1.1.8 HTML page: Setting up Courses in eXact LMS LO #6.1.1.9 - ACTIVITY-Try it: eXact LMS in action: creating a course
6.1.2 How does course progress happen in eXact Suite?	LO #6.1.2.1 VIDEO: Intro to how playing courses in eXact LMS LO #6.1.2.2 HTML page: Accessing a course LO #6.1.2.3 HTML page: Playing learning materials into a course LO #6.1.2.4 HTML page: Tracking of fruition
6.1.3 Teaching and Learning Analytics in eXact LMS	LO #6.1.3.1 VIDEO: Intro to eXact LMS Teaching and Learning Analytics LO #6.1.3.2 HTML page: Behind the scenes: setting tracking LO #6.1.3.3 HTML page: Overview of available reports LO #6.1.3.4 HTML page: Access Statistics LO #6.1.3.5 HTML page: Courses reports LO #6.1.3.6 - HTML page: Reports about SCORM packages LO #6.1.3.7 - HTML page: Courses reports for learners LO #6.1.3.8 HTML page: Understanding reports and making decisions LO #6.1.3.9 ACTIVITY Quiz Understanding reports and taking decisions
6.2 Additional reports in eXact LMS	
6.2.0 Additional reports	LO #6.2.0.1 video: Additional reports in eXact LMS
6.2.1 Learners' satisfaction	LO #6.2.1.1 ACTIVITY Poll & Discussion: Learners' satisfaction LO #6.2.1.2 - HTML page: Evaluation models for satisfaction questionnaires LO #6.2.1.3 - ACTIVITY: Arrange: Evaluation Models: the Kirkpatrick's model LO #6.2.1.4 - ACTIVITY: Drag & Drop Evaluation Models: the Marshall and Shriver Model LO #6.2.1.5 - ACTIVITY: Drag & Drop Evaluation Models: the Van Slyke et al. Model LO #6.2.1.6 - HTML page: Examples of Learners' satisfaction questionnaire
6.2.2 Learning reports	LO #6.2.2.1 HTML page: Learning reports in eXact LMS LO #6.2.2.2 HTML page: Reports on users LO #6.2.2.3 HTML page: Understanding advanced reports and making decisions

	LO #6.2.2.4 HTML page: vignette EMSA Case Study
6.3 Beyond the LMS, monitoring and supporting Non-formal learning via eXact Delivery Portal	
6.3.1 Engaging with Non-formal learning	LO #6.3.1.1 VIDEO Why Corporate interest in Non-formal? LO #6.3.1.2 ACTIVITY: Poll & Discussion: Formal, informal and non-formal Learning LO #6.3.1.3 HTML page: Formal, Informal and Non-formal Learning LO #6.3.1.4 HTML page: Corporate interest in Non-formal LO #6.3.1.5 VIDEO: Non-Formal Learning Use case LO #6.3.1.6 HTML page: How Tracking the Non-formal? LO #6.3.1.7 HTML page: How to use tracked data to take action LO #6.3.1.8 ACTIVITY: Drag&Drop Match activities and learning types LO #6.3.1.9 ACTIVITY: Quiz: Tracking non-formal learning
6.3.2 eXact Delivery Portal	LO #6.3.2.1 VIDEO: Overview of eXact Delivery Portal LO #6.3.2.2 HTML page: eXact Delivery Portal: Visibility groups, Articles, Main Areas and Tags LO #6.3.2.3 HTML page: eXact Delivery Portal Reader's experience: interacting with Articles LO #6.3.2.4 HTML page: eXact Delivery Portal Reader's experience: interacting with Delivery Portal LO #6.3.2.5 VIDEO: eXact Delivery Portal in action LO #6.3.2.6 ACTIVITY: Quiz: eXact Delivery Portal
6.3.3 Understanding reports to assess and take actions	LO #6.3.3.1 HTML page: Which data are collected? LO #6.3.3.2 HTML page: How are data stored? LO #6.3.3.3 HTML page: Where are data stored? LO #6.3.3.4 HTML page: How to access data? Textual and visual representation LO #6.3.3.5 HTML page: What can we infer from the data? LO #6.3.3.6 HTML page: VIGNETTE eXact Delivery Portal case study LO #6.3.3.7 Quiz: eXact Delivery Portal Tracking capabilities
6.4 Module Summary and Conclusion	
6.4.1 Summary of the Module	LO #6.4.1 HTML page: Summary of the Module
6.4.2 Instructor Video: Module Summary	LO #6.4.2 video: Module Summary
6.4.3 Feedback	LO 6.4.3 ACTIVITY Feedback about the Module
6.4.4 Next Up	LO #6.4.4 HTML page: Next Up
6.4.5 Reminder	LO #6.4.5 HTML page: Reminder
6.5 References and Reading	
	LO #6.5 HTML page: References
6.6 Assessment Quiz	
6.6.1 Quiz Details	LO #6.6.1 HTML page: Guidelines for taking part to the Quiz Assessment
6.6.2 Module Quiz	LO#6.6.2 ACTIVITY: QUIZ

6.0 Introduction

6.0.1 Welcome

(Learning Object #6.0.1.1 Video) Welcome to Module 6

Welcome to Module 6

A short (<1 min) **instructor talking head** video with an **overlay text** to introduce the scope and the learning outcomes of the module + Transcript in .txt and .srt files to download.

Video Transcript

*** Welcome to the sixth module of our course.

This module, "**Applying Teaching & Learning Analytics with eXact Suite**", will describe how to deliver e-learning and training via eXact Suite. Above all, the module will make you familiar with the use of **eXact suite learning analytics tools**, show you how to **monitor** the progress of your students and find out how to better **support** them **in formal and non-formal** training scenarios.

My name is Sarah Jenkins and I'm Marketing and Communication consultant at eXact learning solutions, the company developing eXact suite, and I'll be your companion introducing you to the main topics of this module.

Ready? Let's start then!***

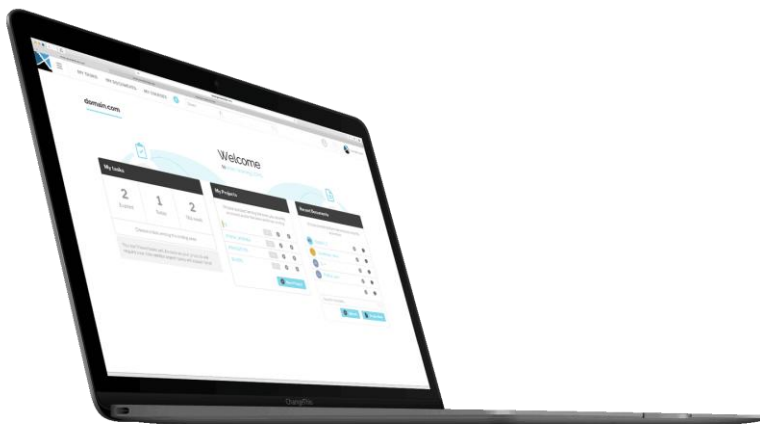
[END OF PAGE]

6.0.2 Introduction

([Learning Object #6.0.2.1 html page](#)) **eXact Suite Overview**

eXact Suite Overview

This module will present **tools for educational data analytics** in **eXact Suite** and focus on the use of these tools to support instructional designers and e-tutors of online courses to support online learners in **formal and non-formal scenarios**.



Source: <https://www.exactls.com/overview/>

eXact Suite is a comprehensive software **solution for knowledge and learning content management** to **author, manage and deliver** new generation, multiple output learning content. Typical end users are corporate enterprises, public administrations, and large educational institutions.

eXact Suite comprises, among other modules, a **Learning Content Management System (LCMS)**, which is a professional software solution allowing authors, teams, and organizations to **create, manage and deliver learning content**.

The **typical users** of an LCMS are the people involved in content production and delivery, such as:

- Subject Matter Experts (SMEs)
- **Instructional Designers (IDs)**

- **E-tutors** of online course
- E-learning authors
- Project managers
- Learning and corporate academy managers
- Quality inspectors
- Chief Learning Officers and Chief Human Resource Officers.

Within an LCMS environment they can collaborate to carry out their tasks.

The eXact learning LCMS has an integrated **Learning Management System (LMS)** module that offers:

- Delivery of e-learning courses compliant with **SCORM 1.2, SCORM 2004** and **xAPI standards**
- Implementation of corporate or branded e-learning portals, also available via iOS and Android tablet apps
- Course and enrollment management
- Tracking of learners' performance

eXact suite also comprises a **Delivery Portal** supporting non formal learning scenarios.

[END OF PAGE]

6.0.3 Learning Objectives

[\(Learning Object #6.0.3.1 html page\)](#) Module 6 Learning Objectives

Module 6 Learning Objectives

By completing this module, you will:

Module 6 Learning Objectives	Learn2Analyse Educational Data Literacy Competence Profile
Know how to obtain, access, and gather the appropriate educational data in eXact Suite	1.1
Demonstrate an understanding of key educational data analysis and modelling methods and how they are applied to teaching and learning in eXact Suite	3.1
Understand how to communicate your interpretation of the educational data in an intuitive and accessible way within eXact Suite	3.2
Be able to interpret insights from educational data analysis within eXact Suite	4.3
Be able to elicit potential implications of the educational data insights from data analysis to instruction within eXact Suite	4.4
Be able to use educational data analysis results to make decisions to revise instruction within eXact Suite	5.1

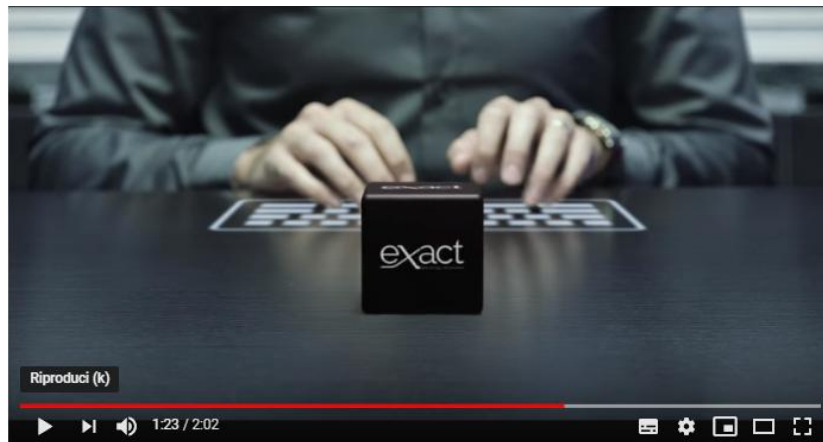
[END OF PAGE]

6.0.4 eXact Suite Intro

(Learning Object #6.0.4.1 video) eXact Suite Intro

eXact Suite Intro

eXact Suite offers a ‘one-stop shop’ learning content ecosystem, where a rapid authoring environment is fully integrated within an enterprise content management platform covering all content lifecycle needs.



External Video: <https://www.youtube.com/watch?v=pEyMYMb3KAw> [2:02]

[END OF PAGE]

(Learning Object #6.o.4.2 video) What is an LCMS?

What is an LCMS?

A short (~ 2 min) **instructor talking head** video **plus some graphics** to introduce LCMS eXact+ Transcript in .txt and .srt files to download.

Video Transcript

*** Hi, by now you know that eXact Suite is an LCMS, but... what is an LCMS? I'll try to explain to give you the overall picture, and later we'll focus on LMS features.

Typically, an LCMS comprises an authoring environment, a digital repository where materials are stored, content management facilities, and a Learning Management System (LMS).

The **authoring environment** of an LCMS is designed for collaborative authoring and is template-based, so that content production is easy, fast, and consistent in terms of quality and attractiveness. Within an LCMS, authoring is usually conceived as single-source, so that content is produced once and can be repurposed into different output formats, such as SCORM compliant learning objects, textual lesson notes, or teacher's guides and so on. In other words, an LCMS supports and streamlines the content production for blended learning and various pedagogic approaches.

An LCMS typically revolves around a **digital repository** that acts as a content management system, where learning materials are indexed and easily made available for reuse and repurposing.

An LCMS conceives course **production** in terms of **projects**, whose resources need to be managed efficiently through clear team allocation, tasks, and deadlines. Workflow automation of content production is another typical feature of an LCMS. The different processes related to content production and delivery can often be represented in terms of procedural flows and the LCMS helps to organize the work and ensure compliance.

Learning content can be **accessed** easily from anywhere, without time constraints or the need for internet access. Learning content is also adaptable to meet individual needs. With eXact learning LCMS each content becomes a unique learning experience which can be wherever, whenever, and in any way learners like.

With eXact learning LCMS, you can **track learning experiences** wherever they happen thanks to online/offline synchronization. Any learning step forward is recorded, stored, and analyzed in your preferred LMS/LRS even if there is no connectivity. Learners can start, enjoy and complete their training when and on any device they like.

With xAPI support, you decide which **formal or informal learning experience** to track. You can also allow your learners to share their experiences with their friends thanks to eXact learning LCMS integration with all main social networks. ***

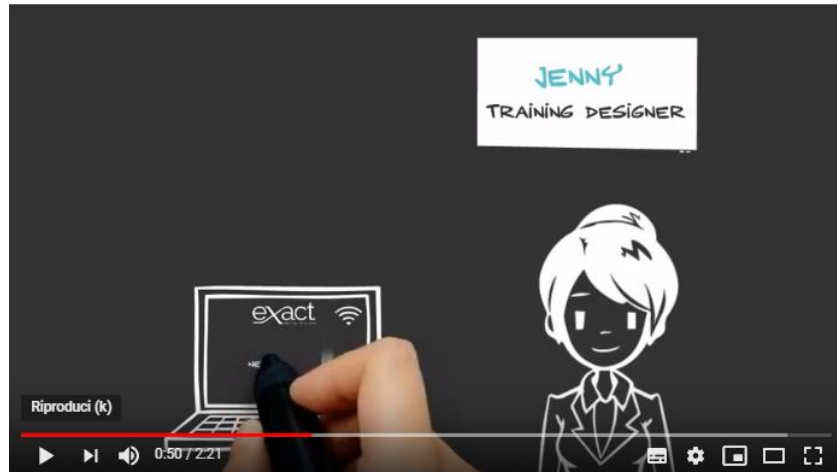
[END OF PAGE]

(Learning Object #6.o.4.3 video) eXact Suite – eXact learning LCMS in 2 minutes

eXact learning LCMS in 2 minutes

Let's watch a video that tells you the story of Susan, Mark and Jenny.

External Video: <https://www.youtube.com/watch?v=gd0hR3NIRdQ> [2:21]



[END OF PAGE]

6.1 Understanding and supporting course progress via learning reports

6.1.1 eXact LMS intro

(LO #6.1.1.1 VIDEO) [Intro to eXact LMS](#)

Intro to eXact LMS

A short (<1 min) **instructor talking head** video to introduce eXact LMS + Transcript in .txt and .srt files to download.

Video Transcript

***Hello again! As we have seen, eXact Suite comprises several modules: an LCMS with **authoring environment** for content creation, a **digital repository** where materials are stored and managed, **project management** facilities, and a **Learning Management System (LMS)**.

We focus now on the latter, the eXact LMS.***

[END OF PAGE]

(Learning Object #6.1.1.2 - Activity) Poll & Discussion: You and LMS

ACTIVITY/PRACTICE QUESTION (Poll)

Now, we would now like to learn a bit more about your experiences with LMSs so far. Please answer the poll questions below.

1. Have you ever been involved in running a course via an LMS, by creating courses, publishing learning objects, enrolling or supporting learners?
 - ☐ Yes
 - ☐ No

2. Have you ever exported a data report from an LMS?
 - ☐ Yes
 - ☐ No

3. Do you have experience in interpreting insights from educational data analysis?
 - ☐ Yes
 - ☐ No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your responses about your previous experience working with an LMS in the following discussion tasks, by posting your thoughts on the discussion board. You may discuss:

1. *Your previous experience as an instructional designer, tutor or school teacher designing and/or organizing and/or tutoring a course via an LMS*
2. *Your previous experience as an instructional designer, tutor or school teacher collecting data about learners' performances in a course via an LMS, reflecting upon data and devising conclusions and actions*

[END OF PAGE]

(Learning Object #6.1.1.3 video) eXact LMS use case

eXact LMS Use Case

A short (<1 min) **instructor talking head** video to introduce eXact LMS + Transcript in .txt and .srt files to download.

Video Transcript

***The typical use case of eXact LMS is the provision of **online and /or blended training** in **medium/large size corporate environments**. Usually, such organizations have several locations, plants, and/or offices all around the world and often these plants have different specializations or areas of interest. Subsequently, the LMS virtual space is typically organized via the use of **Domains**, where each Domain is dedicated to one or several locations, plus one Domain common to the whole Organization. Employees attending courses are called **Learners**, and e-tutors are called **Staff** of the course.

Training materials can be created by the organization itself via the authoring facilities of the LCMS, or acquired externally through a third party provider. In any case, these materials can be arranged in **courses** by training staff and attended by learners. Later, the Staff can retrieve information about usage of learning objects and analyze this information to make decisions and take actions.

In this section we will see how all of this happens in further detail.***

[END OF PAGE]

([Learning Object #6.1.1.4 html page](#)) e-learning formats

e-learning formats

To understand how to use educational data we need to take a step back, and take a moment to understand how courses are tracked and reports are created.

Tracking happens thanks to **e-learning formats**.

As presented in the following table, eXact learning LCMS supports the main industry standards and widely used formats:

	Content output		Ingestion	DR storage
	Online Authoring Tool	Offline desktop app		
SCORM 1.2 / SCORM 2004	●	●	●	●
xAPI	●	●	●	●
HTML5	●	●	●	●
XML	●	●	On Request	●
PDF	●	●		●
MS Word	●	●	●	●
MS Power Point	●	●	●	●
ePub	●	●		●
Mobile apps (iOs and Android)	●	●		●
Other file formats				●

If you are already familiar with e-learning formats you can jump to section 6.1.1.7.

Elsewhere we recommend you to go through the short overview of e-learning formats coming next.

[END OF PAGE]

Focus on formats

Let's look at a brief overview of standards which allow tracking and collecting user data. eXact Suite uses these standards, as you will see in the upcoming topics of the Module.

AICC HACP

The AICC (Aviation Industry CBT Committee) was an early **pioneer** in the world of e-learning standards; their specifications date back to 1980s and the days of “computer-based training.”

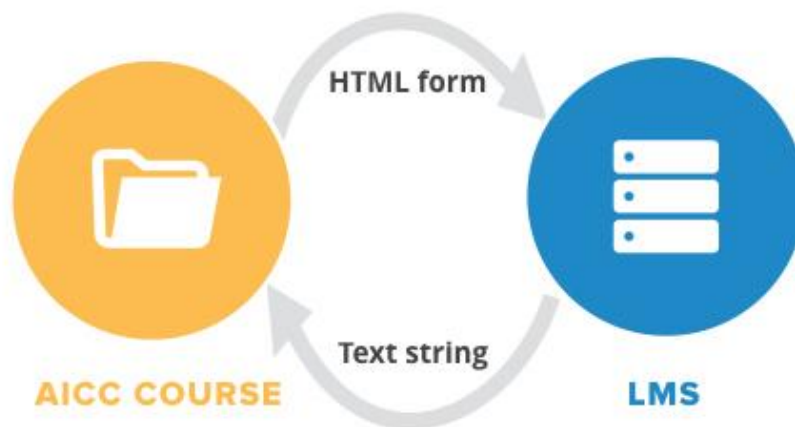


AICC's “CMI Guidelines for Interoperability” was the first

widely adopted specification for interoperability between e-learning content and LMSs (Document No. CMI001 on the AICC site). The run-time communication in SCORM (the most used e-learning standard, that we will describe next in the following section) was based on the AICC's work. Originally this specification began with **file-based exchange of data** between content and LMSs. It was then updated to support an **HTTP-based data exchange**. Recently, it was updated to support an ECMAScript-based data exchange to harmonize with SCORM. AICC HACP is still widely supported, mostly using the HTTP-based data exchange (known as HACP, “HTTP-based AICC/CMI Protocol”). AICC publishes many specifications, but when somebody refers to the “AICC spec,” they are most likely referring to HACP protocol in the AICC CMI specification. The HACP protocol has a unique characteristic that makes AICC HACP very useful and, in fact, **preferable to SCORM in certain situations**. Specifically, since HACP is HTTP-based, it **doesn't suffer from the cross-domain scripting problem** that plagues SCORM's ECMAScript-based communication. In SCORM, because of (good and intentional) browser security restrictions, content served from one domain (ex. www.mycontent.com) can't talk to an LMS that is served from a different domain (ex. www.mylms.com). In AICC HACP, that problem is less restrictive, making it a useful alternative to SCORM in certain deployment situations.

AICC requires four Course Description Files. Once created, these files should be given to the LMS administrator for import into the LMS. The naming convention for the Course Description Files is: **{course_name}.{au, crs, cst, des}** . The four files are:

- **AU File:** This file contains data needed to launch each assignable unit of the course
- **CRS File:** This file contains information about the entire course, including text descriptions.
- **CST File:** This file contains data about the structure of the course. It includes all the assignable units and blocks in the course.
- **DES File:** This file contains a complete list of every content module defined in the course. Content modules can be (AUs, Blocks).



Source: <https://www.softwareadvice.com/resources/scorm-vs-aicc-vs-tin-can/>

SCORM (Shareable Content Object Reference Model)



Released February 1998, SCORM is a “reference model.” The individual books of SCORM are actually references to other specifications. Some of the most significant contributions to SCORM came from the AICC.

Source: <https://www.vitecolearning.eu/corsi-scorm/>

SCORM was created by the The Advanced Distributed Learning (ADL) Initiative¹, a government program reporting to the Deputy Assistant Secretary of Defense for Force Education and Training (DASD(FE&T)), under the Office of the Assistant Secretary of Defense for Readiness (ASD(R)).

SCORM 1.2 - Released October 2001

SCORM 1.2 is when SCORM hit the big time. SCORM 1.2 incorporated all of the lessons learned from the early adoptions of SCORM 1.1 to create a robust and implementable specification. Vendors who adopted SCORM 1.2 realized dramatic cost savings from increased content interoperability.

SCORM 1.2 data include:

- **lesson_location** (where learner left off)
- **suspend_data** (bookmark with the specific information e.g. paragraph)
- **lesson_status** (pass, fail, complete, incomplete)
- **session_time and total_time**
- **score_raw** (score learner got)
- **mastery_score** (passing score)
- **interactions** (individual answers to exam questions, time spent etc.)

Remember that completion and passing are two different and distinct terms in SCORM. “**Complete**” means the user completed the module (the smallest unit of eLearning - chapter, pages are other terms used). i.e. they simply completed, there was no exam and nothing to pass, so they are simply “complete”.

“**Passed**” means that the user not only completed the module but they also passed the module, presumably by doing an exam and acing it!

There are two other pieces of data tracked by the LMS from information sent by the SCORM course:

¹ <https://adlnet.gov/about>

- **Suspend data:** A SCORM course will bookmark the learner's position in a course. The learner can pick up where they left off if they are interrupted - important for those trying to squeeze training into a busy schedule.
- **Mastery score:** This is SCORM-speak for "passing score". In other words, the passing score for an exam in the course. Learners must score above or equal to this score in order to pass the module.

SCORM 2004 "1st Edition" Released January 2004

Widespread adoption of SCORM 1.2 brought some problems to light. SCORM 1.2 was very good, but it still had some ambiguities that needed to be tightened up. SCORM 1.2 also lacked a sequencing and navigation specification that allowed the content vendor to specify how the learner was allowed to progress between SCOs. The **lack of a sequencing specification** meant that most SCORM 1.2 **content was produced as a single monolithic SCO (Shareable Content Object)** instead of created with granular, reusable SCOs. SCORM 2004 addressed both of these problems. SCORM 2004 (in all its flavors) includes very mature versions of the content packaging, run-time and metadata books. The parts of SCORM 2004 that were derived from SCORM 1.2 are VERY mature and VERY stable. In fact, the individual standards that make up these books are well on their way to becoming accredited standards. SCORM 2004 also added a new "book" called "**Sequencing and Navigation.**" This specification allows content vendors to create rules about how users may navigate between SCOs. For instance, a content author can say that "a learner can't take a final test until he has completed all of the courseware material." Or, "if a learner fails question X, remediate him back to SCO Y."

The term "SCORM 2004" is generally used to refer to any edition of the SCORM 2004 specification. You may also see references to SCORM 1.3. Prior to its formal release, SCORM 2004 was indeed called SCORM 1.3, but that name is no longer in official use. The term "1st Edition" is in quotes in this section because this specification wasn't actually called "1st Edition," at the time, it was simply referred to as "SCORM 2004."

Latest SCORM Editions:

- **SCORM 2004 2nd Edition Released July 2004:** to amend some defects in first SCORM 2004 Edition.
- **SCORM 2004 3rd Edition Released October 2006:** a set of improvements to the sequencing specification to remove ambiguities and tighten the specification for greater interoperability. The big change in Third Edition was the addition of user interface requirements for LMSs. Previously, it was completely up to the LMS to determine the appropriate user interface. In Third Edition, new language was added that requires the LMS to provide certain user interface elements to enable sequencing and navigation to function consistently across systems.
- **SCORM 2004 4th Edition March 2009:** further disambiguation of the sequencing specification and a few new features to the sequencing specification which will broaden the options available to content authors. The new features in Fourth Edition make creating sequenced content much simpler. ADL is unveiling a new certification process for SCORM 2004 4th Edition which will require LMS's to be continually retested to maintain their certification ensuring that compliance problems can be continually addressed.



Source: <https://www.softwareadvice.com/resources/scorm-vs-aicc-vs-tin-can/>

The Experience API (xAPI) Released April 26, 2013

The Experience API, also known as Tin Can API or xAPI, is the newest e-learning standard and it solves a lot of issues that were inherent with older versions of SCORM. Mobile learning, team-based learning, cross domain functionality, sequencing, removal of the need for a web

browser, and simulations/serious games are just a few things that are now relatively easy to accomplish. xAPI removes content from the LMS, and allows the content to send “statements” based around [actor] [verb] [object], or “I – did – this” to a Learning Record Store (LRS). LRSs can live on their own or as part of an LMS.

Cmi5 Released June 1, 2016

Cmi5 is a companion specification to xAPI. It provides a set of rules intended to achieve interoperability in a traditional LMS environment and uses the xAPI as the communication protocol and data format. It defines the concept of a course structure which is intended to be packaged and imported into an LMS. The course structure provides metadata information allowing the LMS to launch content, in the form of Assignable Units (AUs). Cmi5 includes the concept of a **learning session** and has specific rules for capturing a core set of data for learning experience.



Source: <https://www.softwareadvice.com/resources/scorm-vs-aicc-vs-tin-can/>

[END OF PAGE]

(Learning Object #6.1.1.6 - Activity) Fill in the blanks: e-learning Formats

Fill in the blanks: e-learning Formats

Please complete the text below about e-learning formats.

AICC HACP should be supported by most vendors. Its level of adoption is likely still second only to SCORM 1.2. AICC requires _____ Course Description Files, that contain data needed to launch each unit, information about the structure of the course, text descriptions, a complete list of every content. [four, 4]

Some statuses in SCORM standard are:

_____ = Completed (no exams) [Completed, completed]

_____ = Completed AND Passed (the exam) [Passed, passed]

_____ = Completed AND Failed (the exam) [Failed, failed]

SCORM 2004 also added a new “book” called _____. This specification allows content vendors to create rules about how users may navigate between SCOs. [Sequencing and Navigation, Sequencing & Navigation]

If you want to track more than just what SCORM or AICC track, then it is recommended that you adopt the _____. [xAPI, XAPI, xapi]

[END OF PAGE]

Playing learning objects via eXact LMS: the SCORM player

In order to properly display and manage SCORM compliant e-learning contents, eXact Suite provides a JavaScript based SCORM player.

The eXact SCORM Player can be launched either in "learning" or in "preview" modality:

- the "**learning**" modality is applied **by LMS courses** available for **learners** and collects information about learners' performances to persistently store them, so that tutors and teachers can look at the learners' results and improvements during their learning path.
- the "**preview**" modality is applied by Digital Repository and allows to "**emulate**" what learners will see so that **authors** can look at the final output without persistently store useless information about performances.

Learning objects are made available to learners from eXact LMS via courses. Let's see how these courses are structured.

[END OF PAGE]

Setting up Courses in eXact LMS

In eXact LMS, **learning objects and other assets** are made **available** to **learners** via grouping them into **courses**.

The course in eXact LMS is a logic entity grouping **materials** and **users**.

A course is identified by a title and optionally can have a description, an edition attribute, indication of its duration, credits, and a thumbnail. It is also possible to assign the course an availability period.

Learning objects and **other materials** are stored in the eXact Digital Repository. The Digital Repository is agnostic in terms of files formats that it can host. Materials of different size, format, and origin can be stored and organized by tags and categories. Materials can be:

- Documents (Learning Objects) generated with the Content Models available in the LCMS (i.e. Fixed Page and Flow);
- Microsoft Office files
- Media: images, audio, videos
- HTML fileXac
- SCORM packages
- PDF
- ZIP archives
- Files created with third -party systems
- etc.

Into the Digital Repository it is possible to upload resources (documents, pictures, audio files etc.), SCORM/IMS Content Packages in PIF format or external URLs links.

All of these materials have an associated status which indicates a material's level of readiness for distribution. Once they are ready to be provided to learners the status is set to **“Deliverable”**.

From the page course it is possible to add learning objects and other materials among the ones with status set as “deliverable”.

The screenshot shows the Canvas LMS interface for a course titled "Negotiation at work". The top navigation bar includes "MY TASKS", "MY DOCUMENTS", "MY COURSES", and a search bar. The course page has tabs for "Set enrollment mode", "Cover Page", "Course reports", "Staff members", "Learners", "Edit", "Add Staff", and "Enroll Learners".

On the left, the course details for "Negotiation at work" (Code: ELIS002) are shown. The description is "The course is always available." Below this, there is a "More options" link and a "Learning Materials" section. The "Add Materials From Repository" button is highlighted with an orange box. Below this, there are two learning materials listed: "Negotiating with Team Members" and "How To Win Friends And Influence People - By Dale Carnegie". Each material has "Change", "Edit", and "Remove" buttons.

On the right, the "CATALOGUE AND ENROLLMENT" section shows the enrollment modality as "SELF ENROLLMENT", "OWNER ENROLLMENT", and "STAFF ENROLLMENT". It also shows the "Presence on catalogue" as "Never on catalogue" with a rating of 5. Below this, the "COURSE STAFF" section shows the course owner as "SA System Administrator" and the course staff as "None defined".

It is possible also to set some constraints upon the navigation among materials in the course, such as if a material is mandatory or optional, and if it is “blocked” until previous material is completed.

Users of the course are called **Staff** and **Learners**. Learners can enrol into courses depending on the enrolment modalities allowed for the course:

- **Self-registration:** the user can self enroll to that course directly without asking to the course's owner
- **Owner enrolment:** the user can't self enroll to that course, only the course owner can enroll learners
- **Staff enrollment:** all staff member can enrol learners into a course

A Learner can access courses, play materials, and access reports about their own activity. Similarly, a Staff member may manage the learning activities and the enrolment process; they can also access the learners' performance reports on all the tracked learning materials.

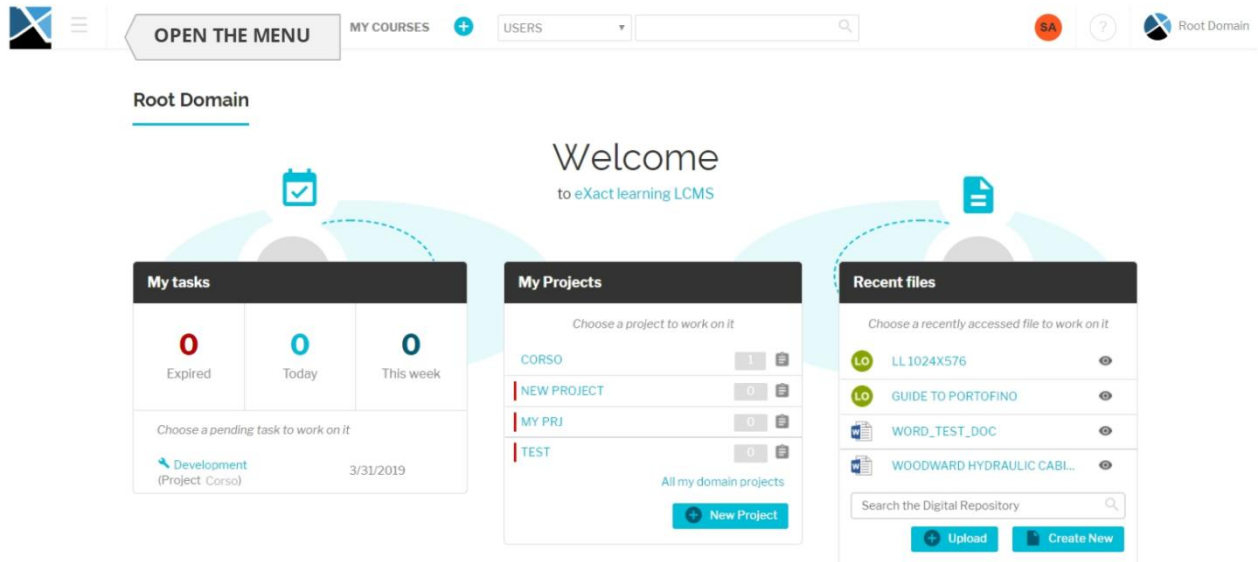
Ready to set up a course by yourself? Let's go!

[END OF PAGE]

(Learning Object #6.1.1.9 – Tutorial-Try it) eXact LMS in action: creating a course

eXact LMS in action: creating a course

Now that we have seen the basics for creating a course and enrolling learners, try it yourself!



Tutorial-Try it to be embedded (2 parts)

Course ready, students coming... Move Next!

[END OF PAGE]

6.1.2 How does course progress happen in eXact Suite?

(LO #6.1.2.1 VIDEO) [Intro to how playing courses in eXact LMS](#)

Intro to how playing courses in eXact LMS

A short (<1 min) **instructor talking head** video to introduce eXact LMS + Transcript in .txt and .srt files to download.

Video Transcript

Hello! Now that we have seen how to create a course in eXact LMS, let's see how fruition of courses happens from a learner's point of view. We'll see how learners can register to a course, enter the course, and play the learning materials it contains.

[END OF PAGE]



(Learning Object #6.1.2.2 – html page) Accessing a course

Accessing a course

Learners can find available courses from the **Catalogue** page, and enrol as they so desire. Once enrolled, learners can find the list of their courses under **My courses** tab. For each course, the main page shows:

- the **course Title**;
- the **course Status** (To be started, Completed, Incomplete);
- the **End date**;
- an **"Info"** button to display details about the course;
- an **"Enter"** button to access the course.

The screenshot displays the 'MY COURSES' interface. At the top, there's a header with a logo, 'MY COURSES', and user information (ML, a question mark icon, and 'Root Domain'). Below the header, a navigation bar shows 'My courses' (selected), 'My pending enrollments', and 'Courses catalogue'. The main content area is titled 'My courses' and features a table with columns: 'Title', 'Status', and 'End date'. Two courses are listed: 'Negotiation at work' (Completed) and 'Enhancing Team's Cohesion' (Incomplete). Each course has an 'Info' button and an 'Enter' button. To the right of the table is a sidebar with filters. The 'DOMAINS' section has a 'View all' checkbox. The 'FILTER COURSES' section includes a search bar and several filter categories: 'Filter by date' (Past, Current, Future), 'Filter by availability' (Enabled, Disabled), 'Filter by state' (To start, Incomplete, Complete), 'Filter by collaboration area' (With collaboration area, Without collaboration area), and 'Filter by type' (All). An 'Update' button is at the bottom of the filter sidebar.

Title	Status	End date
 Negotiation at work	Completed	-
 Enhancing Team's Cohesion	Incomplete	-

DOMAINS

☐ View all

FILTER COURSES

Search

Filter by date

☐ Past

☒ Current

☐ Future

Filter by availability

☐ Enabled

☐ Disabled

Filter by state

☐ To start

☐ Incomplete

☐ Complete

Filter by collaboration area:

☐ With collaboration area

☐ Without collaboration area

Filter by type:

All

Update

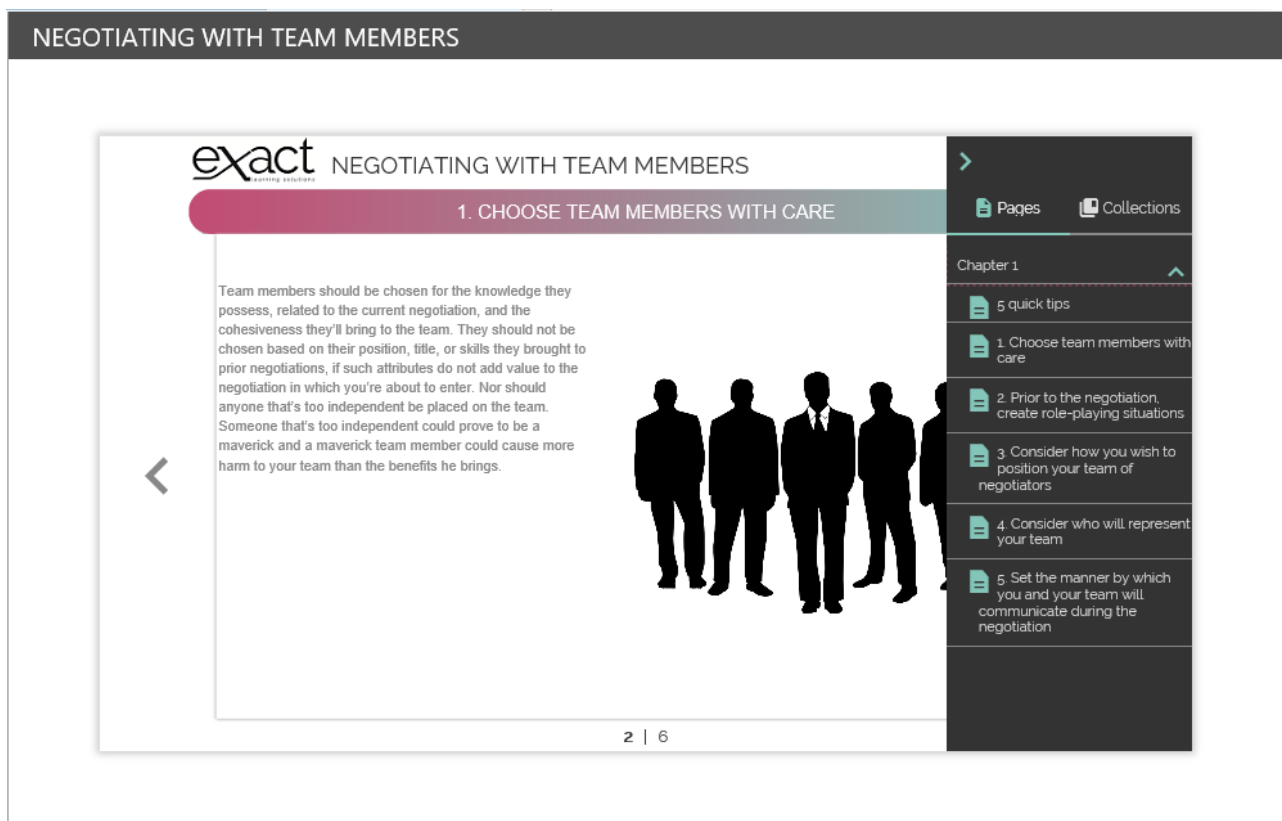
[END OF PAGE]

(Learning Object #6.1.2.3 – html page) Playing learning materials into a course

Playing learning materials into a course

To access any of the learning materials, learners can click on the related **Launch** button: the content will be loaded, and it is possible to either Open or Save the file to their local PC.

As previously said, playing a SCORM learning object the eXact SCORM Player is launched:



The top area displays the title of the whole content package.

Via a hamburger menu the right area can display the content package structure, that can be both a simple list of SCO e.g. a list of the actual Learning Objects that learners should work on, or a more complex structure organized into folders and sub-folders.

An icon before the title page in the menu denotes the completion/success status reached by the learner on the Learning Object:

- not attempted
- incomplete
- completed
- failed
- passed

[END OF PAGE]

(Learning Object #6.1.2.4 – html page) Tracking of fruition

Tracking of fruition

From the course page, for courses containing SCORM packages, users can also view the tracking data of their performances if the SCORM package has been accessed at least once using the eXact SCORM Player in "learning" modality only (which means through the "My courses" section).

The report available for these courses is formed by an icon, giving information about the status, and a button "Results" that allows to display details about the performance of the user (completion status, score, access dates, total time spent). The availability of this information may depend on the possibility of the contents to record such data (for example it is not always possible for the content to write a score or a passing status).

The screenshot shows the 'MY COURSES' section of a learning management system. The course 'Enhancing Team's Cohesion' is displayed with a 'TEAM' image. The course status is 'Passed' with a medal icon. The 'Learning Materials' section lists three strategies: 'Strategy One: Set Clear Goals' (Passed), 'Strategy Two: Convene a Talent Roundtable' (To be started), and 'Strategy Three: Allow Everyone To Play An Active Role' (To be started). Each strategy has 'Results', 'Info', and 'Launch' buttons. On the right, the 'COURSE STAFF' section shows the 'Course owner' as 'SA System Administrator' and 'Course staff' as '[None defined]'. The 'ENROLLMENT' section shows 'System Administrator enrolled you to this course on 4/24/2019 2:36 PM'.

When the learner completes a course, an additional widget appears on the right side to let the learner to download her/his own certificate of completion, if foreseen by the course.

The 'CERTIFICATE' widget displays the text: 'To visualize the **Certificate of Completion** for this course, please [click here](#).' Below this text is a blue button labeled 'Restart Course'.

Alternatively in this widget, after the learner completes the course for the first time a "Restart Course" button is displayed, allowing learner to complete the same course several times.

Course 1



Info	Details
Description	
Availability	
Duration (Min)	

From: 8/1/2018 To: 10/19/2018

Learning Materials



Root LO



To be started

▼ Results

▼ Info

Launch

COURSE STAFF

Course owner



System Administrator

Course staff
[None defined]

ENROLLMENT

System Administrator
enrolled you to this course on
8/3/2018 8:44 AM

CERTIFICATE

To visualize the **Certificate of Completion** for this course, please [click here](#).

A click on the "Restart Course" button erases the current tracking data about the learner on the course and on the related materials so that the learner finds again the "To be started" status on the tracked materials.

Historical tracking data are not erased, when clicking the "Restart Course" button, so that delivery managers can retrieve information about all the times the learner completed the course and the certification widget is anyhow visible (but "Restart Course" button is disabled until the user completes again the course).

Once the learner completes again a course, if s/he downloads the Course Completion Certificate after the second completion date, it will include information about all completion dates for that given learner.

[END OF PAGE]

6.1.3 Teaching and Learning Analytics in eXact LMS

(LO #6.1.3.1 VIDEO) [Intro to eXact LMS Teaching and Learning Analytics](#)

Intro to eXact LMS Teaching and Learning Analytics

A short (<1 min) **instructor talking head** video to introduce eXact LMS + Transcript in .txt and .srt files to download.

Video Transcript

Hello again! Now that we have seen how learners can play courses in eXact LMS, let's see which information the course staff can retrieve about learners' experiences. We'll see how staff can enable tracking, access to tracking data, and understand them to make decisions and appropriate actions.

[END OF PAGE]

(Learning Object #6.1.3.2 – html page) Behind the scenes: setting tracking

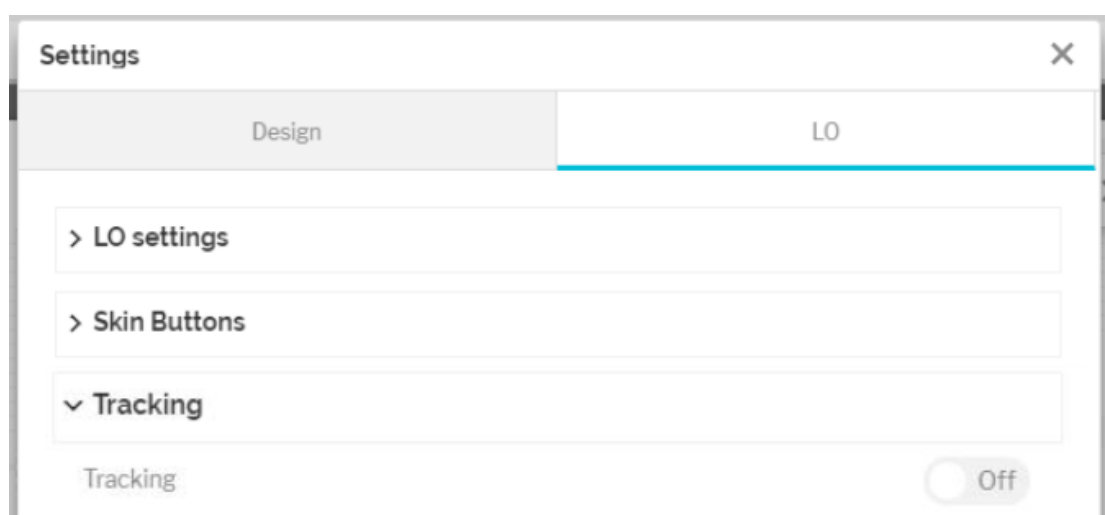
Behind the scenes: setting tracking

eXact learning LCMS supplies instructional designers with a series of modalities to manage each aggregation at a content level and to be able to pack these contents following the desired formative strategy. For example, instructional designers can create a single SCORM object (SCO) simply by adding an image to a page and the tracking information needed to create the SCO object will be automatically created. At the same time, instructional designers can adopt a more complex template structure to manage the creation of a SCO that includes, for example, an index of contents and advanced interactive features. Learning Objects can be created with every granularity level with regards to the desired features and according to the nesting required by the learning choices made when designing the LO.

A Learning Object (LO) can be defined as

the basic (simple or complex) unit of a learning experience, a small, self-contained piece of learning that can be reused in different contexts

In eXact Suite it is possible to set several settings for a learning object from the delivery perspective (as the title, the language, the success score, the bookmark etc), the navigation buttons success score and tracking options.



Let's focus on the **Tracking**.

The instructional designer can define if tracking must be enabled (ON) or disabled (OFF):

- If tracking is **disabled**, **no information about learner's experience with the learning object will be tracked**.
- When tracking is **enabled**, **learner's activity is tracked as per SCORM specification**. It is not necessary to define the type of SCORM tracking specifications (if SCORM 1.2 or 2004) as the content itself is able to automatically adapt, according to the tracking capabilities of LMS player.

The instructional designer can decide to track also certain learner's actions upon a Learning Object in compliance with **xAPI** specifications and save them as statements in an LRS. In this case the instructional designer must indicate a few parameters, such as the LRS access data.

Depending on the kind of tracking we set we can later retrieve different information, as we will see in the following.

All set-up? Then let's move to see which reports we can get!

[END OF PAGE]

Overview of available reports

eXact LMS has several kinds of available reports, about:

- Access Statistics
- Courses
- SCORM packages
- Learners' activity

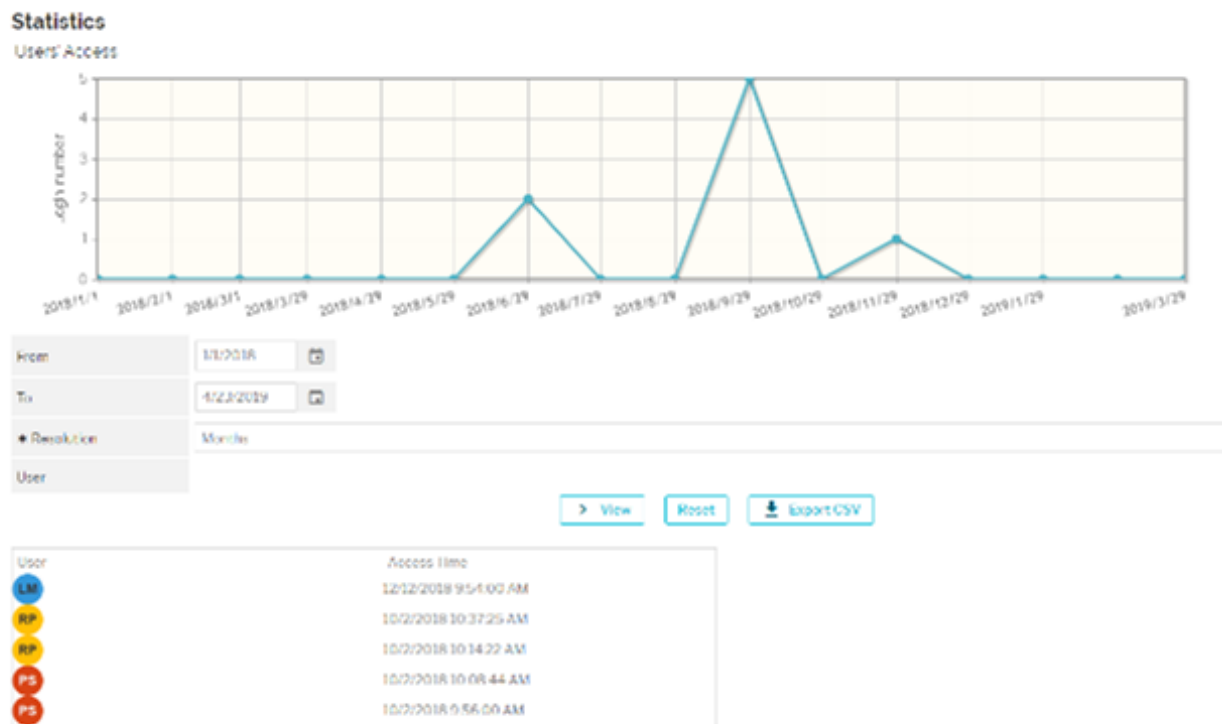
Now, let's look at the available reports in more detail and look at how to analyse them to make decisions and take actions.

[END OF PAGE]

(Learning Object #6.1.3.4 – html page) Access Statistics

Access Statistics

The first reports we are going to analyse focus on Access Statistics. The Access Statistics page allows retrieving information about the users' accesses to the platform.



This page allows to see users' accesses over time. Different filter options are available:

- **From / To:** filters the data by selecting a specific time range.
- **Resolution:** selects if the graph should be displayed in hours, days, weeks or months; an auto option will automatically select the best resolution depending on the time range selected.
- **User:** selects the user to monitor; if blank, all users are considered

The information can be viewed on screen or can be exported in CSV standard format.

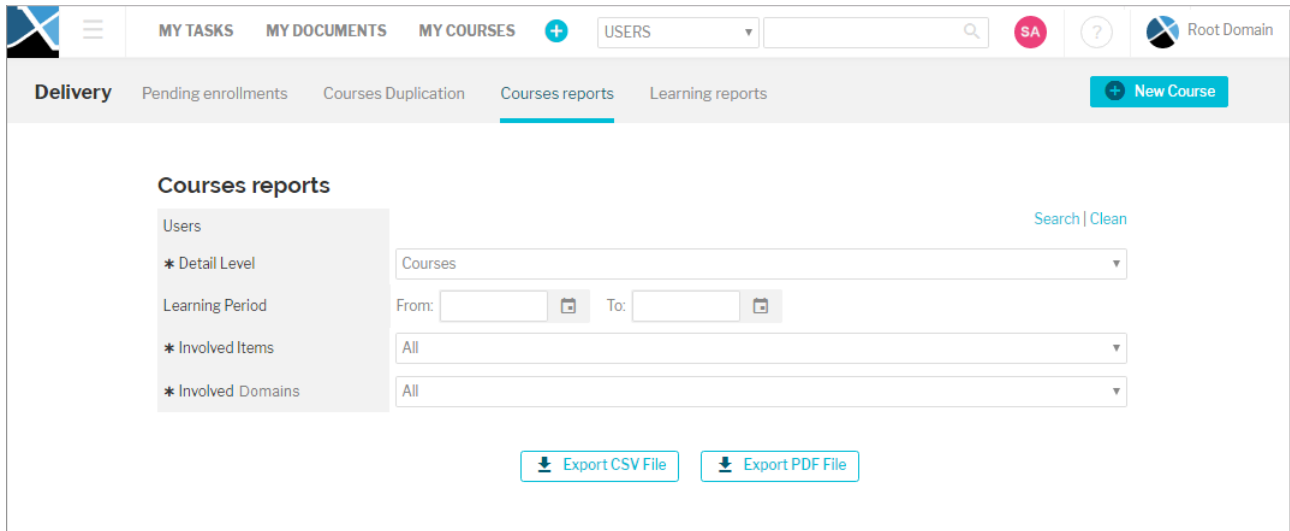
Now we have an idea of users' access over time. What about the courses? We'll see that next.

[END OF PAGE]

(Learning Object #6.1.3.5 – html page) Courses reports

Courses reports

In eXact LMS, e-tutors may access the learning reports to view learners' performances and results on courses. By selecting "Delivery" and then clicking on the "Courses reports" link in the left-hand menu, the following window appears:



The mandatory fields are marked with the (*) sign.

From the "**Users**" field, the "**Search**" link opens a pop-up window that allows the selection of one or more learners to consider for the report: the report will involve all the selected learners and therefore all and only the courses they are enrolled to. If no users are selected, the search will be on all learners (the user can find in the system).

The "**Detail level**" drop down menu allows to define if learning reports should be provided at course level or at SCORM package level.

The "**Learning period**" time interval allows the filtering of learning records based on the "first access date": if both dates are left empty, the system retrieves all courses in which selected learners are enrolled.

The "**Involved items**" drop down menu allows the filtering of records based on the completion status:

- "Completed" option involves "Completed" and "Passed" courses / SCORM packages;
- "Incomplete" option involves "Incomplete" and "Failed" courses / SCORM packages;
- "All" (default) option involves all other allowed statuses.

"All" option allows retrieving also courses / SCORM packages not yet attempted by the learners (i.e. items for which no learning record is available and then no first access date is defined): for this reason if the "All" value is selected the "Learning period" time interval is not taken into account even if the user valued one or both dates.

The "**Involved domain**" drop down menu allows to define which domains should be included to define the list of courses to be considered:

- Current domain only (default option);
- All my domains, in this way a delivery manager can download in a single report the courses of all the domains s/he is delivery manager of;
- A flat list of my domains in which domains are described by means of their path (e.g. Root Domain>Europe>Spain).

By clicking on the "**Export CSV file**" link the report will be saved on the local PC in a standard csv format that can be edited with the most common spreadsheet programs.

By clicking on the "**Export PDF file**" link the report will be saved on the local PC in a pdf format.

This is an example of how a Courses report may appear²:

	A	B	C	D	E	F	G	H	I
	Username	Name	Surname	Course Code	Course Name	Completion status	Date&Time of completion	Domain Code	Domain Name
2	a			CRS_NEG_S002	Negotiation at work	UNKNOWN		root	Root Domain
3	m			CRS_NEG_S002	Negotiation at work	COMPLETED	03/06/2019 12:36	root	Root Domain
4	j			CRS_NEG_S002	Negotiation at work	UNKNOWN		root	Root Domain
5	m			CRS_NEG_S002	Negotiation at work	COMPLETED	03/12/2019 11:06	root	Root Domain
6	e			CRS_NEG_S002	Negotiation at work	UNKNOWN		root	Root Domain
7	f			MAX011	Mastering soft skill	INCOMPLETE		root	Root Domain
8	p			CRS_NEG_S002	Negotiation at work	INCOMPLETE		root	Root Domain
9	s			MAX011	Mastering soft skill	COMPLETED	03/12/2019 10:05	root	Root Domain
10	p			MAX011	Mastering soft skill	UNKNOWN		root	Root Domain
11	l			CRS_NEG_S002	Negotiation at work	COMPLETED	03/07/2019 12:35	root	Root Domain
12	t			CRS_NEG_S002	Negotiation at work	UNKNOWN		root	Root Domain
13	d			CRS_NEG_S002	Negotiation at work	COMPLETED	03/07/2019 11:12	root	Root Domain

The report provides the following information:

- **username, name and surname of the involved learner** (these columns are displayed only if the report involves more than one learner);
- **code and name of the involved course**;
- **completion status achieved** by the learner on the course;
- **completion date and time** (in UTC format, valued only if the learner completed the course);
- **domain** code and name of the domains the courses belong to.

Note: if a user completes the same course several times, reports should include information about all completion events, i.e. the report should include not only the latest record about a completed status but all the records about a completed status after a record about an incomplete status.

It is also possible to get the report of just one specific course, from the course management page.

And what about learning objects report? Up Next.

² Please note that here and in the following, personal data such as first name, last name, user id, user email, etc... have been hidden for privacy reasons.

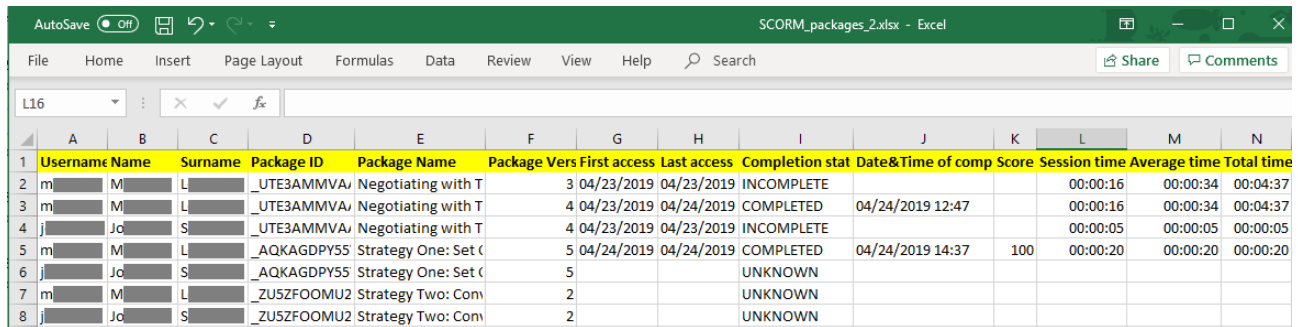
[END OF PAGE]

(Learning Object #6.1.3.6 – html page) Reports about SCORM packages

Reports about SCORM packages

Reports about SCORM packages display a table in which each row deals with the results achieved by a learner on a SCORM package.

This is an example of how a SCORM packages report may appear:



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	Username	Name	Surname	Package ID	Package Name	Package Vers	First access	Last access	Completion stat	Date&Time of comp	Score	Session time	Average time	Total time
2	m	M	L	_UTE3AMMVA	Negotiating with T	3	04/23/2019	04/23/2019	INCOMPLETE			00:00:16	00:00:34	00:04:37
3	m	M	L	_UTE3AMMVA	Negotiating with T	4	04/23/2019	04/24/2019	COMPLETED	04/24/2019 12:47		00:00:16	00:00:34	00:04:37
4	j	Jo	S	_UTE3AMMVA	Negotiating with T	4	04/23/2019	04/23/2019	INCOMPLETE			00:00:05	00:00:05	00:00:05
5	m	M	L	_AQKAGDPY55	Strategy One: Set C	5	04/24/2019	04/24/2019	COMPLETED	04/24/2019 14:37	100	00:00:20	00:00:20	00:00:20
6	j	Jo	S	_AQKAGDPY55	Strategy One: Set C	5			UNKNOWN					
7	m	M	L	_ZU5ZFOOMU2	Strategy Two: Conv	2			UNKNOWN					
8	j	Jo	S	_ZU5ZFOOMU2	Strategy Two: Conv	2			UNKNOWN					

The report provides the following information:

- **username, name** and **surname** of the involved **learner** (these columns are displayed only if the report involves more than one learner);
- **code, name** and **version** of the involved **SCORM** package;
- **first access date** and **time** (in UTC format);
- **last access date** and **time** (in UTC format);
- **completion status** achieved by the learner on the SCORM package;
- **completion date** and **time** (in UTC format, valued only if the learner completed the course);
- **score** achieved by the learner on the SCORM package (integer number);
- (last) **session time, average time** and **total time** spent by the learner on the SCORM package (hh:mm:ss format).

Note: If a user completes the same SCORM packages several times reports should include information about all completion events, i.e. the report should include not only the latest record about a completed status but all the records about a completed status after a record about an incomplete status.

That's enough for reports available to Staff. What about Learners? Are they able to access reports about their own performance? Let's discover next!

[END OF PAGE]

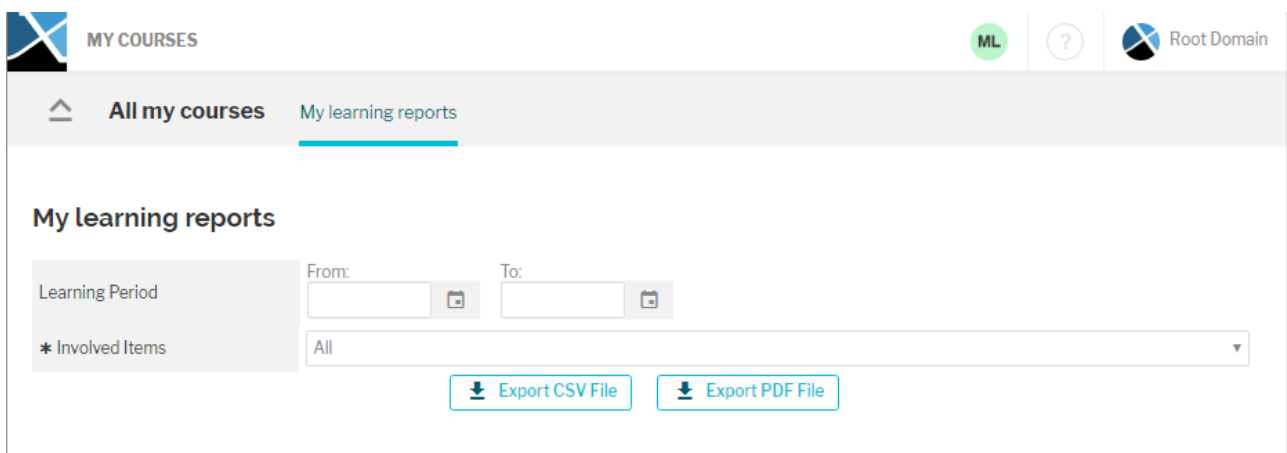
(Learning Object #6.1.3.7 – html page) Course reports for learners

Course reports for learners

Reports about courses are available for learners as well. To look at all and only the courses where a learner is enrolled, he can click on the "My profile" and then select "All my courses" link from the left-hand menu.

The "**All My courses**" page lists **all** and **only the courses** where the learner is enrolled into, in a UI similar to the ones provided for "My courses"; from this page it is possible to enter into each course and look at the info about the single material included in the course and the results achieved by the user on them.

Clicking on the "**Learning reports**" link in the left-hand menu, it is possible to look at the learning records available for the current user in all and only the courses s/he is enrolled in.



The screenshot shows a web interface for 'MY COURSES'. At the top, there's a navigation bar with 'MY COURSES' on the left, a green 'ML' button, a help icon, and a 'Root Domain' link. Below this, a sub-navigation bar has 'All my courses' and 'My learning reports' (which is highlighted with a blue underline). The main content area is titled 'My learning reports'. It features a 'Learning Period' section with 'From:' and 'To:' date pickers. Below that is a '* Involved Items' section with a dropdown menu currently set to 'All'. At the bottom of the form, there are two buttons: 'Export CSV File' and 'Export PDF File', both with download icons.

The report is similar to the "Course reports". From this page the user can download reports involving learning records about all and only the courses the user is enrolled in.

[END OF PAGE]

(LO #6.1.3.8 html page) Understanding reports and making decisions

Understanding reports and making decisions

As seen above, reports can be exported as .csv files and opened as any excel file by a suitable program, such as Microsoft Excel or OpenOffice Calc.

This is how a Courses report appears:

	A	B	C	D	E	F	G	H	I	J
	Username	Name	Surname	Course Code	Course Name	Completion status	Date&Time of completion	Domain Code	Domain Name	
1	a	A	S	CRS_NEG_S002	Negotiation at wor	UNKNOWN		root	Root Domain	
2	m	M	S	CRS_NEG_S002	Negotiation at wor	COMPLETED	03/06/2019 12:36	root	Root Domain	
3	j	J	S	CRS_NEG_S002	Negotiation at wor	UNKNOWN		root	Root Domain	
4	m	M	S	CRS_NEG_S002	Negotiation at wor	COMPLETED	03/12/2019 11:06	root	Root Domain	
5	e	E	S	CRS_NEG_S002	Negotiation at wor	UNKNOWN		root	Root Domain	
6	f	F	S	MAX011	Mastering soft skill	INCOMPLETE		root	Root Domain	
7	p	P	S	CRS_NEG_S002	Negotiation at wor	INCOMPLETE		root	Root Domain	
8	s	S	S	MAX011	Mastering soft skill	COMPLETED	03/12/2019 10:05	root	Root Domain	
9	p	P	S	MAX011	Mastering soft skill	UNKNOWN		root	Root Domain	
10	l	L	S	CRS_NEG_S002	Negotiation at wor	COMPLETED	03/07/2019 12:35	root	Root Domain	
11	t	t	S	CRS_NEG_S002	Negotiation at wor	UNKNOWN		root	Root Domain	
12	d	D	S	CRS_NEG_S002	Negotiation at wor	COMPLETED	03/07/2019 11:12	root	Root Domain	

This is how a SCORM Packages report appears:

	B	C	D	E	F	G	H	I	J	K	L	M	N
	Name	Surname	Package ID	Package N	Package Version	First access	Last access	Completion status	Date&Time of	Score	Session ti	Average ti	Total time
20	P	B	Issuing_of_Digi			11 03/20/2018	11/09/2018	COMPLETED	11/09/2018				
21	P	B	BWM-Inspectio			5 04/16/2018	11/09/2018	COMPLETED	11/09/2018	71		00:25:10	01:15:31
22	F	B	EMSA_Equipme			1 09/11/2018	09/11/2018 16:42	INCOMPLETE			00:00:12	00:00:12	00:00:12
23	P	B	M21_new			2 03/22/2018	11/09/2018	COMPLETED	11/09/2018			00:20:37	03:26:12
24	P	B	m20_1			8 04/30/2018	11/09/2018	COMPLETED	11/09/2018			00:08:06	00:32:24
25	P	B	Ballast_Conven			3 09/11/2018	09/11/2018 16:08	INCOMPLETE					
26	P	B	Ballast_Conven			5 09/11/2018	09/11/2018 16:05	INCOMPLETE					
27	P	B	Ballast_Conven			3 03/28/2018	11/09/2018	COMPLETED	11/09/2018			00:12:09	00:48:38
28	P	B	Accident_Inves			10 03/21/2018	11/09/2018	COMPLETED	11/09/2018			00:08:28	01:07:47
29	A	B	m20_1			8 08/10/2018	08/10/2018 16:32	INCOMPLETE			00:03:26	00:03:26	00:03:26
30	A	B	M21_new			2 04/03/2019	04/03/2019 17:59	INCOMPLETE			00:00:00	00:00:00	00:00:00
31	D	B	Issuing_of_Digi			11 04/26/2017	01/30/2018 11:32	INCOMPLETE					
32	D	B	Accident_Inves			10 01/24/2018	02/14/2018 11:48	INCOMPLETE				00:27:43	01:50:52
33	F	C	Accident_Inves			10 03/26/2019	03/26/2019 09:55	INCOMPLETE			00:00:00	00:00:00	00:00:00
34	A	C	EMSA_Equipme			1		UNKNOWN					
35	N	C	BWM-Inspectio			5 03/29/2018	03/29/2018 12:32	INCOMPLETE					

All data are here, but it is not very useful in this context, so a little more formatting may be needed. A few additional processing is needed. Lets' see how we can better report on the data, so we can better understand it and make decisions.

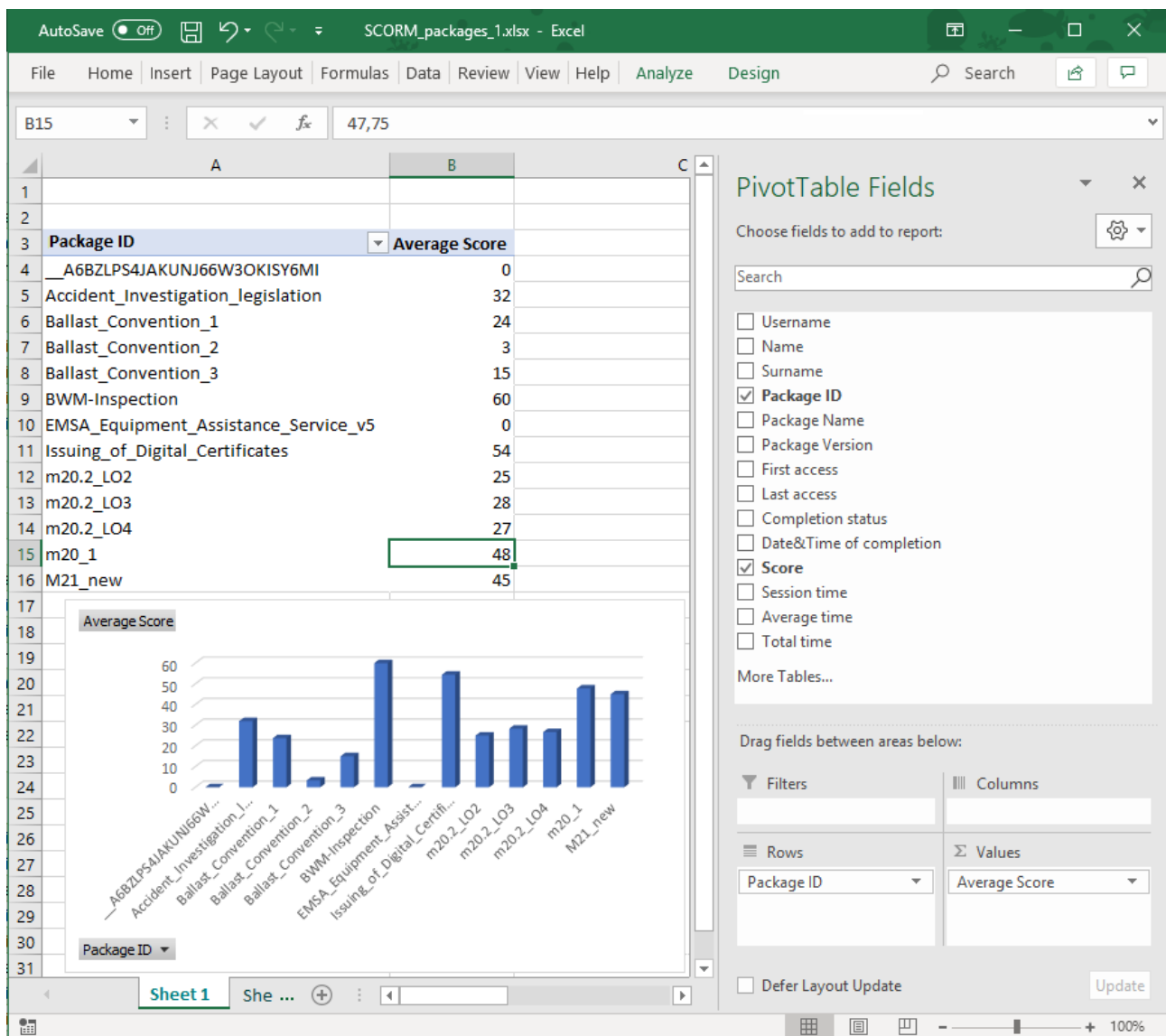
We can envisage mainly in two ways: automatic processing and creating graphs.

1. Automatic processing

Via excel editors it is possible to use formulas to extract further information about data.

For example:

- Counting how many students completed a certain course:
 - Use formula
$$= \text{COUNTIFS}(F2:F13; "COMPLETED"; D2:D13; "CRS_NEG_S002")$$
- Find average score of SCORM Packages:
 - Use a Pivot table, select Package ID as Rows, Average Score as values:



A basic knowledge of statistics, as well as understanding how to deal with formulas with the selected tool, are suggested – and are out of the scope of this Module.

2. Create graphs to have an intuitive understanding of data

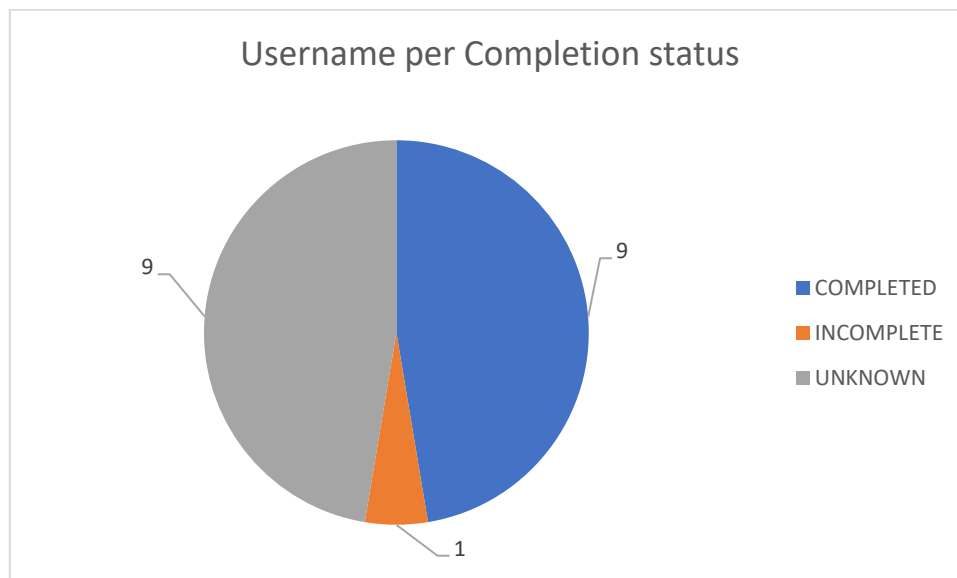
Tools such as Office Excel and OpenOffice Calc allow the selection of data and can automatically build graphs with it. Deciding which data to pay greater attention to usually depends on the Company's training objectives and performance indicators.

Let's see some examples.

Let's assume we have filtered on a specific package id and have the following data:

Username	Package ID	First access	Last access	Completion statu	Score	Session time	Average time	Total time
a	pack001	11/29/2018 17:26	11/29/2018 17:26	UNKNOWN		01:10:00	01:10:00	01:10:00
b	pack001	11/19/2018 10:29	11/19/2018 10:29	UNKNOWN		01:19:05	01:19:05	01:19:05
c	pack001	11/19/2018 10:30	11/20/2018 9:32	UNKNOWN		00:40:02	01:20:04	02:00:08
d	pack001	11/27/2018 10:38:00	11/27/2018 10:38:00	COMPLETED	98	01:40:02	01:40:02	01:40:02
e	pack001	11/19/2018 10:30	11/19/2018 10:30	COMPLETED	70	01:38:04	01:38:04	01:38:04
f	pack001	11/20/2018 11:03	11/21/2018 12:03	COMPLETED	75	00:41:02	00:43:01	02:26:02
g	pack001	11/20/2018 11:30	11/20/2018 11:30	INCOMPLETE	85	01:45:02	01:45:02	01:45:02
h	pack001	12/03/2018 10:38	12/05/2018 09:08	COMPLETED	95	00:42:01	00:51:03	01:00:06
i	pack001			UNKNOWN				
j	pack001	11/20/2018 10:05	11/20/2018 10:05	COMPLETED	55	02:00:03	02:00:03	02:00:03
k	pack001	11/20/2018 09:50	11/20/2018 09:50	UNKNOWN		01:20:13	01:20:13	01:20:13
l	pack001			UNKNOWN				
m	pack001	11/20/2018 12:02	11/20/2018 12:02	COMPLETED	100	01:30:20	01:30:20	01:30:20
n	pack001	11/19/2018 18:29	11/27/2018 11:46	UNKNOWN				
o	pack001	11/27/2018 11:32:00	11/27/2018 11:32:00	COMPLETED	100	01:30:01	01:30:01	01:30:01
p	pack001			UNKNOWN				
q	pack001	11/27/2018 14:08:00	11/27/2018 14:08:00	COMPLETED	98	01:28:11	01:28:11	01:28:11
r	pack001			UNKNOWN				
s	pack001	11/20/2018 15:25	11/20/2018 15:25	COMPLETED	95	01:20:01	01:20:01	01:20:01

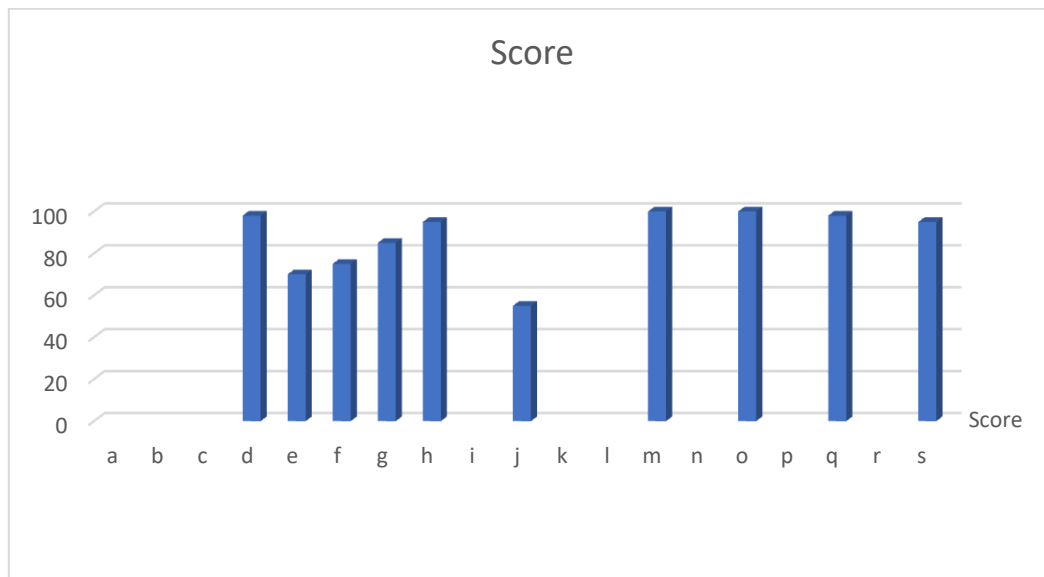
Via a pivot table, we can create a pie chart showing completion status:



From this diagram we can notice that:

- More or less half of the learners have completed, and half never accessed (unknown status); just one accessed and did not complete
 - Therefore, the e-tutor could take action via sending a reminder to learners who never accessed, eventually asking for the reason: could they access the course? Do they remember their account credentials?

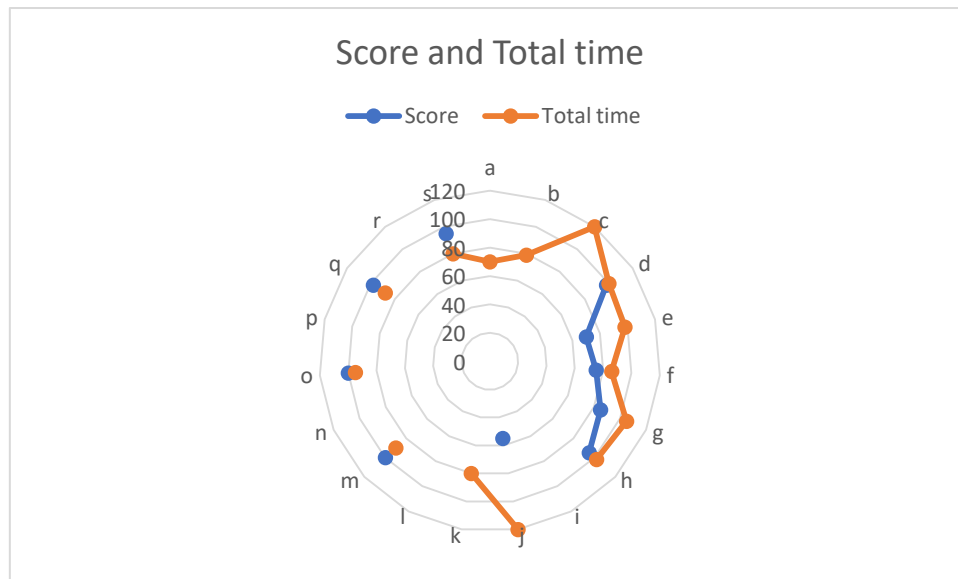
By selecting **Username** and **Score** columns, we can automatically create a histogram showing learner's scores:



From this diagram we can immediately notice that:

- Learners with higher score are **m** and **o**, followed by **d, q, s** and **h**
 - No action seems required
- Learners **a, b, c, i, k, l, n, p, r** have no score, this means they did not take the test yet
 - The e-tutor could wait for a few days before the course deadline, if any, to send them a reminder for taking the test
- Among learners who take the test, **j** was the one with the lower performance
 - The e-tutor could consider getting in touch with him, or maybe reviewing his performance in other courses too, to understand if the low score is an isolated case or a frequent, recurring situation.

By selecting **Username**, **Score** and **Total time** we can automatically create a radar graph showing all these data together:



From this diagram we can make the following hypothesis:

- Spending a lot of time engaging with the learning object does not necessarily correlate to high scores; learners who spent more time, such as c and j, either did not complete or got a low score
- About at least eighty minutes are required by the learning object as nobody with a good score took less time to complete

We are talking about a hypothesis here, as the learners' base is quite small; with small numbers we can't consider having a statistically significant sample.

More typical examples of data analysis:

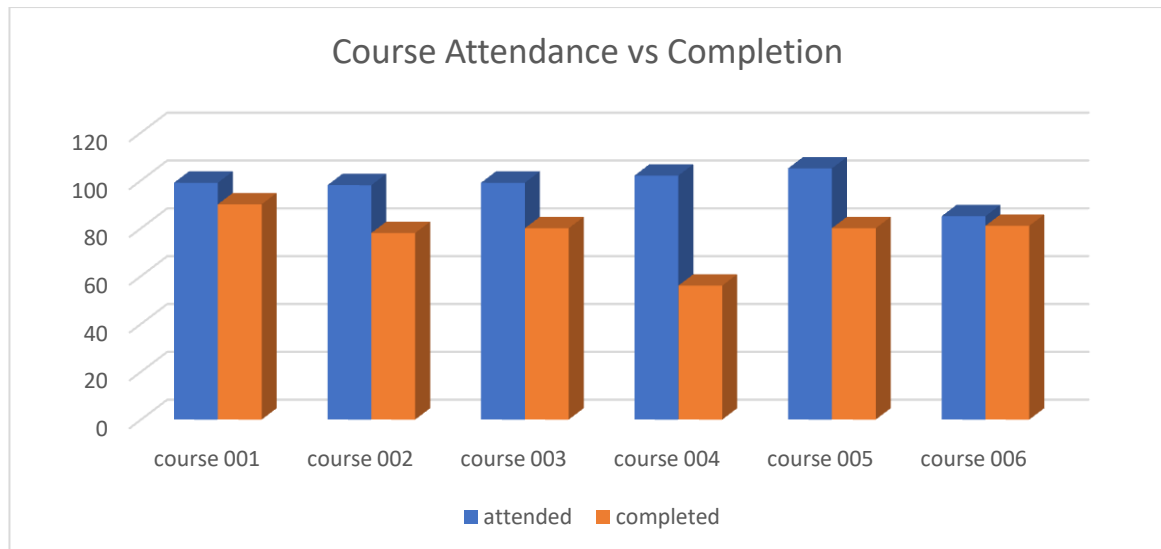
- Comparing courses in terms of attendance vs. completion;
- Comparing (normalized) average scores of courses;
- Analyzing scores of learners for a given learning object;
- Comparing performance of a specific learner over time/courses

[END OF PAGE]

(LO #6.1.3.9 ACTIVITY) Quiz: Understanding reports and taking decisions

Quiz: Understanding reports and taking decisions

Look at the following histogram representing Course attendance vs. Course completion and answer the two questions below.



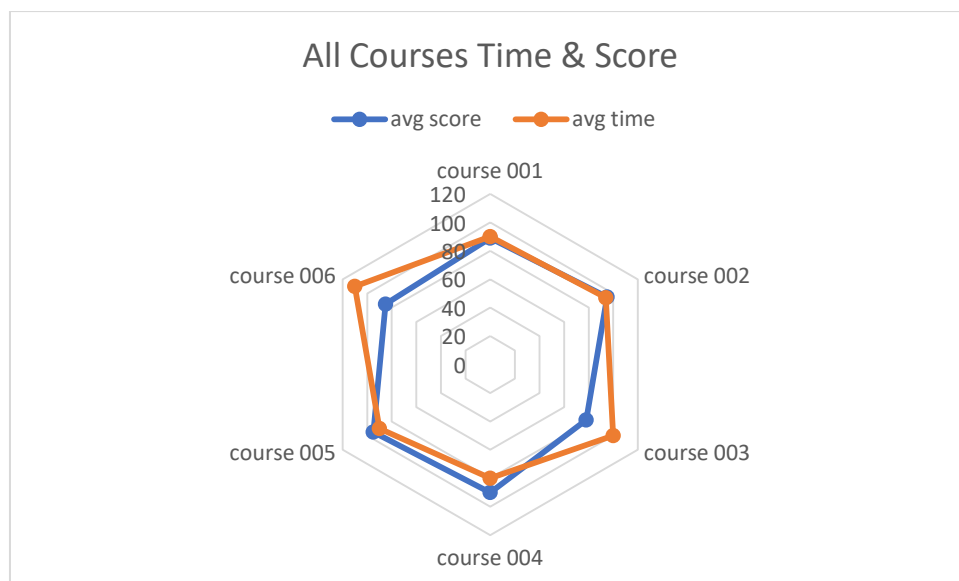
1. Which of the following sentences is true?

- ☒ Almost all learners who attended Course 006 also completed it
- ☐ Course 001 was the most attended course
- ☐ Course 004 had the lowest attendance
- ☐ Course 004 had a high attendance, but less than one third of the learners completed

2. E-tutors should achieve completion of a course by the majority of the users who attended it. Which one seems the most important action that the e-tutors of the course should take in order to achieve that?

- ☒ Getting in touch with students of Course 004 who did not complete yet to call them to action
- ☐ Sending a reminder to students who did not complete Course 006
- ☐ Asking to learners of Course 002 why they are having so low scores
- ☐ Reasoning on why Course 002 and Course 003 have more or less the same numbers

Let's look at another graph and answer the two questions below.



3. Which of the following sentences is true:

- ☒ On average, the course taking most time is Course 006
- ☐ On average, the course taking least time is Course 003
- ☐ On average, Course 003 takes less time than Course 005
- ☐ On average, Course 002 and course 004 take the same time

4. Which hypothesis could the e-tutors of the courses make?

- ☒ it is not always true that taking more time results in a higher score
- ☐ taking a longer time results in a higher score
- ☐ time spent and average score increase proportionally
- ☐ time spent and average score are inversely proportional

[END OF PAGE]

6.2 Additional reports in eXact LMS

6.2.0 Additional reports

(Learning Object #6.2.0.1 video) Additional reports in eXact LMS

Additional reports in eXact LMS

A short (<1 min) **instructor talking head** video to introduce the topic+ Transcript in .txt and .srt files to download.

Video Transcript

***Hi! We have now seen and analyzed basic reports available in eXact LMS. Let's see advanced reports.

One option is to use **satisfaction questionnaires**. These ones work both for online and blended learning. They are very important to gather learners' feedback and consequently enhance the training offer.

Another possibility to get more insights about learners' experience is given by eXact LMS **advanced reports**, presented in the following. Let's move on!***

[END OF PAGE]

6.2.1 Learners' satisfaction

(Learning Object #6.2.1.1 activity) Poll & Discussion: Learners' satisfaction

What do you think about learners' satisfaction in institutional contexts? Have you ever thought that measuring the level of learner's satisfaction can help Institutions to improve their learning offerings?

ACTIVITY/PRACTICE QUESTION (Poll):

1. Do you know the difference between a test and a satisfaction questionnaire?
 - o Yes
 - o No

2. Have you ever been in charge of providing learners' satisfaction questionnaire?
 - o Yes
 - o No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your responses about dealing with learners' satisfaction in the following discussion task, by posting your thoughts on the discussion board. You may discuss:

1. *How would you as an instructional designer, tutor or school teacher assess learners' satisfaction*
2. *How would you analyse and take action basing on satisfaction information*

[END OF PAGE]

Evaluation models for satisfaction questionnaires

In the last decade, the evaluation of training has been further enriched with new elements and the usual evaluation areas have been joined by others, aimed at investigating and enhancing the results in terms of organizational change and impact on organizational and social systems. Different models have followed, which have been integrated, criticized, revisited and adapted to e-learning scenarios.

It is possible, and recommended as a good practice, to integrate a participant satisfaction questionnaire in courses provided by eXact LMS.

In the following we will let you actively discover three exemplary models for satisfaction questionnaires and then show you a couple of real examples of such questionnaires.

[END OF PAGE]

(Learning Object #6.2.1.3 – Activity: Arrange) Evaluation Models: the Kirkpatrick's model

Evaluation Models: the Kirkpatrick's model

The model is articulated on four levels, aimed at ascertaining the change that people get from training and the results from the point of view of the organization that activated the process.

Try to arrange the elements in the right order.

Level 1 - Reaction	Measure the attitude developed by the participants towards the training activity. The measurement of the reaction does not say if and how useful the training activity was for a growth in skills, but only if those who participated had the opportunity to develop a positive experience. The positive experience, moreover, determines an important condition for participants to be inclined to use the skills learned during the training. While not demonstrating the levels of learning achieved, this measurement tells us if there are subjective conditions for such learning to be recalled when the opportunity is presented. The reaction is certainly the level of evaluation most used, because it is the most easily accessible one. The most widely used detection tool, in this case, is the satisfaction test.
Level 2 - Learning	Measure how much the competences-objective of a training activity are in possession of the participants at the end of the activity itself. Knowing the level of learning at the end of the training activity provides two central functions of the evaluation: the formative one that serves to define if the learning itself needs integrations or reinforcements in a short time, in order not to decay; the regulatory one, which is indispensable for deciding whether and to what extent to modify the project just implemented, to improve its effectiveness in the event of future applications.
Level 3 - Transfer	It measures how much the competences-objective of a training activity are effectively used by the participants, in work situations and at a distance of time from the activity itself. The predictability is not of a deterministic nature, but only probabilistic since after some time the skills learned are exercised at the expected level not only by virtue of the quality of the training provided, but also in relation to some fundamental conditions of the work context, which favor or less the exercise of competences. Therefore, the degree of existence of the conditions of exercise of the competences in the specific work context also fall within this evaluation. This assessment is carried out in the ex-post phase.
Level 4 - Results	In this case it is measured whether and how much the client organization has achieved improvements in the performance of the operator who participated in the training activity. It is therefore the organization itself that assesses its willingness to put the operator in a position to exercise competence. It is one of the follow-up activities of the project, but it is usually suggested to carry out this evaluation at the end of the project after an adequate period of time has elapsed.

[END OF PAGE]

(Learning Object #6.2.1.4 – Activity: Drag & Drop) Evaluation Models: the Marshall and Shriver Model

Evaluation Models: the Marshall and Shriver Model

The model is based on five assessment levels oriented to the acquisition of knowledge and skills in the learner, in the context of distance learning projects. Try to associate the content to its evaluation.

The evaluation of the teacher and of the tutor	Also in didactic situations like those distance learning or e-learning, in which teachers / tutors are physically separated in time or distance, it is necessary to obtain feedback from the learners tutor and on the quality of the interaction they establish (even if mediated by chat, e-mail, etc.) on the frequency of interventions in the virtual classroom, on the clarity and timeliness of answers to students' questions, etc.
Evaluation of teaching materials	Students' comments serve to calibrate the difficulty level of the contents, to collect indications about the relevance compared to the educational objectives, the presentation methods and the interest that the contents arouse in the recipients of the interventions. These comments help to improve the overall effectiveness of the content.
Evaluation of course modules	The course structure is evaluated, the structure of the teaching modules and the order in which they are offered within a course.
Evaluation of the curriculum	It is a higher-order analysis that collects and compares the data of previous assessments and the learning outcomes of the learners. It is carried out on all the courses that make up a curriculum and on several editions.
The transfer of learning	It is a summary evaluation with respect to Kirkpatrick model and which includes the four levels. It is relative to the learner's performance.

This model places particular emphasis on the figure of the teacher-tutor who is considered the true animator of the training in the virtual situation.

[END OF PAGE]

(Learning Object #6.2.1.5 – Activity: Drag & Drop) Evaluation Models: the Van Slyke et al. Model

Evaluation Models: the Van Slyke et al. Model

This is a multiple-variable model that considers the input and output aspects of the training process. All these variables must be taken into account in an integrated way, in relation to a second type of variables linked to two output levels: the one relative to the institution and the one relative to the learner itself. Other additions to the model suggest taking into consideration the impact of training on the institution/organization and on society more generally. Try to associate the content to the variables.

The characteristics of the organization	The objectives of the organization, the strategies, the spending policies, the technological infrastructures present, the support structures available, etc.
The characteristics of the learners	Individual objectives, expectations, are to be noted personal motivations, skills prior to the training intervention, experiences of use of technologies, etc. It is the only model that introduces the second concept which also the characteristics of the learner can constitute a factor of success or failure of an e-learning project.
The characteristics of the course	Must be assessed in relation to their ability to respond to the teaching methods chosen for e-learning training. For example, the use of appropriate media with respect to the contents to be conveyed, the collaborative learning mode with respect to the choice of setting up virtual classrooms, etc.
The technological characteristics of the training context	The characteristics must be evaluated of jobs, the more or less extensive use of technologies, software environments and hardware.

[END OF PAGE]

(Learning Object #6.2.1.6 – html page) Examples of Learners' satisfaction questionnaires

Examples of Learners' satisfaction questionnaires

Let's see now a sample of a (very short) satisfaction questionnaire about **contents** and **methodology** and related answers:

SCORMpackagesTrackingReports.csv - Excel									
File Home Insert Page Layout Formulas Data Review View Help Search Share Comments									
K11									
	A	B	C	D	E	F	G	H	I
1									
2		<i>absolute numbers</i>				<i>percentages</i>			
3	QUESTIONS	Below expectations	Sufficient	Adequate	Above expectations	Below expectations	Sufficient	Adequate	Above expectations
4	1. OBJECTIVES Were learning objects declared at the beginning reached out by the end of the course?	10	78	198	16	3,31%	25,83%	65,56%	5,30%
5	2. CONTENTS Were course contents presented in a clear manner?	22	105	156	19	7,28%	34,77%	51,66%	6,29%
6	3. CONTENTS Were learning materials adequate?	14	95	182	10	4,65%	31,56%	60,47%	3,32%
7	4. METODOLOGY Was the e-learning methodology effective?	24	104	151	22	7,97%	34,55%	50,17%	7,31%
8	5. LOGISTICS How was the course logistics?	24	89	171	17	7,97%	29,57%	56,81%	5,65%
9	6. OVERALL EVALUTATION OF THE COURSE Which is the overall evaluation of the course?	17	88	183	10	5,70%	29,53%	61,41%	3,36%

With the data coming out of the learners' satisfaction questionnaire, it is possible to have some graphs and to launch queries to analyze different aspects of the learning environment and improve it. For example, an e-tutor can create these related graphs:



From the graphs above, it is clear that the course went well overall: all aspects were considered adequate or above the expectations by most of the participants. Some considerations could be done about the methodology which is the aspect most rated as “below expectations”, even if by only a minority of the course attendants.

We have seen questions about learning objects, contents, logistics and methodology.

In addition to these groups of questions, it may be useful to ask some questions also on **feelings and emotional aspects** perceived by the learners. This type of questions is useful to bring out the emotional state, which the teacher would immediately realize in the classroom and which in e-learning modality risks instead to remain submerged and thus not to offer the possibility for improving and/or adjusting training experience offer.

Moreover - as underlined by various authors who have dealt with emotional design - asking direct questions such as "Are you are satisfied with the course" risks that complexity of the

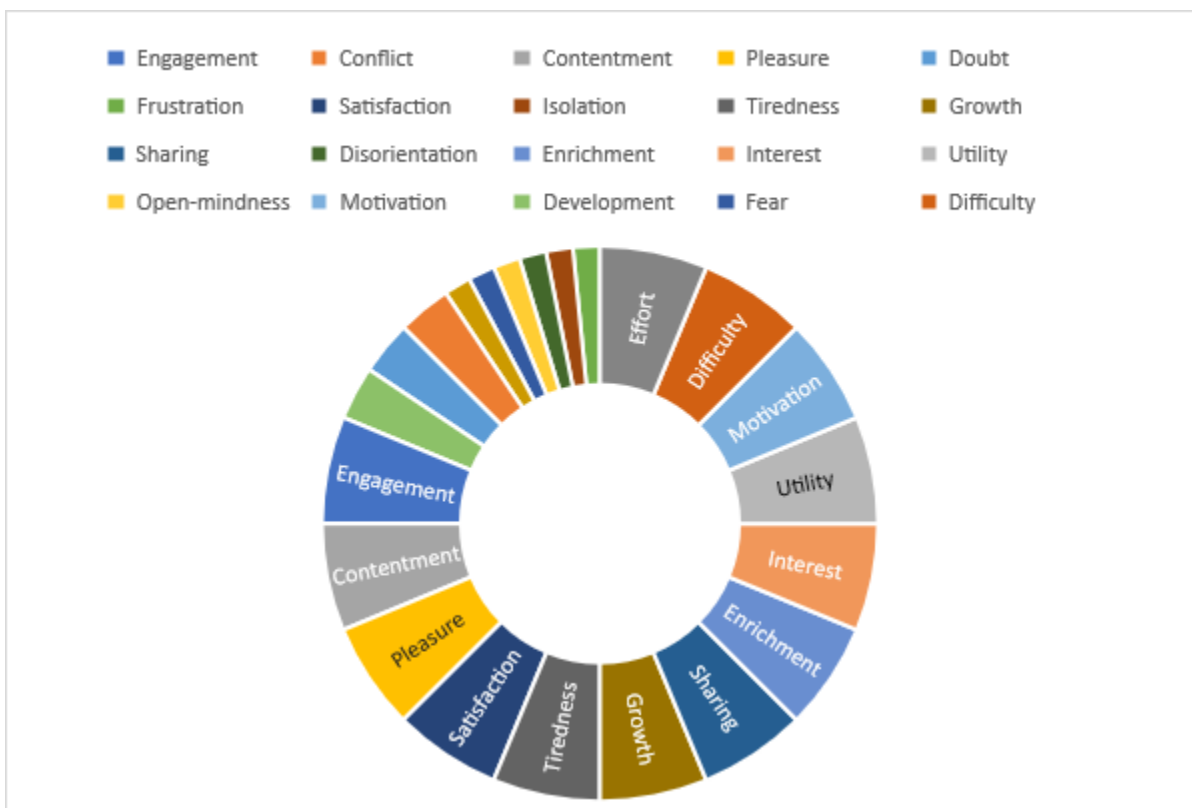
emotions does not come out and therefore the Instructional Designer and/or e-tutor is not able to find more easily the causes that generated them.

Another approach could be the one to add a question on **feelings and emotional aspects** perceived by the learners.

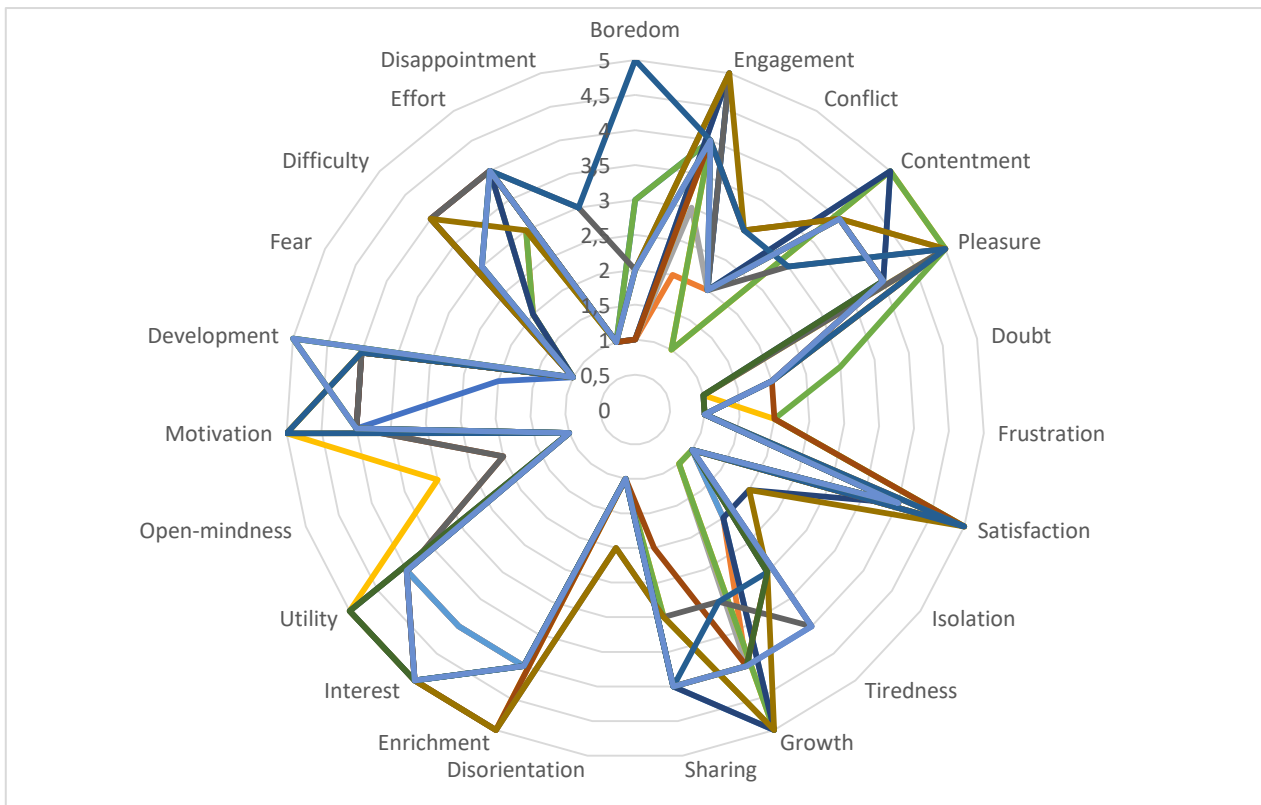
During the study, did you feel any of the following sensations? [please assign a value from 0 (not at all) to 5 (very high)].

Boredom: 0, 1, 2, 3, 4, 5	Isolation: 0, 1, 2, 3, 4, 5	Open-mindedness: 0, 1, 2, 3, 4, 5
Engagement: 0, 1, 2, 3, 4, 5	Tiredness: 0, 1, 2, 3, 4, 5	Motivation: 0, 1, 2, 3, 4, 5
Conflict: 0, 1, 2, 3, 4, 5	Growth: 0, 1, 2, 3, 4, 5	Development: 0, 1, 2, 3, 4, 5
Contentment: 0, 1, 2, 3, 4, 5	Sharing: 0, 1, 2, 3, 4, 5	Fear: 0, 1, 2, 3, 4, 5
Pleasure: 0, 1, 2, 3, 4, 5	Disorientation: 0, 1, 2, 3, 4, 5	Difficulty: 0, 1, 2, 3, 4, 5
Doubt: 0, 1, 2, 3, 4, 5	Enrichment: 0, 1, 2, 3, 4, 5	Effort: 0, 1, 2, 3, 4, 5
Frustration: 0, 1, 2, 3, 4, 5	Interest: 0, 1, 2, 3, 4, 5	Disappointment: 0, 1, 2, 3, 4, 5
Satisfaction: 0, 1, 2, 3, 4, 5	Utility: 0, 1, 2, 3, 4, 5	

Answers to these questions can be analyzed in several ways. Let's see, for example, the resulting pie chart:



and radar graph:



The pie chart shows slices whose dimensions are proportional to the average rating of the corresponding feeling. We can read positive feelings, such as engagement, satisfaction, enrichment, motivation. While we can't read in the pie feelings such as frustration, fear, isolation, because these feelings were so rare that that the corresponding slices are very thin.

From the radar chart we can deduce some correlations among data. For example, we can see very similar values for contentment and pleasure, as for utility, interest and enrichment.

[END OF PAGE]

6.2.2 Learning reports

(Learning Object #6.2.2.1 html page) Learning reports in eXact LMS

Learning reports in eXact LMS

In addition to basic reports, Learning Reports are available in eXact LMS. These reports are “advanced” in the sense that they provide further filtering of data about learners’ experience, as explained in the following.

These reports are not available by default, but rather on demand, when in deep monitoring is requested by the objectives of the Company Training department.

Learning reports can be accessed via the following form:

REPORT SEARCH ENGINE

USERS Search | Clean

MATERIALS Search | Clean

* AGGREGATION LEVEL

PHOTOGRAPHIC REPORTS Date [] [] Detailed report Package statistics User statistics Export CSV

HISTORY REPORT From [] [] To [] [] Export CSV

+ Show report configuration options for history and photo report type

+ Show report configuration options for statistic report type

From the "**Users**" field, click on the "**Search**" link and from the pop-up window that appears select one or more users to consider for the report. To unselect the selection made, click on the "Clean" link. If no users are selected, the search will be on all users.

From the "**Materials**" field, click on the "**Search**" link and from the pop-up window that appears select which material to consider for the report, multiple selection is also allowed here. To unselect all the selected options, click on the corresponding "Clean" link. If no materials are selected, the search will be on all materials.

From the "**Aggregation level**" drop-down menu select the type of material:

- SCO - a Learning Object that is compliant with SCORM standard
- Package - a complete course package

The "Aggregation level" is a mandatory selection. If a course is made of a single SCO, the two reports will track the same information.

The following reports are available:

- **Photographic report** - a report concerning a specific date (only a single date will be selectable in the form and the report will include data up to the specified date).
 - Further available options allow to download **statistics** per packages or users for a given date.
- **History report** - the data on all the user attempts made within a certain time (start date and end date will be selectable in the form).

By clicking on the "Export CSV" link the report will be saved on the local PC in a standard csv format that can be edited with the most common spreadsheet programs.

[END OF PAGE]

Reports on users

eXact learning LCMS platform provides a set of business reports that can be downloaded on local PC in a CSV format for further analysis.

From the User list page, administrators can select the "Export CSV" link related to "All users data" to download a CSV file in which for each user the following information are provided:

login username

- last name
- first name
- e-mail address
- date of birth
- gender
- language
- street
- town
- postal code
- region
- country



Note: eXact learning LCMS platform allows to configure the information to be included in this CSV file.

The information listed above refers to the default configuration provided by the eXact learning LCMS platform, but this default configuration can be updated by adding to / removing from the configuration applied to the eXact learning LCMS installation based on the information provided by the system to describe a user.

This implies that you could find a different number of fields in the downloaded CSV files due to a different configuration.

Reports about learners can be combined with other reports for further data analysis, as we will see in the following.

[END OF PAGE]

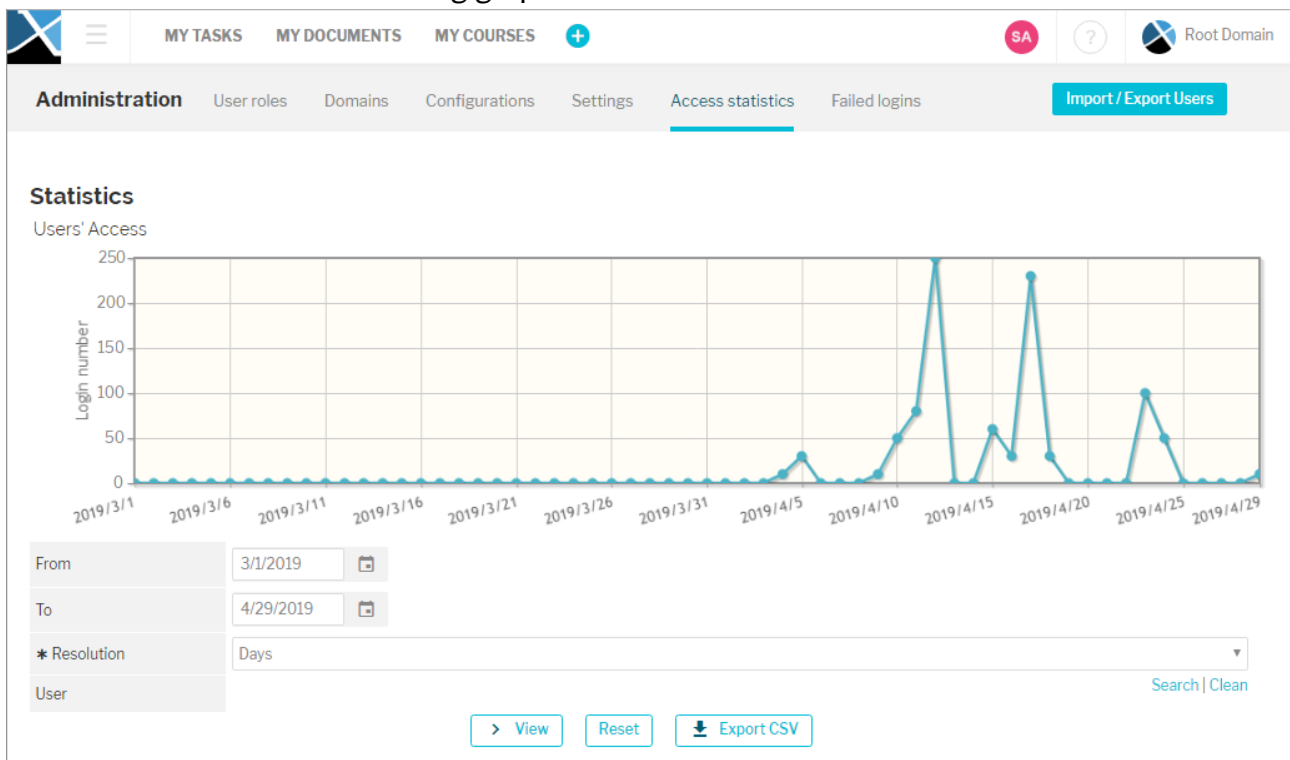
(Learning Object #6.2.2.3 [html page](#)) Understanding advanced reports and making decisions

Understanding advanced reports and making decisions

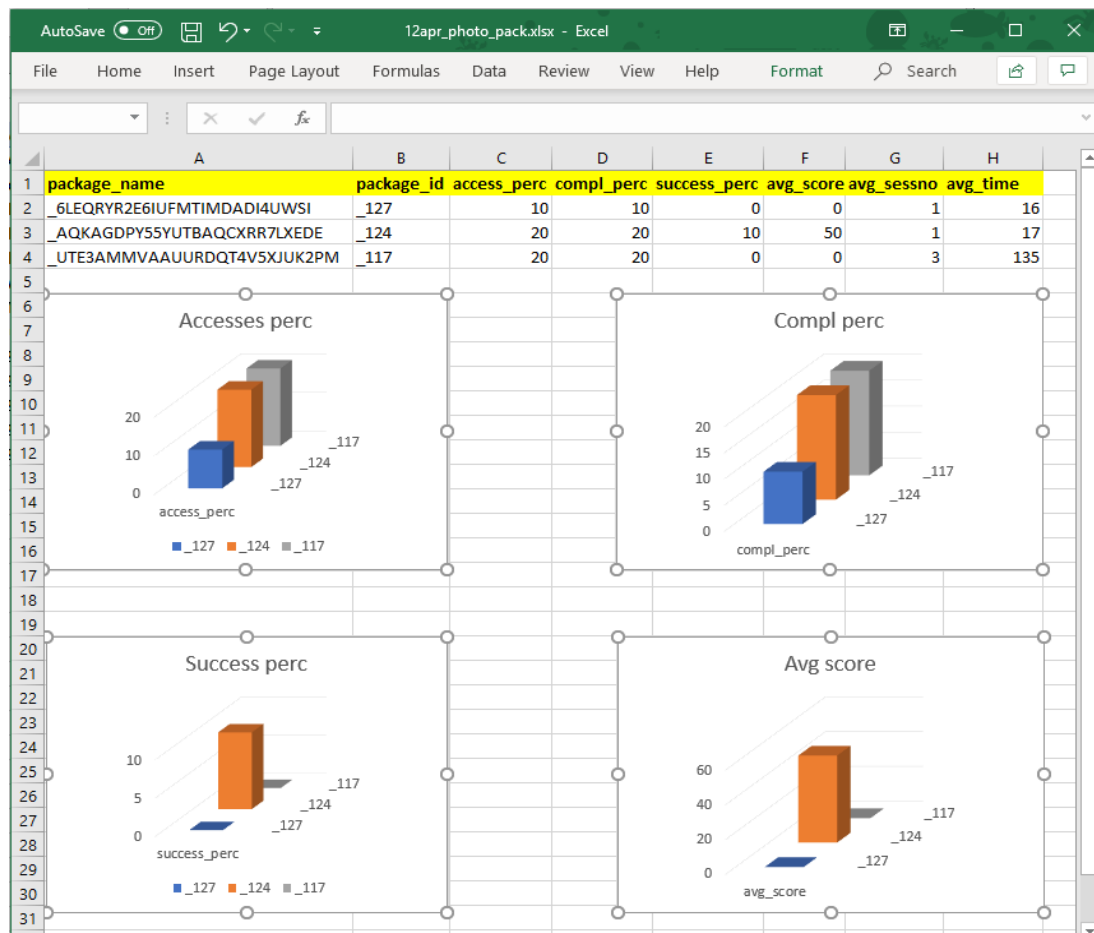
As seen for basic reports, advanced reports can also be exported as .csv files, opened in any Excel file or another suitable program, and used to extract data in analytical or graphical ways. Let's see a few examples.

1. HR Manager: analyzing accesses

Lets' assume we see the following graph from **access statistics**:



From here we can immediately notice a few picks. What did it happen in these days? We can then have a look at the advanced reports, in particular the photographic reports of these days. Let's see the **photographic report per package** of the day of maximum pick and a few graphs we can build upon the data:



We see that there are three learning objects among which the one indicated in grey has the highest number of accesses and completion, but no success at the end. While the learning object indicated in orange, even if having lower access and completion numbers, seems to be sometimes completed successfully.

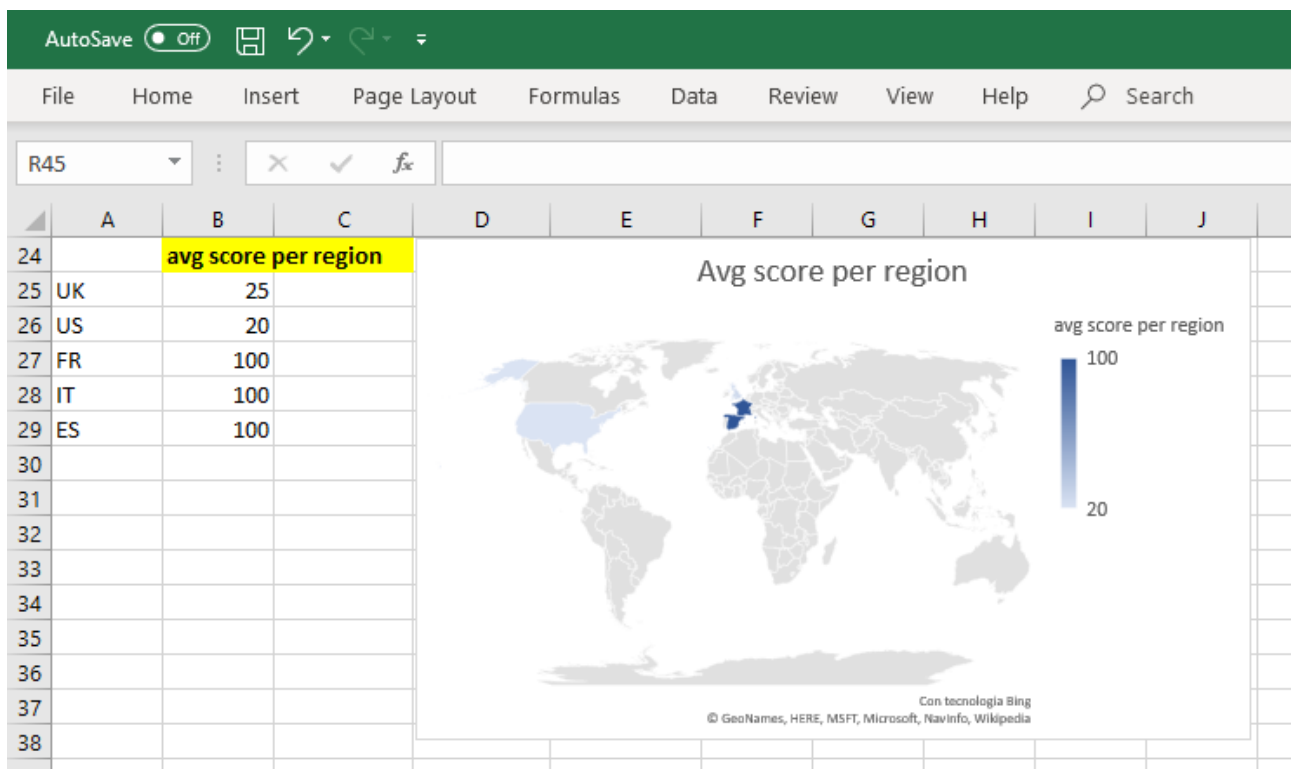
We can further analyze the data depending on our objectives.

2. Instructional designer: analyzing scores

Moving from the previous data, we could for example use a **photographic report per user** referring to the orange learning object:

12apr_photo_pack_user_2.xlsx - Excel									
AutoSave Off									
R16									
	A	B	C	D	E	F	G	H	I
1	user_nam	user_id	access_perc	compl_perc	success_perc	avg_score	avg_sessn	avg_time	region
2	j	32	100	100	0	0	1	13	UK
3	m	163	100	100	100	0	1	20	UK
4	a	44	100	100	100	100	2	24	UK
5	m	37	0	0	0	0	0	0	US
6	a	87	100	100	100	100	1	10	FR
7	d	66	100	100	0	0	1	32	UK
8	m	90	100	100	100	100	1	10	IT
9	p	102	100	100	100	100	1	16	UK
10	j	83	100	100	100	100	1	30	ES
11	h	112	0	0	0	0	0	0	US
12	s	8	100	100	0	0	1	20	US
13	m	31	100	100	100	100	2	24	US
14	r	97	100	100	100	100	1	22	FR
15	t	35	100	100	0	0	1	24	US
16	l	4	100	100	100	100	2	20	IT
17	p	14	100	100	100	100	1	18	FR
18	a	61	100	100	100	100	1	25	ES
19	v	58	0	0	0	0	0	0	UK
20	k	48	100	100	0	0	2	21	UK
21	m	97	100	100	0	0	1	24	UK

We could now **join** with **reports on users** containing users' regions and come to the following representation of average score per region:



From the graph we can notice that employees from Latin countries can successfully pass the learning object, while employees from anglophone countries seem to have problems.

Now we should consider this result and think about what to do next. Could there be a linguistic problem with the LO? Shall we interview a sample of anglophone employees? Shall we interview both anglophone and Latin employees?

3. E-tutor: analyzing scores

Let's see an historic detailed report about a given learning object:

AutoSave history_detailed.xlsx - Salvataggio completato

FileHomeInsertPage LayoutFormulasDataReviewViewHelp

Search

R14

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	user_nam	attempt_n	session_n	first_acces	last_acces	completion_status	completion_d	success_s	success_d	score	score_dt	session_ti	average_t	total_time
2	r		1	1	4/24/2019	4/24/2019	completed	4/24/2019	passed	4/24/2019	100	4/24/2019	60	60
3	a		1	1	4/26/2019	4/26/2019	completed	4/26/2019	passed	4/26/2019	100	4/26/2019	52	52
4	a		1	1	4/29/2019	4/29/2019	completed	4/29/2019	passed	4/29/2019	100	4/29/2019	38	38
5	a		2	2	4/29/2019	4/29/2019	completed	4/29/2019	failed	4/29/2019	0	4/29/2019	203	108
6	a		1	1	4/29/2019	4/29/2019	completed	4/29/2019	failed	4/29/2019	0	4/29/2019	14	14
7	j		1	1	4/29/2019	4/29/2019	completed	4/29/2019	failed	4/29/2019	0	4/29/2019	16	16
8	p		1	1	4/29/2019	4/29/2019	completed	4/29/2019	passed	4/29/2019	100	4/29/2019	550	550

For ease of use, we will use just a fragment of the whole report. Via such report, e-tutors can see:

- Which learners passed or failed the learning object
- How many attempts they took engaging with the learning object
- Each session time, average time and total time spent engaging with the learning object

Based on this information and depending on context requirements and rules, e-tutors may consider:

- To get in touch with learners who did not pass the test the first time and did not repeat the test yet to invite them to retry
- To get in touch with learners who tried to pass the learning object several times without success and to ask which problems they encountered and to find out possible solutions such as providing additional/remedial materials
- To report to HR Head the top N learners which passed the test, and/or the ones who passed in less time, and/or had the higher scores, for recognition and reward

As you figured out so far, data from reports may be used in a variety of ways, under Company's rules and objectives.

Would you like to see a real use case now? Keep going!

[END OF PAGE]

EMSA Case Study

Introduction: the Client

The **European Maritime Safety Agency** (EMSA) is one of the European Union decentralized agencies that carry out technical tasks on behalf of the European



Commission and the Member States. EMSA was founded in 2002 and established in Lisbon as a technical body to support in the field of **maritime safety** and **prevention of pollution from ships**.

The Agency also provides **technical and scientific advice** in the continuous process of evaluating the effectiveness of the measures in place, and in the updating and development of new legislation. It also provides support to, and facilitates **co-operation** between, the Member States and disseminates best practices, providing technical assistance to the European Commission on matters regarding the application and possible amendments to EU legislation.

The need

Among other tasks the Agency works with the European Commission and the Member States on the **implementation of Directive 2009/16/EC on port state control**, participating in technical working groups of the Paris Memorandum of Understanding, hosting and supporting the development and operation of the supporting information system. EMSA, and in particular its Unit B.2 – Ship Safety, has the long-term objective of broadening training for Port States Control Officers (PSCO) from the Paris MoU region in order to increase the professional competency and maintain a harmonized approach in the whole region.

Improvement of training efficiency should **reduce training costs** related to travel and time and facilitate the face-to-face meetings, **addressing training needs by defining key competency and skill gaps**. We will see how EMSA uses **eXact Suite** to **delivery courses** and to **support course progress** via **learning reports**.

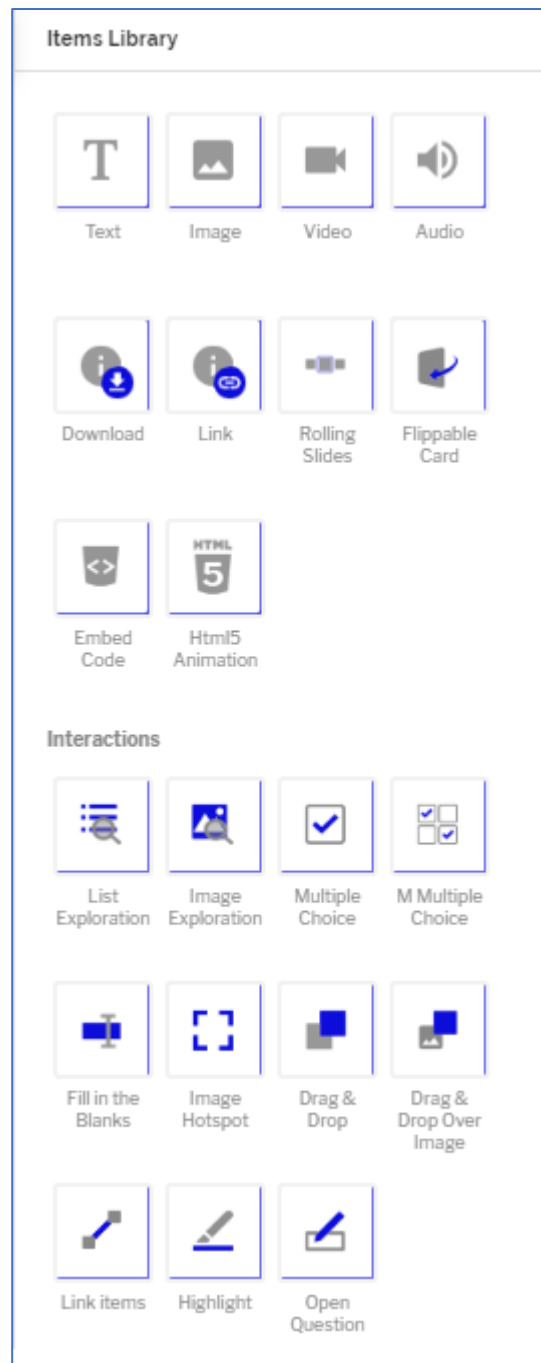
The solution

The project started in 2007 when EMSA launched a tender procedure for the provision of a **Learning Management System (LMS)** for the **delivery of 13 training modules**, in five fields of competence:



Each module has a duration of about 2.5 hours.

Due to the large amount of content to be packaged in SCORM format, the **eXact Packager** authoring tool of the eXact suite was adopted, along with its set of content templates.



Achievements

The proposed solution covers the educational needs of a population of about 2,000 users (with an average annual growth of 5%).

Final users are in fact Port State Control Officers (PSCOs), the inspectors of the port States in charge of verifying compliance through inspection of ships with the international safety regulations, according to the manual and guidelines issued by the Paris Memorandum of Understanding. Users are distributed on the territory of all EU coastal states, Iceland, Norway,

Canada, Russian Federation and Croatia, and have presumably no previous experience in eLearning.

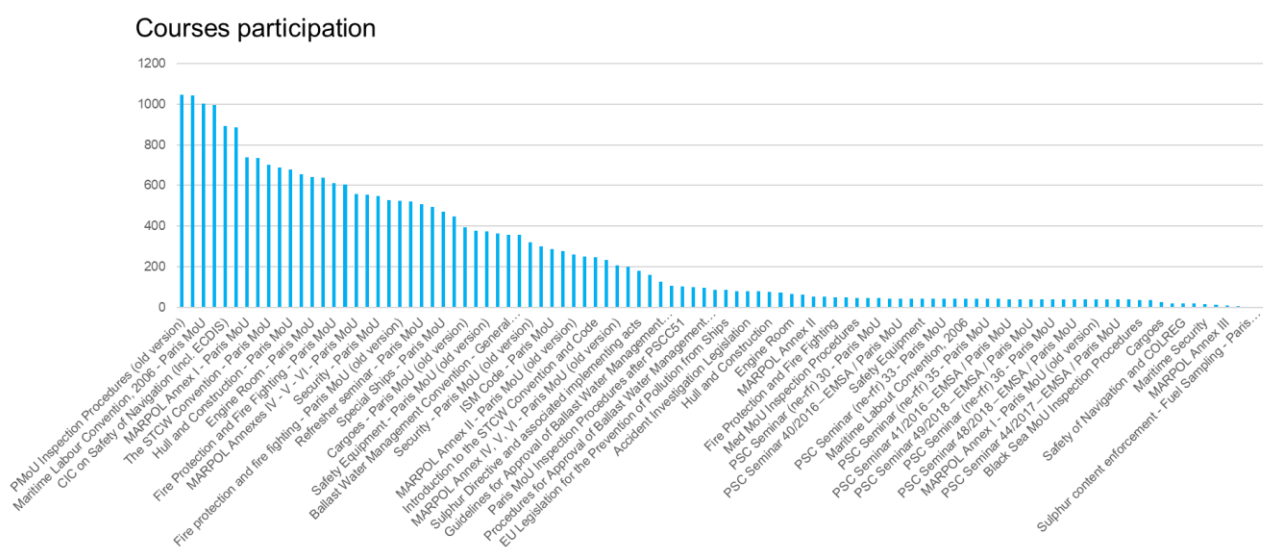
Below a table with some data about EMSA Project.

Software version	LCMS 3.2 → 3.2 R3
Ad-hoc customization	Single Sign On (SSO) management
Total users	4441 <ul style="list-style-type: none"> • 4000 – Learner role • 158 – Disabled
Total domains	90
Online courses in the domains	100
Active users	2570 (64% of total learners)
Average participation to online courses	256
Used functionalities	Delivery (LMS)

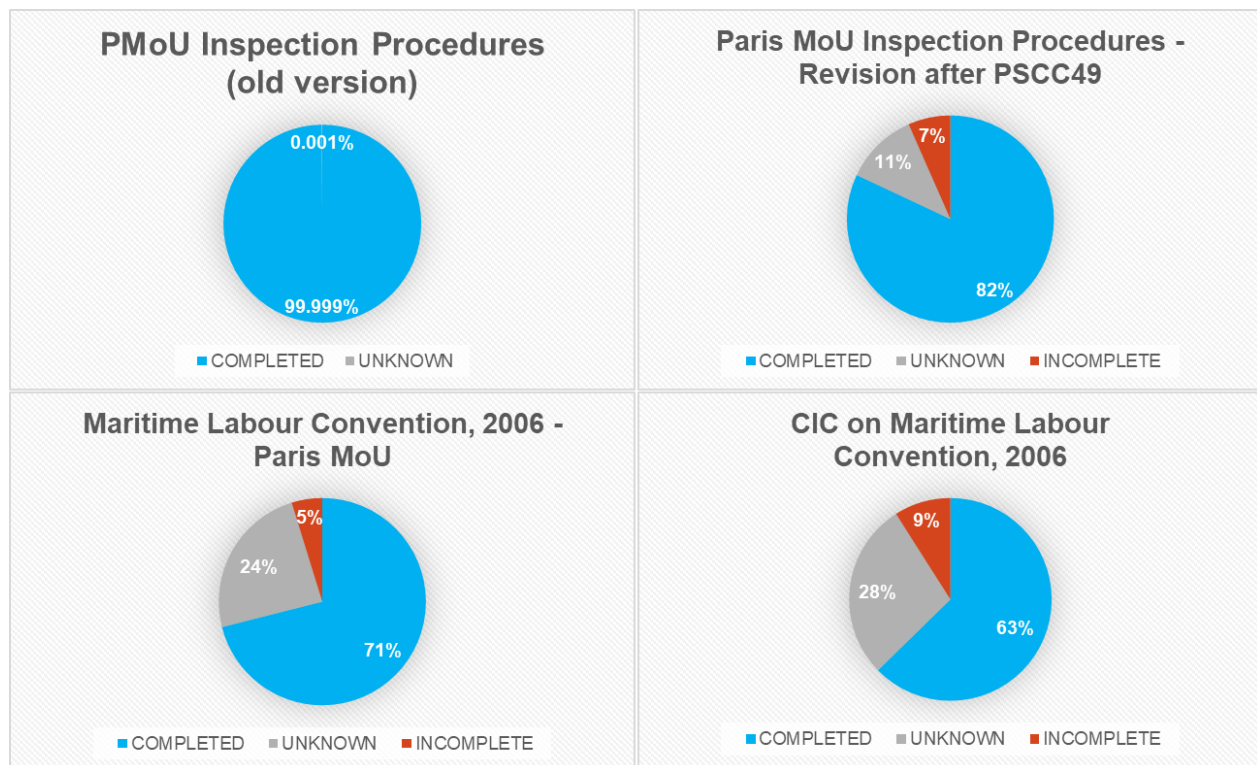
Analytics data have been very useful for **understanding the real activities of the students** on the courses, which **courses** have been the **most followed**, and which were the **periods of greater access** to the platform.

The analysis of these data has made it possible to **improve the courses most demanded** by the learners, to **propose other courses on the same subjects**, to **recover** the students who had not completed the courses, and to **understand** what **difficulties** they had encountered and to try to **overcome** them.

We report below some graphs showing data analytics.



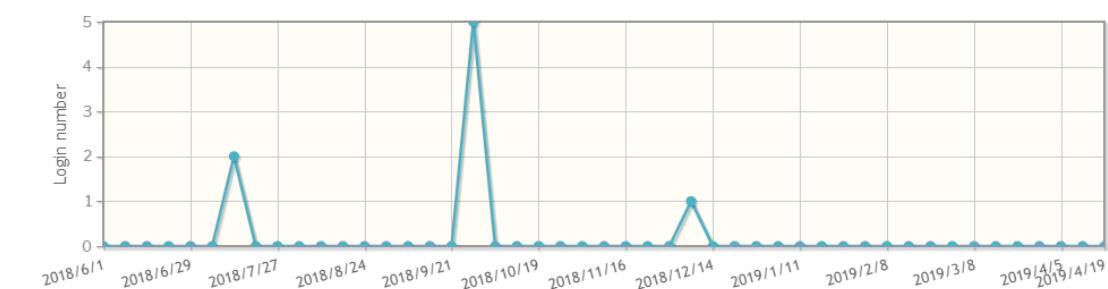
Histogram reporting course participation allows to understand at a glance which courses were the most/least attended as well as to have an idea of the average and most common attendance rates.



Pie charts showing completion state of courses allow to understand at a glance the overall achievements in the course.

Statistics

Users' Access



From	6/1/2018	
To	4/19/2019	
* Resolution	Weeks	
User		

[> View](#)
[Reset](#)
[Export CSV](#)

Access statistics allow to notice interaction of users with the LMS. Peaks can be further analyzed in conjunction with Company actions and events, such as sending reminders about course attendance, approximating of deadline and closure periods.

[END OF PAGE]

6.3 Beyond the LMS, monitoring and supporting Non-formal learning via eXact Delivery Portal

6.3.1 Engaging with non-formal learning

(Learning Object #6.3.1.1 video) Why Corporate interest in Non-formal?

Video: Why Corporate interest in Non-formal?

A short (~ 2 min) **instructor talking head** video to introduce the topic+ Transcript in .txt and .srt files to download.

Video Transcript

***Enterprises benefit nowadays from relevant technological advances in sensor systems, automation, cyber-physical systems, Artificial Intelligence, Big Data analysis and Internet of Things. This evolving technology wave is often referred to as the fourth industrial revolution, or “**Industry 4.0**”. This trend implies changes in manufacturing workplaces towards less manual work and more “brain” work. Future manufacturing workers need the ability to analyze, abstract, and innovate, and the knowledge levels surrounding these principles in general are rising.

Just as industrial technological novelties change the way work happens, digitalization also changes the way we **communicate** and **learn**. The classical approach of apprenticeship, with one-to-one mentoring on the job, is nowadays replaced by more **physical distance** and **technology mediated tutoring** via synchronous and/or asynchronous remote communication. ICT-based learning has gone from being closed off and centered around the individuals to being **social**, fostering **spontaneous and proactive knowledge sharing** and **exchange**.

In the following we will see an example of such kind of platform, supporting non formal learning: the **eXact Delivery Portal**.***

[END OF PAGE]

(Learning Object #6.3.1.2 activity) Poll & Discussion: Formal, informal and non-formal learning

Do you think about learning always only in institutional contexts? Have you ever thought that learning can happen in a variety of contexts?

ACTIVITY/PRACTICE QUESTION (Poll):

1. Do you know the difference between formal, non-formal and informal learning?
 - o Yes
 - o No
2. Have you ever managed, supported or worked providing non-formal learning?
 - o Yes
 - o No
3. Do you think that it would be possible to track non-formal learning?
 - o Yes
 - o No

ACTIVITY/PRACTICE QUESTION (Discussion)

We encourage you to elaborate on your responses about formal, non-formal and informal learning in the following discussion task, by posting your thoughts on the discussion board.

You may:

1. *Share your experiences about managing, supporting or working providing non-formal learning*
2. *Describe your experiences in tracking informal and non-formal learning experiences, analysing data and related findings*

[END OF PAGE]

Formal, Informal and Non-formal Learning

The importance to Europe of **skilled and knowledgeable citizens** extends beyond formal education to learning acquired in non-formal or informal ways. Citizens must be able to demonstrate what they have learned to use this learning in their career and for further education and training.

Countries should establish systems that allow individuals to **identify, document, assess, and certify all forms of learning** for advancing their career and for further education and training.

The 2012 Council Recommendation on validation of non-formal and informal learning³ encouraged Member States to put in place national arrangements for validation by 2018. These arrangements should enable individuals to increase the visibility and value of their knowledge, skills and competences acquired outside of formal education and training: at work, at home or in voluntary activities.

Cedefop, the European Centre for the Development of Vocational Training, gives the following definitions of **formal, non-formal** and **informal learning** (Cedefop 2008):

- **Formal learning**

Learning that occurs in an organized and structured environment and is explicitly designated as learning and is intentional from the learner's point of view, typically leading to certification. For example: formal learning takes place within school hours as part of a curriculum.

- **Informal learning**

Learning resulting from activities related to work, family or leisure. It is not organized/structured in terms of objectives, time or learning support. Generally unintentional from the learner's perspective. For example: learning occurring on a museum/park visit with a family member, where learning takes place as part of the outing, but is not planned/ structured. A pervasive ongoing occurrence of learning via participation/knowledge creation, in contrast with more outcome-based learning.

- **Non-formal learning**

Learning which is embedded in planned activities not explicitly designated as learning (in terms of learning objectives, learning time or support), but which contains an important

³ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32012H1222%2801%29>

learning element. It is intentional from the learner's point of view. For example: non-formal learning as part of after school sport or science club, where the learning of new skills is expected.

[END OF PAGE]

Corporate interest in non-formal learning

Many challenges must be faced in next decades: demographic, socio-economic and technological drivers are leading towards a disruptive change of the world as we know it. Technology is changing the habits, consumptions, production, and ways of working (industry 4.0, internet of things just to mention few examples). The jobs of 65% of children starting their primary school today do not yet exist, and will provide goods or services which are not yet requested. Today we are educating our children for jobs that do not yet exist, in order to solve problems we are not yet even aware of.

Skills seem to be the keystone for the future. The one-size-fits-all approach to learning does not meet the dynamically shifting needs of today's knowledge economy, much less the needs of the future's "connected economy".

As renowned futurist Alvin Toffler wrote:

"the illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn and relearn."

It will be crucial for people to learn their multiplier skill, their meta-skills, the skills they possess that can be transferrable to new businesses that haven't even yet been conceived.

The greatest driver of the shift in the education economy is the advent of the World Wide Web. Students take ownership of their learning, while also developing personal connections with each other, their teachers and other adults. It tailors learning to each student's unique strengths, thereby encouraging curiosity while keeping them engaged and present.

As we transition from a formerly passive society to more participatory one, a new generation of "producer" has resulted. The "sharing economy"—whilst not a new principle, is a term coined only within the last two decades. And yet, it has fundamentally changed the way we shop, work, commute, and sleep, focused primarily on the democratization, demonetization, and dematerialization of goods and services.

Corporations and enterprises are aware of these changes and aim today at modernizing their training infrastructure to offer supporting knowledge sharing and exchange, provide platforms where users can proactively search and retrieve information, as well as build relationships and make their voices be heard. At the same time, the Company needs to be aware of what is happening on such platform and be able to analyse data to intervene, recognize, and enhance.

The **Modern Workplace Learning** is well depicted by Jane Hart as from figure below:

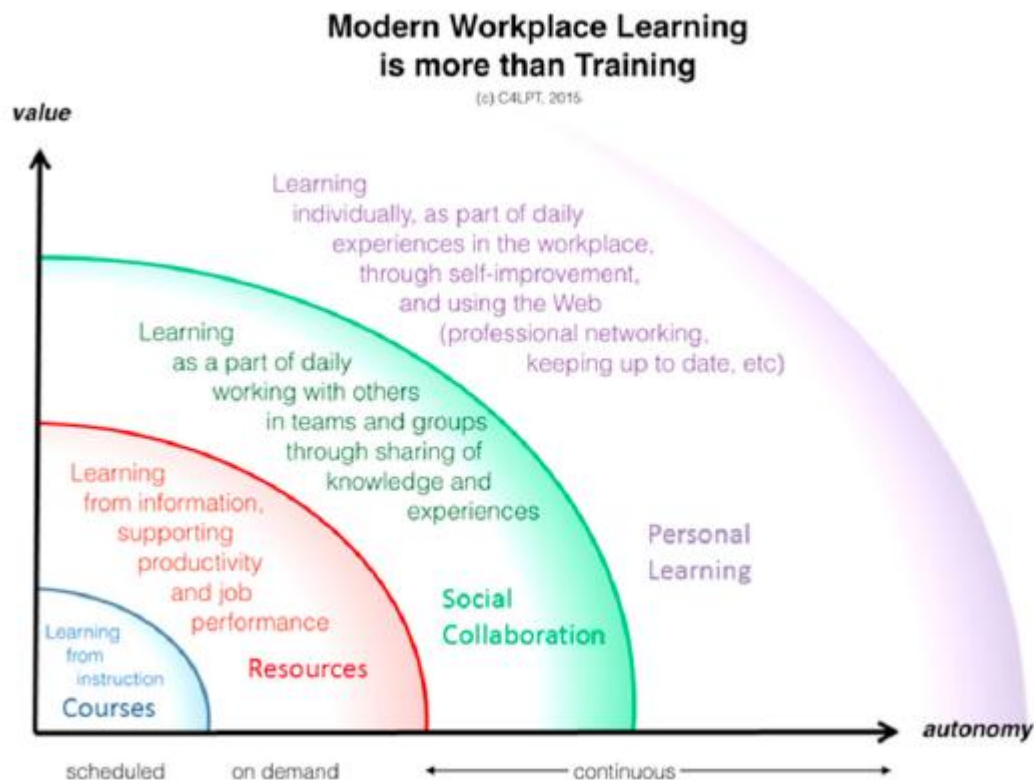


Figure 1 The Modern Workplace Learning Framework (Hart 2016)

The value, importance and need of formal training organized in courses managed by the company remains and constitutes the core of workplace learning. Building on this the need for additional resources emerge. At the same time, learning continuously happens both in the form of daily collaboration with on site and remote colleagues sharing knowledge and experiences, and as a personal, individual experience via self-improvement and autonomous research.

Modern enterprises acknowledge the importance and the value of social collaboration and proactive learning and wish to support them and take lessons to enhance their own formative offerings.

Would you like to know how this happens in practice? Our non-formal learning use case is Up Next.

[END OF PAGE]

(Learning Object #6.3.1.5 VIDEO) Non-formal Learning Use Case

Video: Non-formal Learning Use Case

A short (~ 2 min) **instructor talking head** video **with a few graphics** to introduce the topic+
Transcript in .txt and .srt files to download.

Video Transcript

***Last year we met a customer, which is a multinational group, that deals with designing and selling of furniture. They expressed the wish to offer something more than corporate training to their stakeholders. Their idea was to have portals enabling employees from different departments, as well as external suppliers and customers, to interact directly with learning content as well as each other, and with the learning content and training providers.

Roughly, the starting point was imagined as a **content catalogue** supporting basic/advanced search for specific content. Their employees were encountering difficulties and spending a lot of time **searching** for content relevant to their role/workplace. With the new portal, content sharing should be organized per group of users, such as Sales, Marketing, Design; search should allow to filter results in an intuitive way and select areas of interest to view content for.

Another Company objective was the one to enable users to **share** their knowledge and **interact** with other colleagues with similar learning needs and interests, as well as enable them to **send feedback** to content creators.

From the Company perspective, it is important to be able to **track the access and the usage** of the portal distinguishing behaviors per role, i.e. admin, learner, trainer. With this data, the company aims gathering a **further understanding of** its stakeholders' **interests and needs**, **adapting and enhancing** its **learning offerings** basing on **received feedback**, and **discovering hidden knowledge and experts** thanks to users' content sharing.***

[END OF PAGE]

(LO #6.3.1.6 HTML page) How Tracking the Non-formal?

How Tracking the Non-formal?

At this point in our MOOC you have already seen what educational data are and how they can be collected from LMSs. But technology is various, and learning happens nowadays even on different platforms. How can we track an employee's interest for a certain topic? His/her likeness of a certain content? Or a discussion involving a group of employees, while maintaining a standard of compliance and interoperability?

The **Experience API** (or **xAPI**) is a recent specification for learning technology that makes it possible to collect data about the wide range of experiences a person has (online and offline). This API captures data in a consistent format about a person or group's activities from many technologies. Very different systems can securely communicate by capturing and sharing this stream of activities using xAPI's simple vocabulary.



Figure 2 Source: <https://xapi.com/overview/>

Previous specifications were difficult and had limitations (see [xAPI vs SCORM](#)), but the Experience API is simple and flexible. It lifts many of the older restrictions. Mobile learning, simulations, virtual worlds, serious games, real-world activities, experiential learning, social learning, offline learning, and collaborative learning are just some of the things that can now be recognized and communicated well with the Experience API.

How does the Experience API work?

- People learn from interactions with other people, content, and beyond. These **actions** can happen anywhere and signal an event where learning could occur. All of these can be recorded with the Experience API.
- When an activity needs to be recorded, the application sends secure **statements** in the form of "Noun, verb, object" or "I did this" to a **Learning Record Store (LRS.)**

- Learning Record Stores record all of the statements made. An LRS can share these statements with other LRSs. An LRS can exist on its own, or inside an LMS.

What is a key in xAPI, and represents its novelty respect to previous standard, can be summarized in the following points:

- **Statement freedom:** the structure of “statements” using nouns, verbs and objects lets you record almost any activity. Think: “I did this.”
- **History freedom:** the Experience API allows LRSs to talk to each other. LRSs can share data and transcripts with one another, and your experiences can follow you from one LRS (or organization) to another. Learners can even have their own “personal data lockers” with their personal learning information inside them.
- **Device freedom:** any enabled device can send Experience API statements (mobile phones, simulations, games, a CPR dummy, the list goes on). A constant network connection isn’t necessary — occasional connectivity is fine.
- **Workflow freedom:** tracking learning events doesn’t have to start or end in an LMS, it can start wherever the learner is and on whatever device they choose to use. Your content isn’t tied to an LMS.

If you wish to dive deeper into the Experience API you can view the full Experience API specification [here](#).

Would you like to understand how LRS statements collected via xAPI could be used? Then move next!

[END OF PAGE]

How to use tracked data to take action: An Employee's Story



Figure 3 Source: <https://xapi.com/an-employees-story/>

Adam just got hired to be a **forklift driver** in a warehouse. One of the first things he needs to do is get his forklift **certification**.

In a NON-xAPI world, Adam would do his **training**, take a **written test**, take a **real-world operating evaluation**, and then be given his certification.

In a xAPI-enabled training system, the level of detail is expanded. There is a whole new picture of training that comes into focus, because **every bit of the training can be tracked and stored in an LRS**. Every time that Adam does a safety check on his forklift, the steps he must go through are tracked. The answers to his written test are tracked.

A new step to his training can even be added — a video game in which he learns where the controls of the forklift are located, and how to operate them. Every step of the video game and every reaction that Adam has within it can be tracked.

Perhaps the best part is that even after Adam's training is over, his real-world job performance can be tracked. The Experience API can be tied in to the warehouse's inventory system, and it can log whenever Adam loads or unloads a pallet. Supervisors can begin tying training to real-world performance and answering questions about training that they could

never answer before. This is made even easier because all of this xAPI data lives in one place, and in one format, inside a Learning Record Store.

The great thing about the Experience API is that **even after the training is over**, Adam's **performance on the job can be tracked** in the same way that his training on a real forklift can be. His **performance and training results can be measured** beside others' results, and **big-picture decisions about training can be made much easier than before**. Compliance tracking can even live in the same system as training results and real-world activity tracking.

Adam's boss got notifications from his Learning Record Store that Adam had been in two accidents and dropped one pallet all in his first week of the job. Going back to see reports from Adam's first week, the supervisor notices that Adam hasn't been sounding the forklift's horn at every intersection as he's supposed to. Adam's boss assigns a forklift safety course to Adam, and Adam takes this course before continuing on the job.

Does Adam's safety skyrocket above that of others after this course? Should everybody take this course? There are a ton of questions that arise when you have access to all the data that xAPI lets you store and report on.

The Experience API brings all your learning and performance data into one place, where you can compare loads of learning and performance metrics and make more informed decisions about learning and teaching.

Would you like to read the whole use case, you can access it from [here](#).

Ready for a final recap of this section? Move next!

[END OF PAGE]

(LO #6.3.1.8 ACTIVITY: Drag & Drop) Match activities and learning types

Drag & Drop: Match activities and learning types

Please find below a list of activities. Match them with the correct learning type (formal learning, non-formal learning, informal learning).

- **Formal learning activities:**
 - English course organized by Company during working hours
 - Online course provided by the Company about safety at work with final test
- **Informal learning activities:**
 - Visiting a contemporary art exhibition
 - Watching a film in no mother-tongue language
- **Non-formal learning**
 - Watching a documentary on TV
 - Watching a tutorial about DIY on YouTube
 - Taking swimming lessons
 - Attending a professional seminar

[END OF PAGE]

Quiz : tracking non formal learning

1. As per Hart's Framework, dimensions of learning nowadays comprise:
 - ☒ resources, courses, social collaboration, personal learning
 - ☐ resources, social collaboration, personal learning, social sharing
 - ☐ courses, resources, social collaboration, communication
 - ☐ courses, resources, personal learning, communication
2. The Experience API makes it possible to collect data about the wide range of experiences a person has, storing information as:
 - ☒ statements
 - ☐ sentences
 - ☐ UTF-8 encoding
 - ☐ xml tags
3. The Experience API stores information into an LRS, which is a:
 - ☒ Learning Record Store
 - ☐ Lifelong Resource Store
 - ☐ Learner's Repository System
 - ☐ Learning Resource Store

[END OF PAGE]

6.3.2 eXact Delivery Portal

(LO #6.3.2.1 VIDEO) Overview of eXact Delivery Portal

Video: Overview of eXact Delivery Portal

A short (~ 2 min) **instructor talking head** video **with a few graphics** to introduce the topic+ Transcript in .txt and .srt files to download.

Video Transcript

***Considering several customers' requirements, feedbacks, and wishes we developed the **eXact Delivery Portal**. The eXact Delivery Portal is a web application, accessible from the desktop as well as mobile devices, which realizes a **simple and straightforward means to access contents** of several kinds, and in the meanwhile **tracks user's interactions** with the content. End Users are called "Readers" to keep them distinct of LMS users, generally called "Learners".

After an LCMS is integrated with the Delivery Portal, when a **material** is set to "**Deliverable**" in the LCMS, it is also possible to decide to automatically create and **publish** it as an **Article** on the Delivery Portal, providing information about the material and a **direct link to access** the material itself. Articles are organized in **Main Areas** and **Visibility groups** and can have **tags** associated to them.

Readers are organized in Visibility groups as well. Readers can **browse** articles available on the portal, **launch** materials, **comment** and rate the articles, create **personal lists**, and **propose** own materials.

Behind the scenes, Readers' interaction with the Delivery Portal and published articles is **tracked** via **xAPI**, a recent specification for learning technology that makes it possible to collect data about a wide range of experiences a person may have. Very different systems can securely communicate by capturing and sharing this stream of activities using xAPI's simple vocabulary. Data are sent as secure **statements** in the form of "Noun, verb, object" or "I did this" to a **Learning Record Store (LRS)**. Delivery Managers can access these data both directly via backend administrative tools and in an easier way via a **graphics dashboard**.***

[END OF PAGE]

(LO #6.3.2.2 HTML page) eXact Delivery Portal: Visibility groups, Articles, Main Areas and Tags

eXact Delivery Portal: Visibility groups, Articles, Main Areas and Tags

Let's have a short overview of the eXact Delivery Portal before we move to understand tracked data and their possible usage.

End Users of the Delivery Portal are called "Readers", to distinguish them from LMS users, which are traditionally called "Learners".

Readers are organized in **Visibility groups**. Visibility groups are defined as per Company's requirements. For example, Visibility groups could correspond to Departments; or to physical plants or locations. Visibility groups are set of users who share the same access rights to contents.

Contents, called "**Articles**", are classified in Main Areas. Again, the actual Main Areas of an instance of Delivery Portal depend on Company's requirements. For example, Main Areas could correspond to Company's main products; or to production phases, such as Design, Engineering, Testing.

The classification of articles can be refined via **tags**. Tags allow to provide additional information about contents' topic, level of difficulty, etc.




All clear so far? Let's move on!

[END OF PAGE]

(LO #6.3.2.3 HTML page) eXact Delivery Portal Reader's experience: interacting with Articles

eXact Delivery Portal Reader's experience: interacting with Articles

Articles are presented via a collection called “Catalogue”, which appears as below.



CATEGORIES




TOP PAGES

MY FAVORITES


MY RECENT

PROPOSE

DASHBOARD


EDITORS' PICKS



Guidelines

Strategy Three: Allow Everyone To Play An Active...


By admin on May 21 2019 - 1:24pm



Manuals

Coding Standards and Best Practices


By admin on May 10 2019 - 11:52am



Manuals

Top 15+ Best Practices for Writing Super...

By admin on May 10 2019 - 11:44am




Events

WFY Annual Event

By admin on May 09 2019 - 5:11pm


LATEST



Guidelines

Strategy Three: Allow Everyone To Play An Active Role


By admin on May 21 2019 - 1:24pm



Manuals

Coding Standards and Best Practices


By admin on May 10 2019 - 11:52am



Guidelines

Strategy Two: Convene a Talent...


By admin on May 09 2019 - 5:01pm



Guidelines

Strategy Three: Allow Everyone To...


By admin on May 21 2019 - 1:24pm



Manuals

Top 15+ Best Practices for Writing Super Readable Code

By admin on May 10 2019 - 11:44am

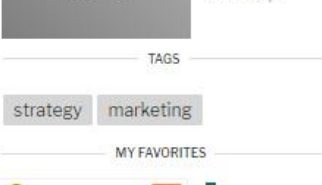


Events

WFY Annual Event

WFY Annual Event will take place in London, UK, 5th-7th December 2019. Here you can find all logistic information...


By admin on May 09 2019 - 5:11pm



Guidelines

Negotiating with Team Members

By admin on May 03 2019 - 12:52pm



Guidelines

Negotiation Skills: Be Prepared


By admin on May 08 2019 - 4:56pm

TODAY'S MOST POPULAR

strategy

marketing


MY FAVORITES



Guidelines

Negotiating with Team Members

By admin on May 03 2019 - 12:52pm




Guidelines

Negotiation Skills: Be Prepared


By admin on May 08 2019 - 4:56pm

LATEST POSTS




Strategy Three: Allow Everyone To Play An Active...

By admin on May 21 2019 - 1:24pm



Coding Standards and Best Practices

By admin on May 10 2019 - 11:52am



Top 15+ Best Practices for Writing Super...

By admin on May 10 2019 - 11:44am

TAGS


strategy

marketing

SEARCH

Enter the terms to search for

Go




eXact Delivery

Portal

Privacy Policy

Cookie Statement

Terms of Use




89




In Catalogue view, Articles present a title, a thumbnail, indication of their category and kind of related content, number of comments, if any, author, and date of publication.





The extended version of the Article shows additional information, such as description, available download formats, rating, comments, as well as suggestions for other related Articles.



[HOME](#)
[CATEGORIES](#)
[TOP PAGES](#)
[MY FAVORITES](#)
[MY RECENT](#)
[PROPOSE](#)
[DASHBOARD](#)


Product Presentation



sales

eXact

presales

delivery portal

sample


marketing


LT19

ATD19

production

RELATED



Product Presentation


Delivery Portal Mobile

By Administrator on Jan 14 2019 - 12:19pm

eXact Delivery Portal

By Administrator on Feb 20 2019 - 6:28pm



PRODUCT PRESENTATION:
eXact Delivery Portal


The Portal for the informal Learning



eXact learning solutions 2019

a Company of LATTANZIO


Format: application/presentation
Size: 285.8 KB
Version: 2

Download

RATING:  AVG 4 (1 VOTE)

TAGS:  DELIVERY PORTAL  EXACT


COMMENTS



all, Feb 20 2019 - 6:30pm

My comment

PERMALINK




all, Mar 08 2019 - 8:41pm


Hi Danilo, this is pretty awesome

PERMALINK


Write a comment...


MORE PRODUCT PRESENTATION


Product Presentation


Delivery Portal Mobile

By Administrator on Jan 14 2019 - 12:19pm


Product Presentation


Overview

By Administrator on Dec 12 2018 - 4:34pm

Readers have several ways to interact with Articles. They can **rate** and see **average rating** out of all votes received by the Article. They can read and reply to **comments**. They can add the articles to a personal list of **Favorites**. Of course, they can **access information** about the content to which the Article relates, or **download** and/or directly **play** the content, depending on its type.

[END OF PAGE]

(LO #6.3.2.4 HTML page) eXact Delivery Portal Reader's experience: interacting with the Delivery Portal

eXact Delivery Portal Reader's experience: interacting with the Delivery Portal

The eXact Delivery Portal allows to **search** for Articles basing on an Article's title, description, tags, and category. Readers also can use a **tag cloud** to search for Articles related to a specific topic. **Latest published** Articles are highlighted by a specific section. Readers also have at their disposal a list of **recently accessed** Articles. The Delivery Portal also highlights Articles which received the **highest average ratings** and **most viewed** ones. When accessing an Article, the Delivery Portal also offers **recommendations** about other Articles belonging to the same Category.

Readers can also **provide their own contributions**; a dedicated form allows them to send ideas, documents, learning objects, and any other material that may feed the Company's knowledge base. If approved by Administrators, these contents can also be published on the Delivery Portal as Articles and therefore made available to other Readers.



[END OF PAGE]

(LO #6.3.2.5 VIDEO) eXact Delivery Portal in action

Video: eXact Delivery Portal in action

A short (~ 2 min) **screen recording video** with **voiceover** to introduce the topic+ Transcript in .txt and .srt files to download.

Video Transcript

***Welcome to the eXact Delivery Portal! Let's have a closer look.

As you already know, Articles are presented via a collection called a "**Catalogue**". This is the Catalogue.

In Catalogue view Articles present a **title**, a **thumbnail**, indication of their **Main Area** and **kind** of related content, number of **comments**, if any, **author**, and date of **publication**.

The extended version of the Article shows additional information, such as **description**, available **download formats**, **rating**, **comments**, as well as **suggestions** for other related Articles.

As you can see, Contents are classified in **Main Areas**. The classification of articles can be refined via **tags**. Tags allow to provide additional information about contents' topic, level of difficulty, etc.

Readers have several ways to interact with Articles.

They can **rate** and see average rating out of all votes received by the Article.

They can read and reply to **comments**. They can add articles to a personal list of **Favorites**.

Of course, they can **access information** about the content to which the Article relates, or **download** and/or directly **play** the content depending on its type

The eXact Delivery Portal allows to **search** for Articles based on an Article's title, description, tags and category. Readers also can use a **tag cloud** to search for Articles related to a specific topic. **Latest published** Articles are highlighted by a specific section. Readers also have at their disposal a list of recently accessed Articles. The Delivery Portal also highlights Articles which received the **highest average ratings** and **most viewed** ones. When accessing an Article, the Delivery Portal also offers **recommendations** to other Articles belonging to the same Category.

Readers can also provide their **own contributions**: a dedicated form allows them to send ideas, documents, learning objects and any other material which can feed the Company knowledge base. If approved by Administrators, these contents can also be published on the Delivery Portal as Articles and therefore made available to other Readers.***

[END OF PAGE]

(LO #6.3.2.6 ACTIVITY Matrix quiz) Quiz

Quiz: eXact Delivery Portal

Let's recall the main functionalities of Delivery Portal.

ACTIVITY (Quiz):

eXact Delivery Portal allows end users ("Readers") to:

	True	False
Search for contents basing on title	X	
Search for contents using a tag cloud	X	
Share contents on social networks		X
Rate contents	X	
Discuss contents	X	
Receive a notification when a new colleague enters the company		X
Contribute own contents to the company knowledge base	X	
Gain badges for passing exams		X
Send anonymous feedbacks		X

[END OF PAGE]

6.3.3 Understanding reports to assess and take actions

([Learning Object #6.3.3.1 HTML page](#)) Which data are collected?

Which data are collected?

Behind the scenes, Readers' interaction with the Delivery Portal and published articles is tracked via xAPI. **Each Reader's interaction** with the Delivery Portal **is tracked**: access to Portal, view an Article, run a search, comment, rate... everything.

In addition to this Reader's interaction with the eXact Delivery Portal, **Learning Objects** created via eXact Online Editor also track Reader's interaction, such as **attempt** or **completion** of the learning object, **success** or **failure** (if the learning object contains an evaluation test), **interaction with pages, media and individual questions in tests**.

All this tracking is **transparent** to Readers: they can freely interact with the Portal and the Portal collects data in back end. Data are sent as xAPI statements in the form of "Noun, verb, object" or "I did this" to a Learning Record Store (LRS).

Would you like to have a look behind the scenes and discover a bit more about xAPI statements? Then move next!

[END OF PAGE]

How are data stored?

All information about Readers' interaction with the Delivery Portal and its learning objects is stored as an xAPI statement. Simple xAPI statements take the general form of “[actor] [verb] [object]”. These labels coincide with the field names on a statement object. So, in conveying the information that “Sally experienced ‘Solo Hang Gliding’”, we can quickly spot “Sally” as the actor, “experienced” as the verb, and “Solo Hang Gliding” as the activity. Ignoring the structure of the specific parts, the statement object itself would take this structure in JSON format:

```
{  
  
  "actor": "Sally",  
  
  "verb": "experienced",  
  
  "object": "Solo Hang Gliding"  
}
```

This is at least simply useful, but simple strings can only take us so far. How do we know which Sally we mean? Which ‘Solo Hang Gliding’ activity was it, one that was part of military training, one from a commercial enterprise, or something self-directed? Let’s expand these parts and show a valid xAPI statement:

```
{  
  
  "actor": {  
  
    "name": "Sally Glider",  
  
    "mbox": "mailto:sally@example.com"  
  
  },  
  
  "verb": {  
  
    "id": "http://adlnet.gov/expapi/verbs/experienced",  
  
    "display": {"en-US": "experienced"}  
  
  },  
  
  "object": {
```

```

    "id": "http://example.com/activities/solo-hang-gliding",

    "definition": {

        "name": { "en-US": "Solo Hang Gliding" }

    }

}

```

Here we have added structure to ensure we have a way to uniquely identify the component parts. This helps us correlate statements about the same person, activity, or verb. There is also some structure added to provide information about our objects, like name.

As you can imagine, we can also add a lot more to a statement, i.e. in the form of statement **context** (“Sally completed ‘Solo Hang Gliding’ in the context of ‘Army Training Level 1’” or “Bob completed ‘Truck Driving Training Level 1’ on his Android phone, under the instruction of Dan”) or **results** (“Bob passed ‘Truck Driving Training’ with score 90%”). It is possible also to declare **custom fields**, in the form of **extensions**.

(source: <https://xapi.com/tech-overview/>)

You can find further information about xAPI statements at:

- [Statements 101](#) takes you through the basics of statements that you need to know in order to get going with xAPI.
- [Statement Explorer](#) is an interactive example statement that explains the high-level structure of the statement.
- [xAPI Lab](#) is a tool that supports you to build your own statement and send it to an LRS.
- [Statements Deep Dive](#) takes you beyond the basics to help you get the most out of xAPI.

Where are these statements stored? Let’s move on to see!

[END OF PAGE]

(Learning Object #6.3.3.3 HTML page) Where are data stored?

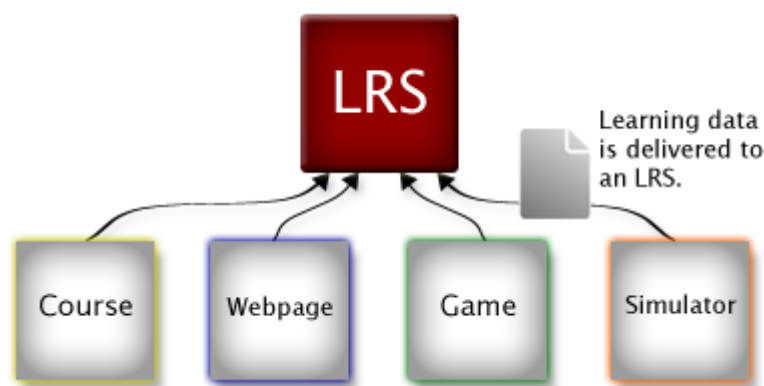
Where are data stored?

xAPI statements are stored into a **Learning Record Store (LRS)**. The LRS is the heart of any xAPI ecosystem, receiving, storing and returning data about learning experiences, achievements and job performance.

Learning Record Stores are normally **stand-alone** products including a range of **reporting** and **analytics** features. They can also be **incorporated into an LMS**. LRSs can **communicate** with one another, allowing for the **portability** of learning data across systems.

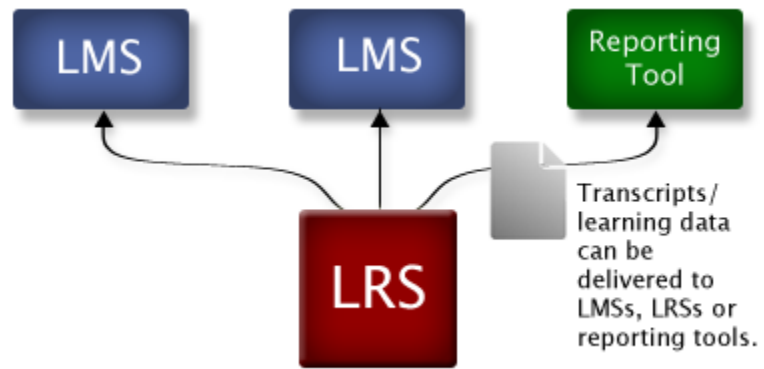
LRSs and LMSs are very different products. Whilst LRS likely replaces and goes beyond the reporting and analytics capability of an LMS, there are many other functions of the LMS that aren't included in an LRS. In the context of the delivery and tracking of e-learning, the LRS stores and handles xAPI data, while an LMS might also deliver, play and track eLearning content.

An LRS enables tracking of a wide variety of learning experiences, not limited to activities that are browser based. An LRS can store learning data in the form of xAPI statements from a range of activity types- from mobile apps, games, and simulators, to instructor led training sessions.



Source: <https://scorm.com/what-is-an-lrs-learning-record-store/>

Data from these experiences can be **shared with other systems** for **reporting analytics** and to **support adaptive learning experiences**. As the LRS collects data from a range of experiences, these sets of **data can be compared and collated** to evaluate the effectiveness of training programs and learning solutions.



Source: <https://scorm.com/what-is-an-lrs-learning-record-store/>

Interesting! Then let's see how we can access this data. Move on to find out!

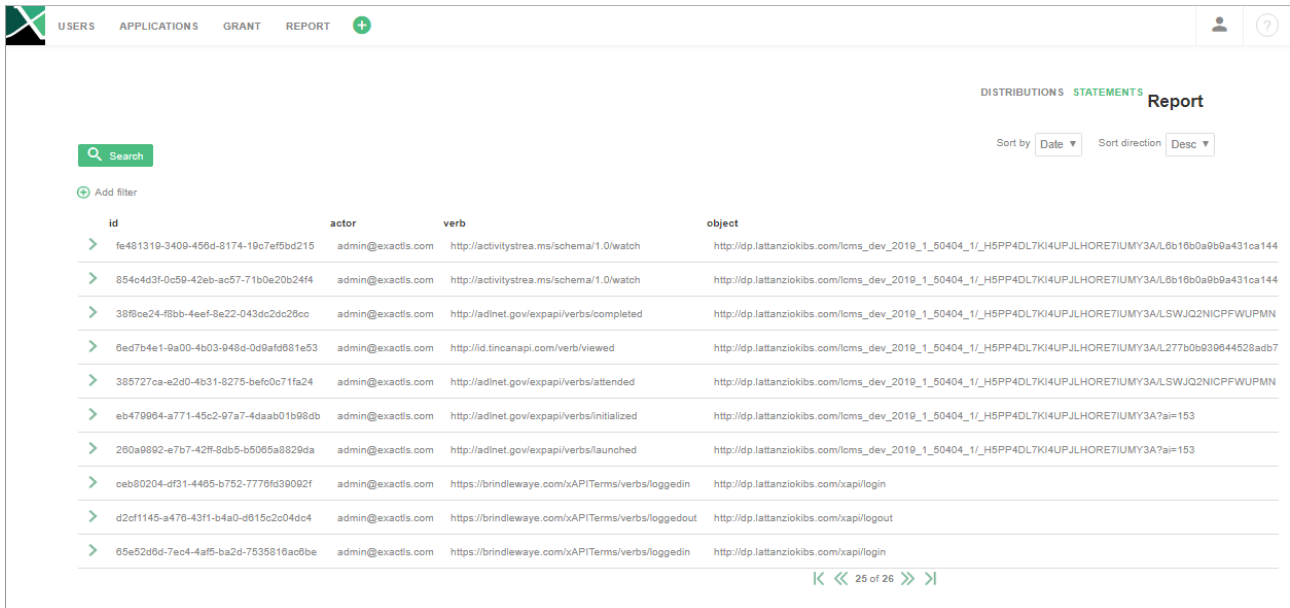
[END OF PAGE]

(Learning Object #6.3.3.4 HTML page) How to access data? Textual and visual representation

How to access data? Textual and visual representation

Data tracked by the eXact Delivery Portal via xAPI can be accessed in several ways.

xAPI statements can be accessed via back-end:



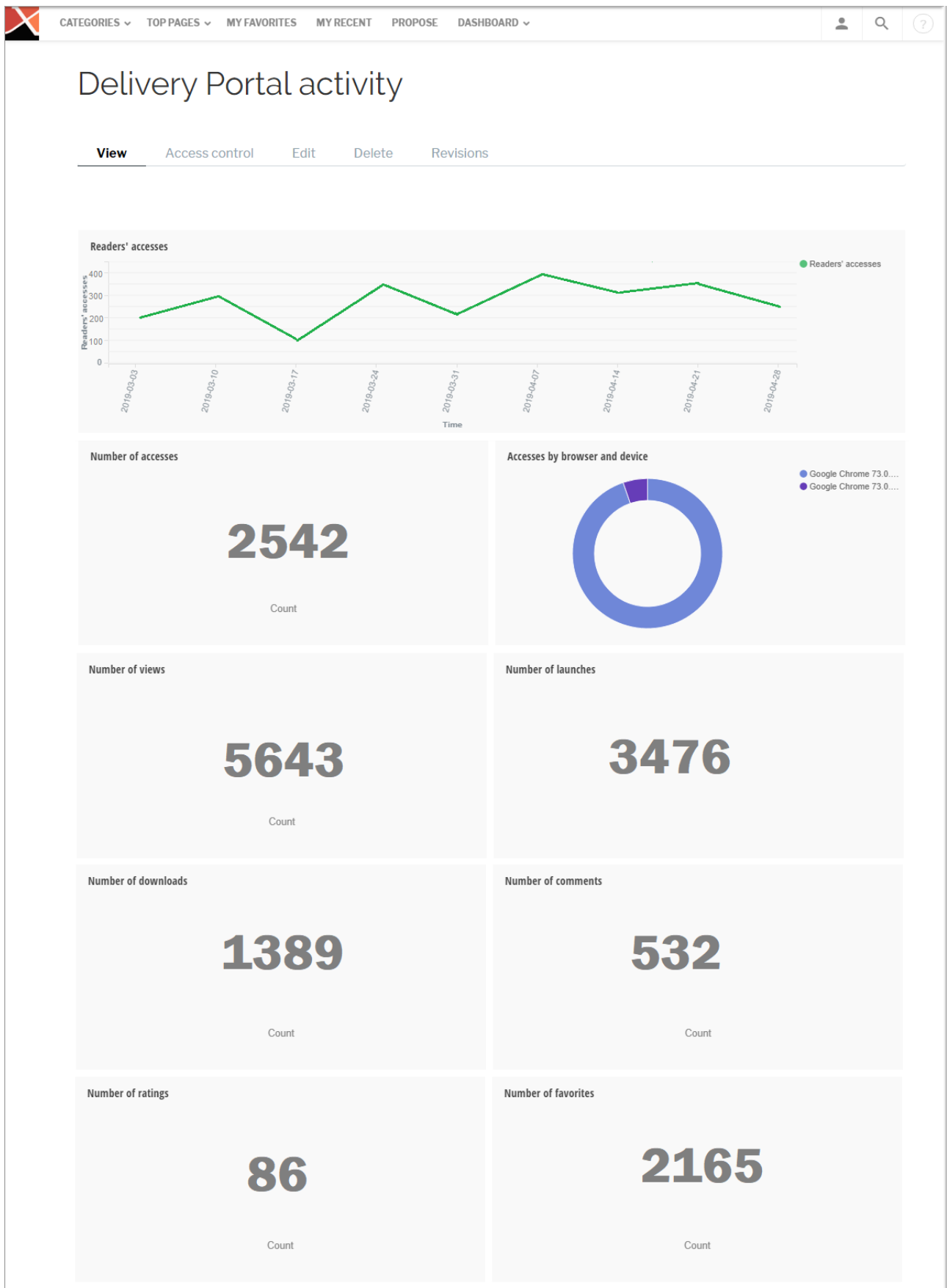
id	actor	verb	object
> fe481319-3400-456d-8174-19c7ef5bd215	admin@exactis.com	http://activitystrea.ms/schema/1.0/watch	http://dp.lattanziokibs.com/loms_dev_2019_1_50404_1/_H5PP4DL7K14UPJLHORE7IUMY3A/L8b16b0a9b9a431ca144
> 854c4d3f-0c50-42eb-ac57-71b0e20b24f4	admin@exactis.com	http://activitystrea.ms/schema/1.0/watch	http://dp.lattanziokibs.com/loms_dev_2019_1_50404_1/_H5PP4DL7K14UPJLHORE7IUMY3A/L8b16b0a9b9a431ca144
> 38f8ce24-f8bb-4eef-8e22-043dc2dc26cc	admin@exactis.com	http://adinet.gov/expapi/verbs/completed	http://dp.lattanziokibs.com/loms_dev_2019_1_50404_1/_H5PP4DL7K14UPJLHORE7IUMY3A/LSWJQ2NICPFWUPMN
> 6ed7b4e1-9a00-4b03-048d-0d9af981e53	admin@exactis.com	http://id.fincanapi.com/verb/viewed	http://dp.lattanziokibs.com/loms_dev_2019_1_50404_1/_H5PP4DL7K14UPJLHORE7IUMY3A/L277b0b939644528adb7
> 385727ca-e2d0-4b31-8275-befc0c71fa24	admin@exactis.com	http://adinet.gov/expapi/verbs/attended	http://dp.lattanziokibs.com/loms_dev_2019_1_50404_1/_H5PP4DL7K14UPJLHORE7IUMY3A/LSWJQ2NICPFWUPMN
> eb470904-a771-45c2-97a7-4daab01b98db	admin@exactis.com	http://adinet.gov/expapi/verbs/initialized	http://dp.lattanziokibs.com/loms_dev_2019_1_50404_1/_H5PP4DL7K14UPJLHORE7IUMY3A?ai=153
> 260a9892-e7b7-42ff-8db5-b5065a8829da	admin@exactis.com	http://adinet.gov/expapi/verbs/launched	http://dp.lattanziokibs.com/loms_dev_2019_1_50404_1/_H5PP4DL7K14UPJLHORE7IUMY3A?ai=153
> ceb80204-df31-4405-b752-7776f39092f	admin@exactis.com	https://brindleywaye.com/xAPI/terms/verbs/loggedin	http://dp.lattanziokibs.com/xapi/login
> d2cf1145-a476-43f1-b4a0-d615c2c04dc4	admin@exactis.com	https://brindleywaye.com/xAPI/terms/verbs/loggedout	http://dp.lattanziokibs.com/xapi/logout
> 05e52d6d-7ec4-4af5-ba2d-7535816ac0be	admin@exactis.com	https://brindleywaye.com/xAPI/terms/verbs/loggedin	http://dp.lattanziokibs.com/xapi/login

Data are indeed in the form of xAPI statements, and human processing of such data is not straightforward nor easy.

The eXact Delivery Portal by default provides information as **graphs grouped into a couple of dashboards**.

The first dashboard “**Delivery Portal Activity**” by default shows:

- Readers’ accesses through time
- Total number of accesses
- Accesses grouped by browser and device
- Total number of views
- Total number of launches of LOs
- Total number of downloads
- Total number of comments
- Total number of ratings
- Total number of favorites



The second dashboard “**Article and Readers statistics**” by default shows:

- Views per Article

- Views per Reader
- Launches per Article
- Launches per Reader
- Downloads per Article
- Downloads per Reader
- Ratings per Article
- Ratings per reader
- Favorites per Article
- Favorites per Reader

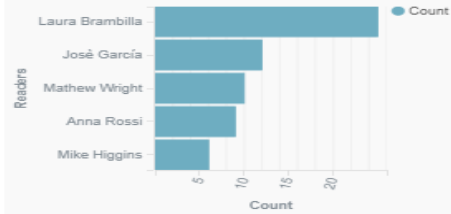


Articles and readers statistics

Views per article



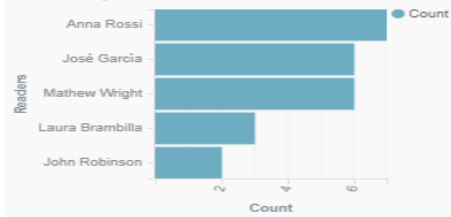
Views per reader



Launches per article



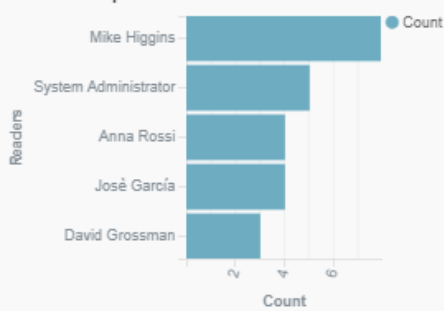
Launches per reader



Downloads per article



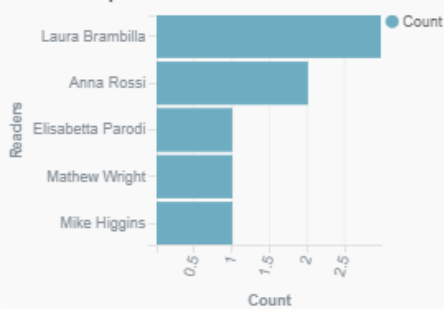
Downloads per reader



Comments per article



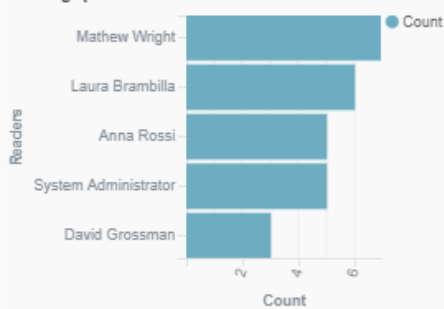
Comments per reader

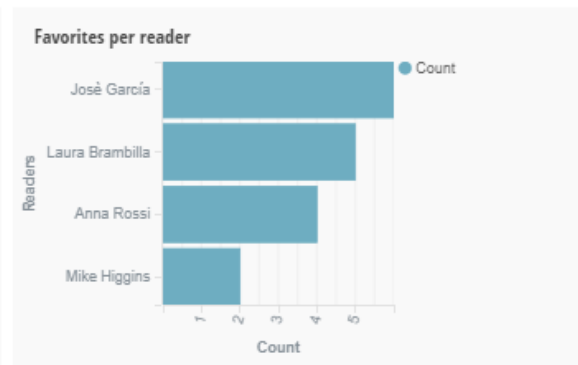


Ratings per article



Ratings per reader





In addition to default ones, custom graphs and dashboards can be added on a project basis, depending on specific customer's needs.

[END OF PAGE]

(Learning Object #6.3.3.5 HTML page) What can we infer from the data?

What can we infer from the data?

The Delivery Portal aims at gathering insights about stakeholder's interests and training needs to support the training department, mainly instructional designers, in enhancing the training offer.

Usually when setting up the Portal the Company already has some objectives in mind and therefore analyzes related indicators. Additional unexpected information and findings can emerge from further analysis.

Typical cases:

- **Searching for the reason of unexpected low engagement of Readers with a specific learning object**

In this case an in deep analysis of fruition can help, such as number of accesses towards number of completions. If accesses are low, then the solution would be to enhance the promotion of the material. If the accesses are much higher than completions, then additional data can be analyzed, such as spent time on overall material, accessed pages, last accessed page. If most of users drop at a certain page, previous pages could be reviewed, and additional attention should be paid to the “leaving page”: which elements are present on this page? Is there something not clear? Is there something too complex?

- **Searching for the reason of failed tests**

Via xAPI it is possible to track user's answers and find out which ones are the most typical mistakes and in turn, instructional designers can review the related didactical parts, i.e. adding more detailed explanations and examples.

- **Searching for successful patterns**

Via the Delivery Portal it is also possible to identify most “successful” materials, based on Company criteria: which Articles lead to more discussion, and/or have highest average scores, and/or lead to more downloads, and/or are most put in favorites, etc. By comparing topics, format, and lengths it is possible to devise common characteristics and formulate hypothesis to be further validated.

- **Understanding modality of usage/access**

Accesses to the Delivery Portal can be grouped by browser and device. This information can help the company to decide i.e. to invest in achieving compatibility of developed learning objects with a certain browser and/or optimizing content for fruition via mobile devices.

- **Much activity is observed around a specific topic**

It can be the case that Readers show a great interest via commenting, rating, downloading, and putting in Favorites some materials related to topics which are not usually considered valuable by Corporate programs. This could be a sign of an interest

or need which could be further supported by the Company if in line with the overall business objectives.

[END OF PAGE]

VIGNETTE eXact Delivery Portal case study

Anna is Senior Training Manager in the Training Department of WeFacilitateYou (WFY)⁴, a multinational group which develops and sells a software for managing registration to international events such as conferences and workshops. WFY has been using the eXact LCMS for the last five years for their content production and management, as well as delivering blended courses via eXact LMS. Anna has just been assigned a new challenging task: managing the set-up of a new instance of the eXact Delivery Portal, which is an optional module of the eXact Suite. The Company's objective is to establish a corporate portal enabling employees from different departments as well as external suppliers and customers, to interact directly with learning content as well as each other, and with the learning content and training providers. The Company aims at achieving engagement of all stakeholders in the Company's mission and enhancing the training offerings via a deeper understanding of stakeholder's needs and interests, going beyond the LMS courses themselves.

Anna is therefore in charge of managing the configuration, launch, and monitoring of the WFY eXact Delivery Portal.

The first thing Anna does is organizing a configuration workshop with the Senior Training Managers of the different sites of the Company. The team needs to identify the **materials** to be shared, at least for the start-up phase, and also to outline **visibility groups** and **Main Areas**. Early end user visibility groups will be **Marketing, Production, and Sales** departments. The first bulk of materials to be shared will be guidelines about the corporate identity and branding as well as some learning objects about negotiation and customer management. Also, manuals about coding languages and best practices in code writing will be shared. Therefore, early Main Areas are devised as Case Studies, Company Materials, Company Presentation, Events, Guidelines, Graphics, Manuals, and Product Presentation.

At this point, Anna refocuses the team on what the company aims to achieve via this project: an enhanced participation of its stakeholders and gathering feedback to enhance the production of training content. The team highlights that they will need to **track** access to articles and monitor **views, launches, downloads, comments** and **ratings**. They will be interested to spotlight, recognize and award **most active users**, as well as **most successful contents**, in terms of accesses, views, and higher rating.

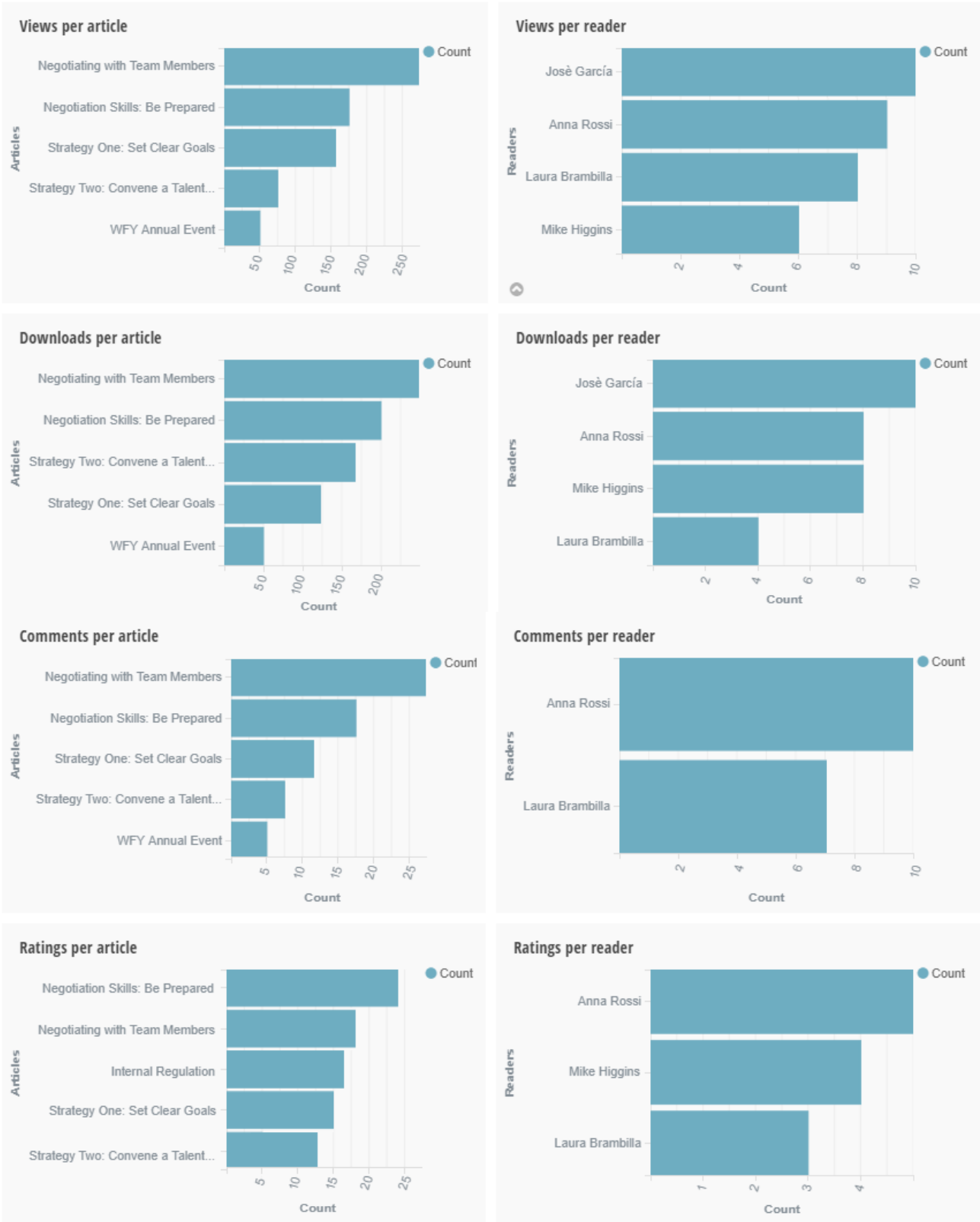
The team is also interested in gaining further **insights about the less successful LOs**. In the past, recognition that some LOs for internal training (in which the Company heavily invested in developing multimedia assets) were not completed by most of the learners. Now that LOs are published on the Delivery Portal and tracked via xAPI, the team hopes to collect further insights.

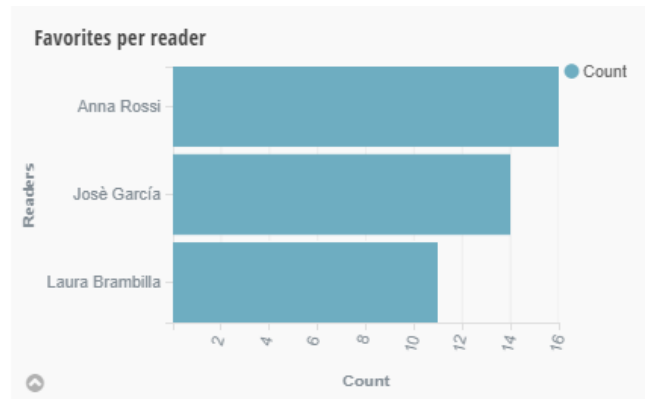
Three months after

⁴ The name and the acronym of the Company do not refer to a real Company

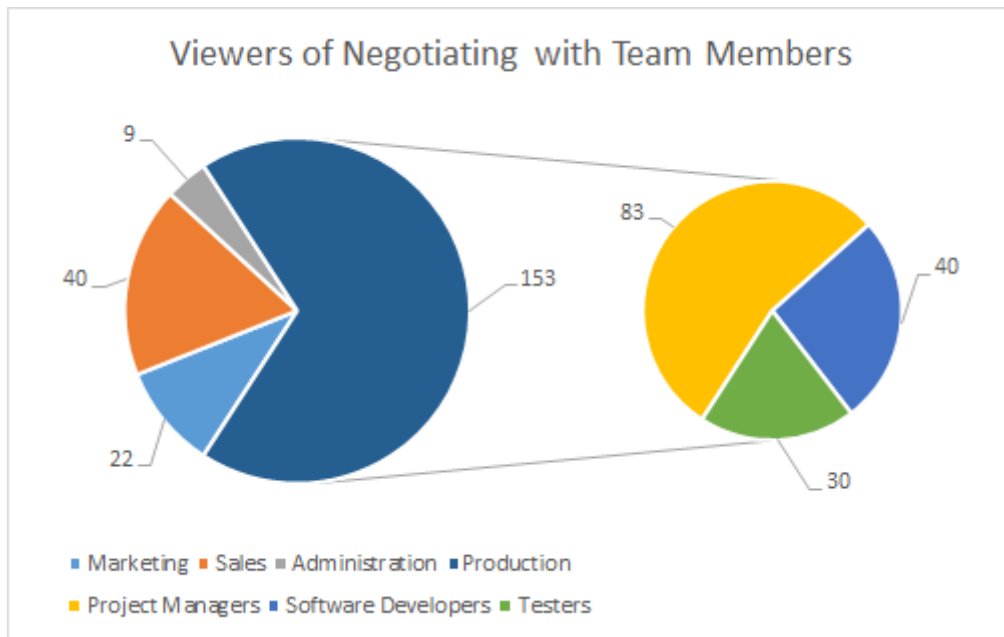
Three months after the launch of the WFY Delivery Portal, Anna calls a review meeting with the heads of the Training Department to analyze collected data and devise conclusions.

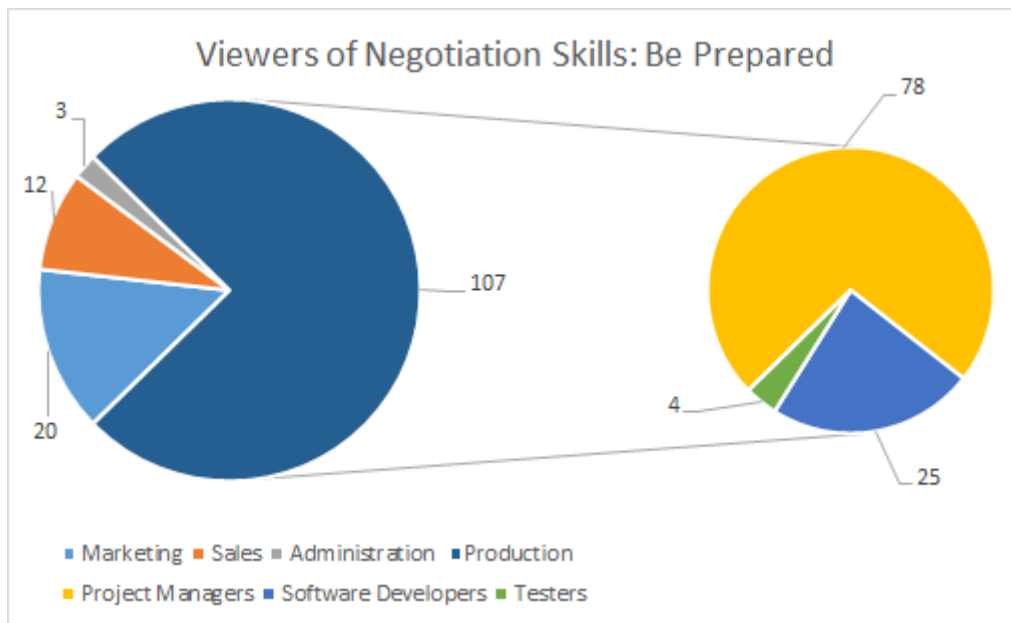
From the graphs in the Dashboard it is clear that the most successful Articles are related to a couple of learning objects dealing with negotiation.





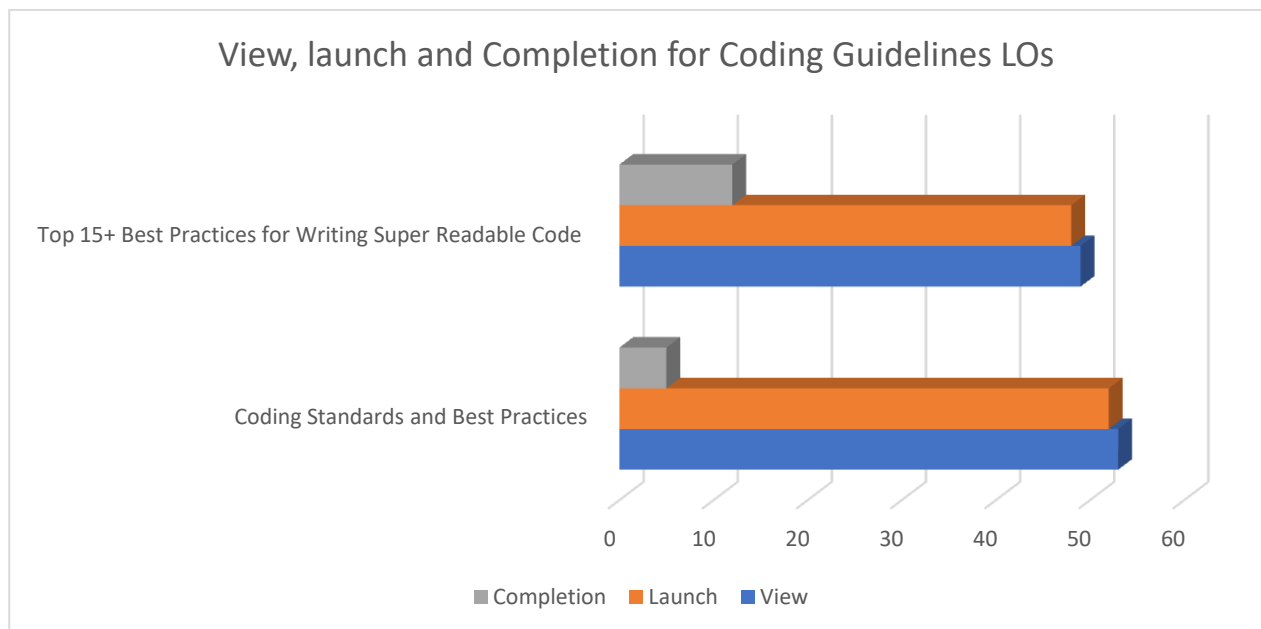
Anna notices that the number of accesses to the Negotiation learning objects are quite high and wonders which categories of employees are accessing those materials, which were originally meant to target Sales. Talking with the Delivery Portal provider she requests a small custom development to be able to get a further analysis of the data grouping the Readers of specific learning objects basing on additional data.





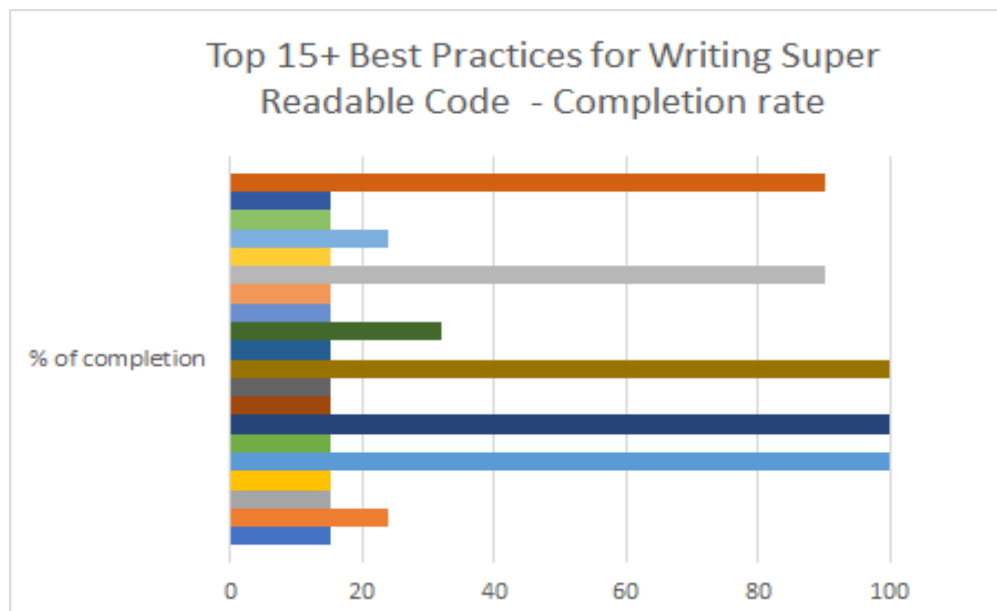
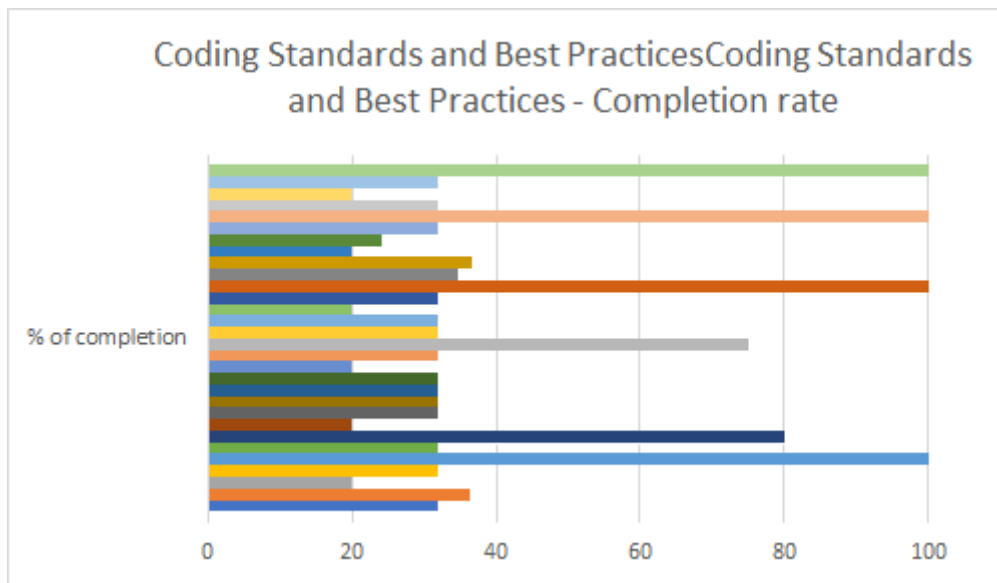
By analyzing these advanced graphs, Anna and the team spot that most of the users accessing the learning objects about Negotiation are project managers from the Production Departments, while very few people from the Sales Departments viewed the learning objects.

Anna and the team are also surprised by the difference between number of accesses, views and completion about a couple of learning objects about coding best practices.



While the number of accesses and views is almost the same, the completion rate is very low.

Anna asks for detailed information about pages of the learning objects.



From the detailed graphs, it is clear that many people leave the learning objects when they arrive at a certain point. Anna asks the Head of the Instructional Designers to appoint someone to check what the learning object present at the main abandon points.

And then?

Anna ran an internal survey about employees' needs and interests for internal training. It came out that Project Managers from the Production team were interested in training about soft skills, such as Negotiation and Leadership, in order to better manage relationships within their teams.

Anna also had a meeting with the Head of the Instructional Designers of the Company. By checking the coding learning objects, it came out that the contents share a video lasting over 20 minutes, with screensharing and voiceover, which is the same for the two materials. The voice has a weird accent and it is not easy to understand. In addition to amend the video, Anna

decided to agree upon establishing an internal best practice to avoid videos with speech over screen recording to be longer than three minutes. It was also recommended to always use professional speakers for training videos. Breaking the long videos with some text and reinforcement quizzes and adding a professional speaker, the learning objects with coding best practices became very popular among Company newcomers.

And ever after...

Anna continued to regularly meet the Heads of the Training Departments and review data from the Delivery Portal every three months.

The team asked the Provider to add custom graphs, splitting accesses per period of the day, and found out that a good number of employees were accessing the portal late evening; definitely outside of working hours, and showing spontaneous interest.

The team also asked a couple of instructional designers to review the tests with the worst scores. It came out that harder questions had misleading words to be rephrased. The team decided to also provide a few additional learning objects to further offer training resources to employees.

Next WFY Review meeting of Delivery Portal is tomorrow. What will they find out this time?

[END OF PAGE]

(Learning Object # 6.3.3.7 ACTIVITY) Quiz: eXact Delivery Portal Tracking capabilities

Quiz: eXact Delivery Portal Tracking capabilities

1. The eXact Delivery Portal tracks via xAPI (multiple responses):

- ✓ adding an Article to Favorites list
- ✓ launching a learning object
- ✓ downloading a material
- ☐ capturing a screenshot of a learning object

2. Tracked data are made available by default via:

- ✓ graphs
- ☐ .csv files
- ☐ excel files
- ☐ .pdf files

3. Please find below a list of information tracked by the eXact Delivery Portal. Match them with the dashboard where you expect to find the related graph.

- **Delivery Portal activity:**
 - Readers' accesses to Portal over time
 - Accesses to Portal by browser and device
 - Total number of views of Articles
 - Total number of comments to Articles
- **Articles and Readers statistics:**
 - Views per Article
 - Views per Reader
 - Downloads per Article
 - Comments per Reader

[END OF PAGE]

6.4 Module Summary and Conclusion

6.4.1 Summary of the Module

[\(Learning Object #6.4.1 html page\)](#) Summary of the Module

Summary of the Module

Welcome to the end of the Module! In this Module we have seen:

- An introduction to eXact suite
- An overview of eXact LMS, how courses are managed and learning objects can be managed and tracked
- How to access educational data about courses, learning objects and learners, and how they can be analyzed to make decisions and take actions by e-trainers for supporting learners
- An overview of eXact Delivery Portal for Corporate non-formal learning, which data can be tracked, and how they can be analyzed to make decisions by the training department and how instructional designers can enhance the production of training content

[END OF PAGE]

6.4.2 Instructor Video: Module Summary

(Learning Object #6.4.2 video) Module Summary

Module Summary

A short (~ 2 min) **instructor talking head** video to introduce the topic+ Transcript in .txt and .srt files to download.

Video Transcript

***Welcome to the end of the Module! In this Module we have seen **educational data in eXact suite**, namely in **eXact LMS** and **eXact Delivery Portal** modules.

We have seen the eXact LMS with its **courses** and **reports** for **formal learning**. We have seen which data can be collected and how they can be used by e-trainers to better help learners.

We have also seen the eXact Delivery Portal, supporting **non formal training** across a corporate enterprise. We have seen how end user's experiences can be tracked and how these data can be accessed to review and enhance the production of training content.

Finally, we invite you to complete a Feedback survey and the final Quiz of the Module.***

[END OF PAGE]

6.4.3 Feedback about the Module

We'd like to have your feedback about the Module. Would you please answer the few questions below? This will enable us to enhance the Module.

Question	Not at all	Not much	Enough	Much	Extremely
Are learning objects declared at the beginning reached out by the end of the Module?	1	2	3	4	5
Are contents presented in a clear manner?	1	2	3	4	5
Are examples and use cases clear and understandable?	1	2	3	4	5
Are the quizzes doable?	1	2	3	4	5
Is your overall evaluation of the course positive?	1	2	3	4	5

What was the (average) amount of time you spent on this module?

- ☐ Less than 30 mins per day
- ☐ 30 mins - 1 hour per day
- ☐ 1 hour - 2 hours per day
- ☐ More than 2 hours per day

What was the total amount of time you spent on this module?

- ☐ Less than 4 hours
- ☐ 4-6 hours
- ☐ 6-8 hours
- ☐ More than 8 hours per day

Did you utilize any of the links to external web sites?

- ☐ Yes
- ☐ No

Would you like to tell us something more about your experience with the Module?

[END OF PAGE]

6.4.4 Next Up

There are plenty of Learning Management Systems which provide different tools for educational data analytics. The next module will present you such tools of the IMC Learning Suite – a Learning Management System of the IMC AG.

[END OF PAGE]

6.4.5 Reminder

Ready for the final test? After References and suggestions for further readings, you will find the final test of the Module. Please move next for further information and instructions.

[END OF PAGE]

6.5 References and Reading

(Learning Object #6.5 html page) References

REFERENCES

Council Recommendation of 20 December 2012 on the validation of non-formal and informal learning:

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32012H1222%2801%29>

CEDEFOP, 2008. Terminology of European education and training policy – A selection of 100 key terms. Luxembourg: Publications office.

eXact Suite: <https://www.exactls.com/our-business/>

Hart, J., 2016: Rethinking workplace learning, Learning in the Modern Workplace.

Tvenge N., Martinsen K., Integration of digital learning in industry 4.0, 8th Conference on Learning Factories 2018 – Advanced Engineering Education & Training for Manufacturing Innovation, Procedia Manufacturing 23 (2018) 261-266, Elsevier

<https://www.sciencedirect.com/science/article/pii/S2351978918304992>

xAPI reference website: <https://xapi.com/overview/>

[END OF PAGE]

Module 6: MULTIPLE CHOICE QUIZ

This quiz contributes to the final assessment for receiving the Learn2Analyse MOOC **Certificate of Achievement**. Your grade in the course is calculated based on your replies to **100 multiple choice quizzes** distributed to the 6 core modules. In order to successfully complete this course and gain your Certificate of Achievement you must gain a mark of **60% or greater** overall to all 100 quizzes.

The quiz of Module 6 consists of **10 questions**, including:

- multiple choice with one correct answer;
- multiple choice with more than one correct answer; and
- true/false questions.

It is "open book" and there is no set time limit.

You will have **two attempts** to answer all quiz questions except for the "true/false" questions. When you click "Check", it will register as your first attempt. If your answer is incorrect, try again and then click "Final Check".

It should take less than **30 minutes** of your time to complete this quiz.

Question 6.1: The most widely used e-learning formats, which allow tracking users' interaction with e-learning contents, are (multiple answers are allowed):

1. SCORM
2. xAPI
3. EPUB
4. XLIFF

Question 6.2: Reports about courses and SCORM packages in eXact LMS:

1. can be accessed directly or exported as .csv/.pdf files
2. are presented only graphically via graphs in a dashboard
3. are provided as .csv/.pdf files as well as graphs in dashboard
4. can be extracted from database only via backend APIs

Question 6.3: In eXact LMS, reports about SCORM packages allow to (multiple answers are allowed):

1. easily calculate average score per package
2. easily calculate average time spent per package
3. retrieve a given learner's last access date and time to a given package
4. retrieve a given learner's completion date and time of a given package

Question 6.4: The Access Statistics page allows to (multiple answers are allowed)

1. see at a glance which are the days with the highest number of accesses within a given timespan
2. see at a glance which are the days with the lowest number of accesses within a given timespan
3. see how many users accessed to a given course
4. see how many users registered to a course within a given timespan

Question 6.5: Analyzing historic reports in eXact LMS, e-tutors for the benefit of the learners may (multiple answers are allowed):

1. See average number of attempts requested to pass a learning object and then decide to get in touch with learners who did not pass the test the first time and did not repeat the test yet, to offer them assistance and invite to retry
2. Find out which learners passed the learning object with the highest score in least time and inform the Management for recognition and reward
3. Find out which learners accessed the platform out of working hours, to invite them to observe more strictly the working hours
4. Find out which learners used own devices to access the platform and remind them to use only Company devices

Question 6.6: A history report is an advanced report:

1. concerning the data on all the user attempts made within a certain timeframe
2. concerning a specific date
3. concerning information about the users' accesses to the platform
4. concerning username, name and surname of the involved learner

Question 6.7: The Experience API (or xAPI) is a recent specification for learning technology that makes it possible:

1. to collect data about a wide range of experiences, both online and offline
2. to track SCORM learning objects
3. to access learners' reports
4. to elaborate graphs out of statements

Question 6.8: The eXact Delivery Portal tracks Reader's experience via xAPI statements, whose basic structure is:

1. Noun, verb, object
2. Noun, verb
3. Noun, verb, object, context
4. Noun, verb, object, context, extension

Question 6.9: The eXact Delivery Portal makes statements information available as:

1. graphs in dashboards
2. periodic notification emails
3. statistics and summaries
4. excel sheets

Question 6.10: The analysis of data tracked via eXact Delivery Portal typically may lead to (multiple answers are allowed):

1. understand the reasons of unexpected low engagement
2. discover successful patterns in engaging learning objects
3. identify and award most engaged users
4. increase ROI after IT investments

[END OF PAGE]

Learn2Analyze

Knowledge Alliances (Key Action 2)

AGREEMENT NUMBER: 2017 - 2733 / 001 – 001

PROJECT NUMBER: 588067-EPP-1-2017-1-EL-EPPKA2-KA

WP3. Learn2Analyse MOOC Design and Development

Result 6a Learn2Analyze MOOC version 1 Learning Materials

Module 7: Educational Data Analytics with IMC Learning Suite

Module 7

Educational Data Analytics with the IMC Learning Suite

Estimated Effort to complete: **8** hours

Assessment Multiple Choice Questions: **10**

7.0.	Introduction.....	6
7.0.1.	Welcome	6
	(LO #7.0.1.1 HTML page) Scope of Module 7.....	6
7.0.2.	Learning Objectives	7
	(LO #7.0.2.1 HTML page) Module 7 Learning Objectives	7
7.0.3.	Introducing the IMC Learning Suite.....	8
	(LO #7.0.3.1 HTML page) The IMC Learning Suite.....	8
	(LO #7.0.3.2 VIDEO) IMC Learning Suite Intro	10
	(LO #7.0.3.3 VIDEO) IMC Learning Suite Walk-Through.....	11
	(LO #7.0.3.4 ACTIVITY) Discussion: IMC Learning Suite Features.....	12
7.1.	How educational data is handled in the Learning Suite.....	13
7.1.1.	What types of educational data can be collected?	13
	(LO #7.1.1.1 HTML page) General principles of data handling.....	13
	(LO #7.1.1.2 HTML page) User roles, organisational structure and groups	14
	(LO #7.1.1.3 HTML page) Data available for reporting.....	16
	(LO #7.1.1.4 VIDEO) Introduction to reporting basics.....	17
	(LO #7.1.1.5 ACTIVITY) Discussion: Why user specific access rights are necessary?	18
7.1.2.	Representing and accessing educational data in the Learning Suite through reports	19
	(LO #7.1.2.1 HTML page) Target groups benefiting from educational data	19
	LO #7.1.2.2 HTML page) List-view based reports.....	20

(LO #7.1.2.3 HTML page) Role specific dashboard with graphical report panels	22
(LO #7.1.2.4 HTML page) Learning Analytics Dashboard	25
7.1.3. Tutor Centre - Accessing educational data for course supervision.....	27
(LO #7.1.3.1 HTML page) Introduction to the Tutor Centre.....	27
(LO #7.1.3.2 HTML page) Participants' progress in a specific course.....	29
(LO #7.1.3.3 HTML page) Individual participant progress for course component	31
(LO #7.1.3.4 HTML page) Average progress of participants per component of the course	32
(LO #7.1.3.5 HTML page) Progress on a course component of each individual participant	33
(LO #7.1.3.6 HTML page) Learning-progress history per component	34
7.2. Considering Teaching Analytics while designing a course in the Learning Suite	35
7.2.1. Designing an e-learning course in the Learning Suite	35
(LO #7.2.1.1 HTML page) Designing a course in the IMC Learning Suite	35
(LO #7.2.1.2 HTML page) Using a lesson plan in the Learning Suite	40
7.2.2. Case Study: IBIS – Designing an Online Course to prepare Teaching and Learning Analytics 41	
(LO #7.2.2.1 HTML page) About the IBIS Online Course	41
(LO #7.2.2.2 HTML page) Design of IBIS Online Course	42
(LO #7.2.2.3 VIDEO) Learner view of overall programme structure in Learning Suite	44
(LO #7.2.2.4 HTML page) Using exercises to prepare learning analytics	45
(LO #7.2.2.5 VIDEO) Learner view of detailed lesson plan of an IBIS module.....	46
(LO #7.2.2.6 ACTIVITY) Discussion: Which analytics does the design of the IBIS course structure enable?	47
7.2.3. Using Gamification in your instructional design	48
(LO #7.2.3.1 HTML page) Introduction to Gamification	48
(LO #7.2.3.2 HTML page) Experience Tracks and Experience Points (XPs)	49
(LO #7.2.3.3 HTML page) Badges.....	53
7.3. Tools for Learning Analytics in the Learning Suite	54
7.3.1. Using the Learning Analytics dashboard of the Learning Suite.....	54

(LO #7.3.1.1 HTML page) Customization options of the Learning Analytics dashboard.....	54
(LO #7.3.1.2 HTML page) Graphical representation of the reported data.....	56
(LO #7.3.1.3 ACTIVITY) Quiz: Choose diagram types.....	57
7.3.2. Collecting and retrieving learner data.....	58
(LO #7.3.2.1 HTML page) Static and dynamic data	58
(LO #7.3.2.2 HTML page) Dynamic data on learning behaviour	60
(LO #7.3.2.3 HTML page) Reports – Overview of important reports for instructional designers and e-Trainers.....	62
(LO #7.3.2.4 ACTIVITY) Discussion: How would you use the reports as an instructional designer or e-Tutor?.....	66
7.3.3. Reports for Activity and Engagement Analysis	67
(LO #7.3.3.1 HTML page) Reporting and supervision of the learner’s engagement activities.....	67
(LO #7.3.3.2 HTML page) Report: Course Learning History	68
(LO #7.3.3.3 ACTIVITY) Quiz: Course Learning History	74
(LO #7.3.3.4 HTML page) Tutor view of learner engagement: “Course Instruction”	75
(LO #7.3.3.5 ACTIVITY) Quiz: Select the best tutor view for your task.....	76
7.3.4. Reports for Achievement Analysis	79
(LO #7.3.4.1 HTML page) Analysing a learner’s assessment activities: Reports and Tutor Centre.....	79
(LO #7.3.4.2 HTML page) Report: Test questions per user	80
(LO #7.3.4.3 ACTIVITY) Quiz: Working with the report “Test questions per user”	84
7.3.5. Reports for content interaction analysis.....	85
(LO #7.3.5.1 HTML page) Report: SCO status in courses.....	85
(LO #7.3.5.2 ACTIVITY) Discussion: Why record processing time of a learning object?	90
(LO #7.3.5.3 HTML page) Detailed content analysis of WBTs	91
(LO #7.3.5.4 Video/WBT) WBT example – Part 3 of RHAPSODY program	92
(LO #7.3.5.5 HTML page) Report: Extended WBT report	93
(LO #7.3.5.6 ACTIVITY) Drag & Drop Exercise: Categorize reports.....	96
7.3.6. Notes on historical data and processing times in the Learning Suite	97

(LO #7.3.6.1 HTML page) How to deal with historical data in the Learning Suite	97
7.3.7. Case study: RHAPSODY – Analytics in action	98
(LO #7.3.7.1 HTML page) RHAPSODY Overview	98
(LO #7.3.7.2 HTML) RHAPSODY Analytics at a glance	99
7.3.8. Data protection and GDPR	100
(LO #7.3.8.1 HTML page) Data protection and GDPR - Overview	100
(LO #7.3.8.2 VIDEO) Data Protection in the Learning Suite	102
7.3.9. Advanced reporting options of the Learning Suite	103
(LO #7.3.9.1 HTML page) Beyond standard reports.....	103
(LO #7.5 ACTIVITY) Discussion: Express your impressions and attitude towards IMC Learning Suite	104
7.4. References and Further Readings	105
(LO #7.4.1 File to download) Report definitions of IMC Learning Suite.....	105
(LO #7.4.2 HTML page and File to download) Case-study: RHAPSODY Analytics at a glance	105
(LO #7.4. 3 HTML page and File to download) References and Further Readings.....	106
7.5. Module 7: Multiple-Choice Quiz	107

7.0. Introduction

7.0.1. Welcome

[\(LO #7.0.1.1 HTML page\) Scope of Module 7](#)

Welcome to **Module 7 - Applying Teaching & Learning Analytics with the IMC Learning Suite.**

This module will present the tools for educational data analytics in the IMC Learning Suite and will focus on the usage of these tools. In this module you will learn how IMC Learning Suite can support instructional designers of online courses to reflect on their educational designs and re-design them.

After a brief introduction to the IMC Learning Suite – a professional Learning Management System developed by IMC AG (www.im-c.com) – you will get an overview of main principles and techniques about how educational data is collected and processed in the Learning Suite. This module introduces the tools of the Learning Suite for learning analytics and shows potential applications of teaching analytics.

At the end of this module you will be given practical examples on how to use the analytics tools of the Learning Suite to gain additional insight from the educational data generated within the Learning Suite.

[END OF PAGE]

7.0.2. Learning Objectives

([LO #7.0.2.1 HTML page](#)) [Module 7 Learning Objectives](#)

By completing this module, you will:

Module 7 Learning Objectives	Learn2Analyse Educational Data Literacy Competence Profile
Know how to obtain, access and gather the appropriate educational data in the IMC Learning Suite	1.1
Understand how to apply data processing and handling methods (i.e., configuring and filtering reports, choosing the relevant data) in the IMC Learning Suite	2.1
Be able to use data presentation tools of the IMC Learning Suite	3.2
Be able to interpret insights from educational data analysis within the IMC Learning Suite	4.3
Be able to elicit potential implications of the educational data insights from data analysis to instruction within the IMC Learning Suite	4.4
Be able to use educational data analysis results to make decisions to revise instruction within the IMC Learning Suite	5.1
Be able to apply educational data privacy and distinguish between different levels of data protection within the IMC Learning Suite	6.2

[END OF PAGE]

7.0.3. Introducing the IMC Learning Suite

(LO #7.0.3.1 HTML page) The IMC Learning Suite

The “IMC Learning Suite” is a Learning Management System (LMS) which supports an organisation’s entire learning management processes. The mission of the Learning Suite is to offer a digital learning environment which makes learning and teaching simpler whilst, at the same time, being able to model complicated learning scenarios and administration processes of any organisational structure. To achieve this mission, the IMC Learning Suite offers a flexible software architecture, the freedom to combine individual components, the ability to adapt configuration settings, the ease of integration as well as a huge variety of functionality. With more than 20 years of experience in the e-learning market [IMC \(www.im-c.com\)](http://www.im-c.com) has created an LMS which is considered one of the most comprehensive and easy to use learning technology solutions on the market. The IMC Learning Suite is used by more than 5 million users around the globe in organizations of all sizes and industries.

The following Figure summarizes the high-level characteristics of the IMC Learning Suite.

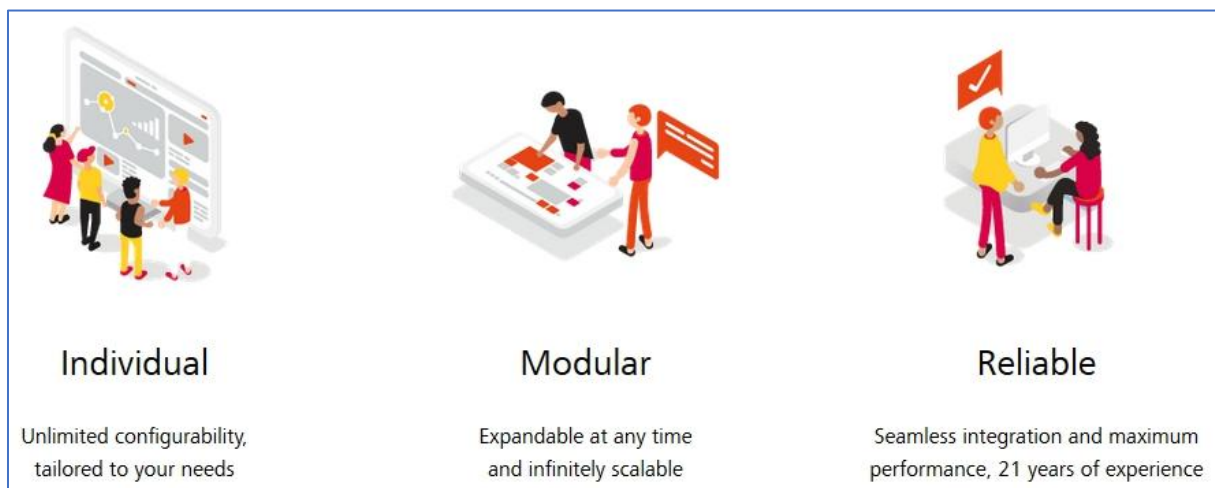


Figure 1 (Existing GRAPHIC) Characteristics of the IMC Learning Suite
Source: <https://www.im-c.com/uk/learning-technologies/learning-management/>
[Source file: Characteristics of the IMC Learning Suite.jpg](#)

The next Figure outlines the unique features of the IMC Learning Suite. These are:

- Intuitive user guidance
- Skill and Competence Management
- Learn anytime, anywhere
- Reporting Dashboard
- Seamless integration
- Highest safety standards

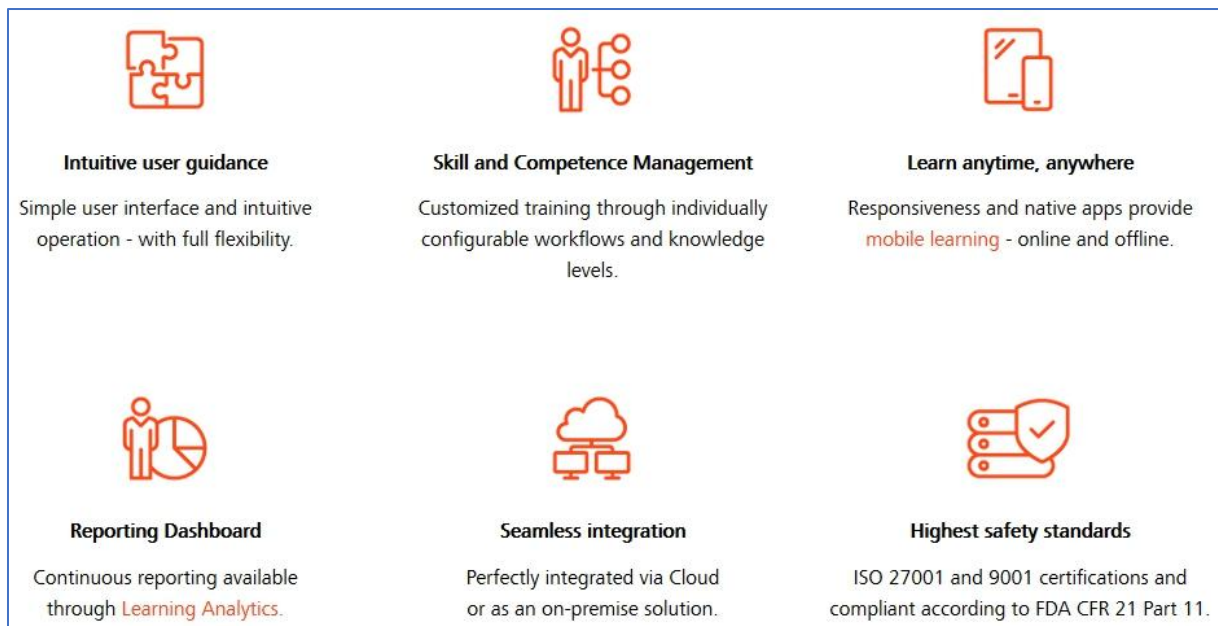


Figure 2 (Existing GRAPHIC) Unique features of the IMC Learning Suite

Source file: Features of the IMC Learning Suite.jpg

The “Reporting Dashboard” feature depicted on the left bottom of the above figure may have already grabbed your attention. In the following sections we will elaborate on the Learning Analytics features offered through the Reporting Dashboard” in more detail.

You may be interested to read a review of the IMC Learning Suite by David Patterson (UK eLearning Analyst - 2017) entitled “IMC LMS Review: Complete Learning Suite for Online & On The Job Training” available at www.learninglight.com/imc-lms-review/.

Please note that images, screen captures, videos and other visual material showing the IMC Learning Suite in this course module refer to Version 13.10 of the IMC Learning Suite or earlier. In general, the features will apply to later versions as well, they may change their look and feel though.

[END OF PAGE]

(LO #7.0.3.2 VIDEO) IMC Learning Suite Intro



Video 1 (Original Video): Video Introducing IMC Learning Suite

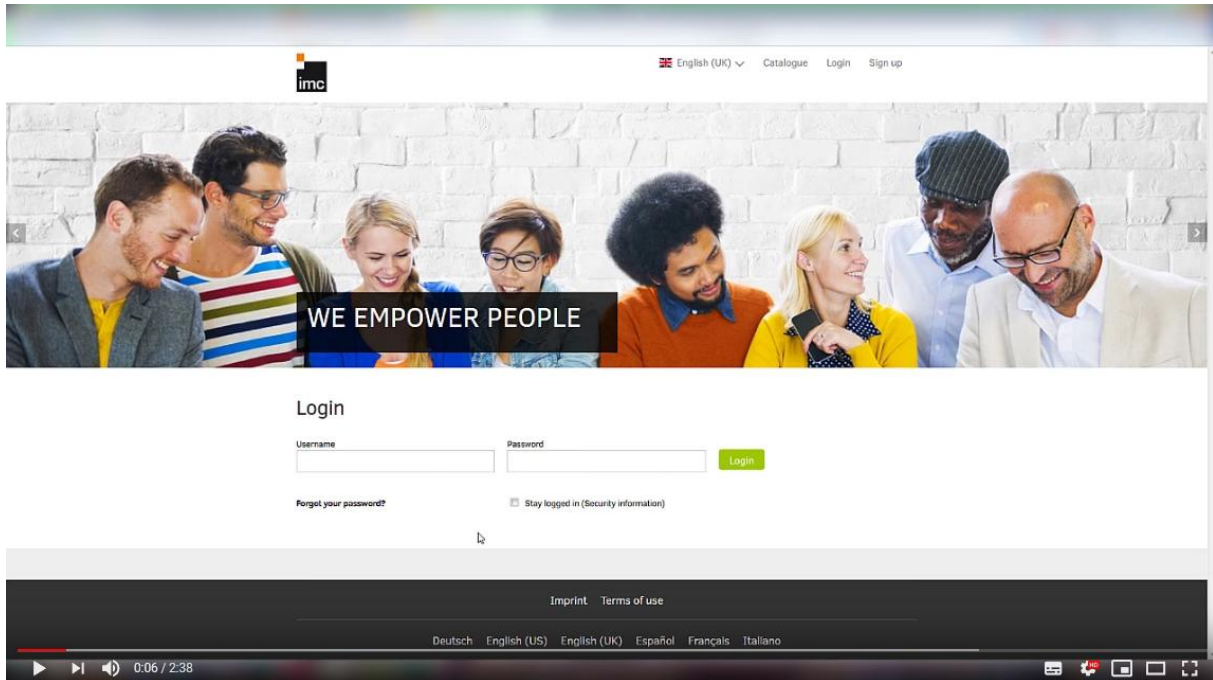
Source file (image): LMS-Slideshow-for-L2A_v1.jpg

Source file (video): LMS-Slideshow-for-L2A_v2.mp4

This short intro video highlights the main features of the IMC Learning Suite.

[END OF PAGE]

(LO #7.0.3.3 VIDEO) IMC Learning Suite Walk-Through



Video 2 (Existing Video): IMC Learning Suite Walk Through
Source file (video): <https://youtu.be/Dkkl3ajGMA0>

This video shows a brief walk-through of the IMC Learning Suite from the perspective of a learner.

After watching the videos and working through the outline above, think of any other LMS you might be familiar with and its features. In the next Activity you are welcome to express your thoughts and participate in the discussion.

[END OF PAGE]

(LO #7.0.3.4 ACTIVITY) Discussion: IMC Learning Suite Features

Based on the information you gained so far, think of any other LMS you know and try to answer the following questions in the discussion board below.

- 1. *What other LMSs have you worked with before?***
- 2. *In which features do you see strong differences between IMC Learning Suite and other LMSs?***
- 3. *What features do you expect to be available in the IMC Learning Suite regarding educational data analytics?***

[END OF PAGE]

7.1. How educational data is handled in the Learning Suite

7.1.1. What types of educational data can be collected?

(LO #7.1.1.1 HTML page) [General principles of data handling](#)

Educational data within the Learning Suite is mainly delivered as a report. What data is collected and how that data can be reported, depends on some general principles of data handling in the Learning Suite. It is important to understand these principles.

Different types of users of the Learning Suite, e.g. administrators, tutors or HR managers, have tailored access to reports and data in the Learning Suite. To this end reporting in the Learning Suite is designed around the following general principles. As a user of the Learning Suite

- You only see what you are allowed to see according to your user role and respective access rights, and the same is true for reports.
- If you can see data in a list, you can export it (e.g. course lists, user lists) into the standard formats .csv or .xlsx for further processing.
- Where a report concerns analytical relations between objects (e.g. which user completed which learning object of a course at which time), the reports are found in the so-called “Learning Analytics” section of the Learning Suite.
- You can configure Learning Analytics reports in a dashboard to be easily accessible for relevant users (e.g. tutors, administrators, managers, etc.)

Considering these principles at the beginning of the system configuration would be beneficial for instructional designers and e-tutors.

[END OF PAGE]

(LO #7.1.1.2 HTML page) User roles, organisational structure and groups

In the Learning Suite, user specific access rights control which type of user has access to which data and reports in the Learning Suite. This implies that the same report may be accessible for multiple users in the system, but the resulting reported data differ, for example a tutor may be able to report data only about participants from the course s/he is tutoring, while other users see data about all users of an organization. For every IMC Learning Suite installation of an organization, the organization decides on the user roles and access rights and a global system administrator can configure these access rights.

There are *system user groups* representing user roles such as system administrator, tutor, moderator, HR manager, etc. and *target user groups* clustering users depending on specific purposes, e.g. all students of a university enrolled in the minor Business and Innovation and taking part in a specific course. Additionally, users can be clustered into Business Units and other organisational structures.

Typical system user roles include:

- Administrator: Can configure the system, create and manage users, adapt navigation elements, access reports etc.
- Super user: Has access to all users and system components.
- Tutor: A tutor can be assigned to a course. The tutor has access to the progress and results of the users of that course.
- HR: Sees all employees of a company and their training status.
- Line manager: Sees only the users s/he is a manager of.
- Content Administrators: Can create and edit content of a course.
- Student: Can see courses and learning contents, but have no administrative rights.

In addition, target groups can be created to freely cluster persons into groups to give them the required access rights. In many examples of this course module you will encounter a target group we have called “KUL Students WS18/19” which collects all students who enrolled in a university course and now take part in a MOOC.

Groups can also have a hierarchical structure to model the structure of one or more organisations. See for example a structure in the following figure:

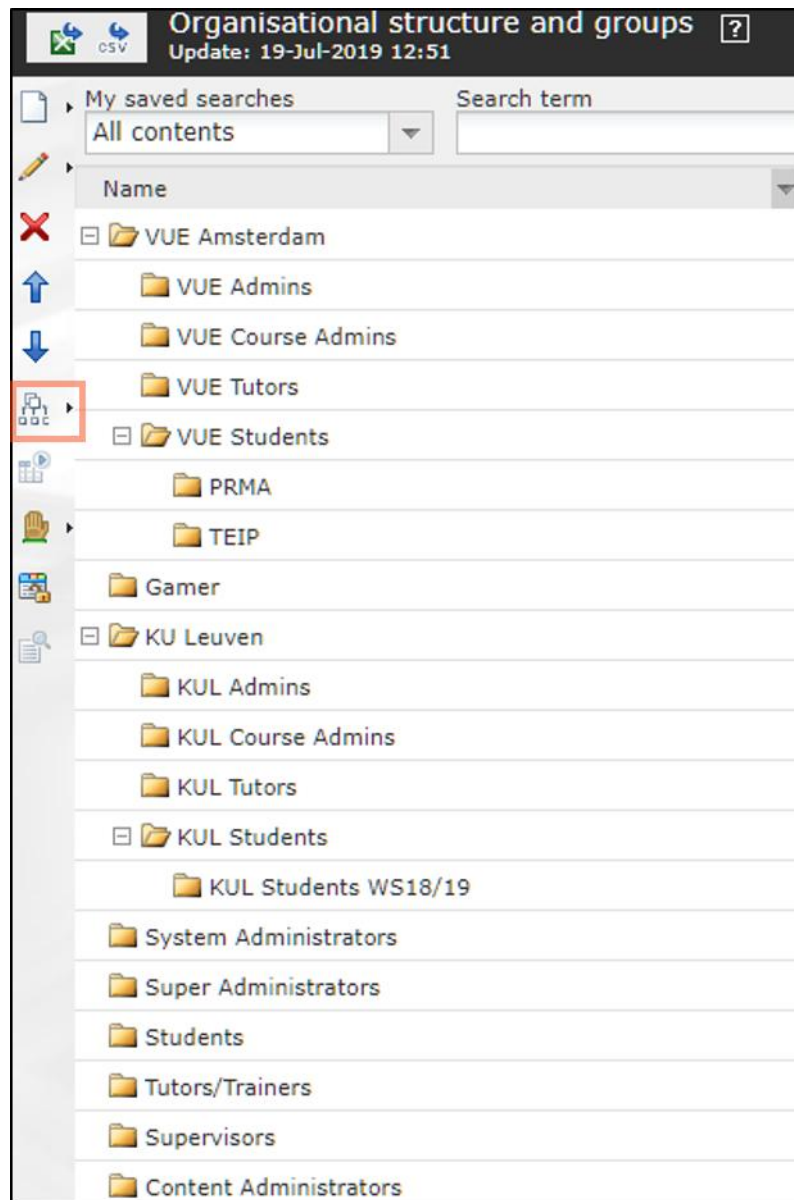


Figure 3 (Original GRAPHIC) Hierarchical structure of user groups
 Source file: organisational-structure-and-groups.png

Groups and access rights options in the learning suite are very elaborated and can map all kinds of business requirements of large organisations. For the purpose of this module it is sufficient that you understand the basic principles of user roles.

[END OF PAGE]

(LO #7.1.1.3 HTML page) Data available for reporting

In an analytics context, we often distinguish static data from dynamic data. **Static data** of the learner is information which does not change at all or remains almost unchanged during the learning process. To static data belongs, for instance, the learner's identifying information like name, surname, birthdate, birthplace, nationality etc. Also, the learner's educational history like courses enrolled or taken, grade records, transcripts and other academic performances could be considered as static data. **Dynamic data** refer mainly to the learner's activities during the learning process.

In the Learning Suite both types of data are available. Almost all **objects** (e.g. users, courses etc.) that exist in the system are available for reporting. **Activities** on these objects that take place on the system (e.g. a user **registers** to a course, a user **passes** a test) are stored in the database and can be extracted via standard reports.

The most important objects and activities relevant for reporting in the Learning Suite are:

Objects

- **Users**, represented by a unique user ID.
- **User metadata**, e.g. first name, last name, email, title, image, country, or other data that an organisation wants to include in a user profile.
- **Organisational structure and role-specific user groups**. The system allows you to cluster users into different groups in order to allocate them group-specific access rights to functions, objects and the navigation of the system.
- **Learning objects** including courses, programmes (bundles of interrelated courses), catalogues (lists of courses, programmes or individual learning objects), individual learning objects (HTML pages, files, videos, images, tests, practical assignments, Web-Based-Trainings, etc.)

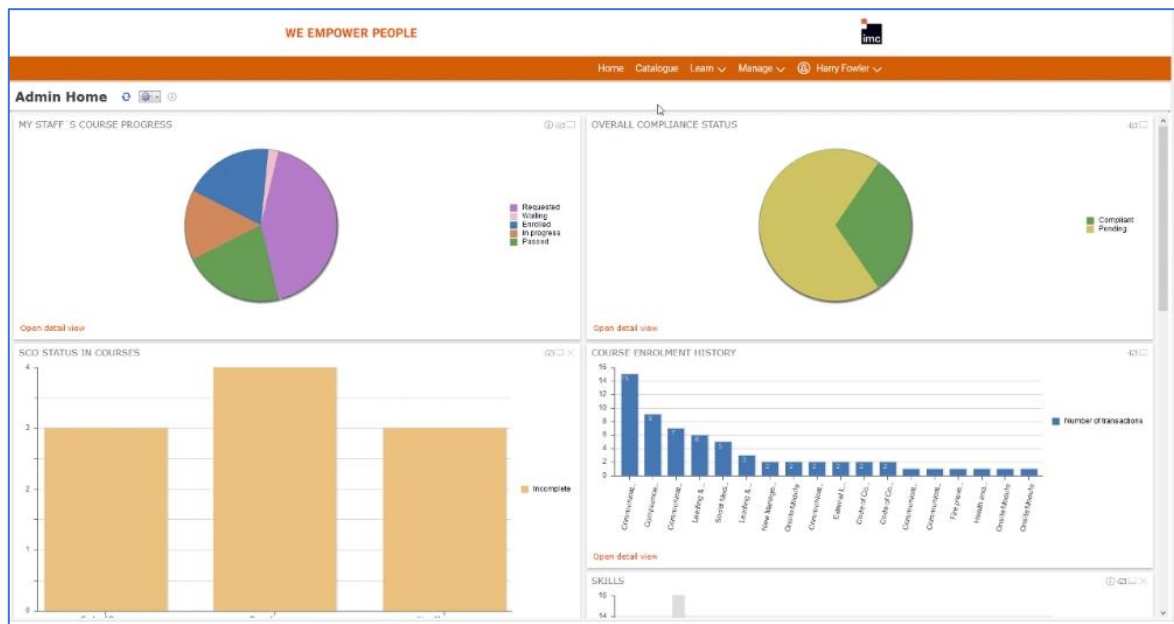
Activities

- **Learning activities** (e.g. **registration** of a user to a course, **login** of a user into the system, user **completing** a learning object, user **failing** a test, etc.)
- **Performance and evaluation data** such as test results, compliance status (e.g. did a user complete all courses that belong to a security training before the deadline) and feedback summaries (e.g. results to course feedback questionnaires).

Let's look at the main reporting features of the Learning Suite explained in the next introduction video "Introduction to reporting basics".

[END OF PAGE]

(LO #7.1.1.4 VIDEO) Introduction to reporting basics



Video 3 (Existing VIDEO) Introductory Video on Basic Reporting Features of the Learning Suite

Source file (VIDEO): Reporting.mp4 (see also <https://learningconnect.im->

[c.com/imdlearningconnectiltp/pages/mediacontent.jsf?catalogId=1700&mediaId=129870\)](https://www.imdlearningconnectiltp/pages/mediacontent.jsf?catalogId=1700&mediaId=129870)

This video gives you a brief introduction to the reporting features in the Learning Suite

[END OF PAGE]

(LO #7.1.1.5 ACTIVITY) Discussion: Why user specific access rights are necessary?

Think about why access rights are important. Give some examples where the access rights play a bigger role. You may consider specific cases from the point of view of an educational organization, tutor and a learner. You may discuss your ideas in the discussion board below.

Why access rights are important? Give examples and elaborate.

[END OF PAGE]

7.1.2. Representing and accessing educational data in the Learning Suite through reports

(LO #7.1.2.1 HTML page) Target groups benefiting from educational data

IMC Learning Suite provides a range of reporting options and exporting functionalities including the option to graphically represent the educational data. Reports in the Learning Suite can be configured to meet the needs of different user groups. Such user groups can have then personalized dashboards, for instance:

E-Tutors can rely on information retrieved from the Learning Suite regarding learners' behaviour while making decisions on whether/when to intervene the learning process. Dynamic data related with learners' behaviour may refer to engagement, performance or interaction information. E-Tutors can use such educational data to take supportive actions towards the learners who are struggling to learn or at risk of dropping the course.

Instructional designers have an opportunity to see how the course they have created is used. Especially, the reports may give them information about whether the learners are following the initially proposed structure of the course or they are sporadically accessing the learning materials. Reports can help to reveal the strengths and weaknesses of the course structure. Looking at the interaction data, instructional designers can gain more insight on the quality of their learning materials, especially the activity-based learning objects and assignments.

Learners can benefit from the insight obtained through their data by regularly receiving updates on the progress they make compared to their peers. They also receive specific recommendations on additional courses, they might be interested in. Gamification, an advanced feature of the Learning Suite exploiting educational data, can be used to additionally boost the learners' motivation. Learners can collect experience points and badges and when they learn in a group, they can immediately see their results on a leaderboard compared to other users.

HR and training managers of an organization can also use the data to identify more and less popular learning content thus offering topics according to staff's individual preferences and needs.

Those reporting possibilities will be explained hereinafter in detail.

[END OF PAGE]

LO #7.1.2.2 HTML page) List-view based reports

IMC Learning Suite provides a wide range of user and content specific lists. The lists are configurable regarding search fields, advanced search fields as well as optional search fields which can be added by a user to the list search at any time. Given that flexibility each user can arrange searches and output tables to fully fit the daily needs perfectly. Any combination of search parameters and tailor table output of the search results can be saved and is therefore re-useable at any time in a sense of a tailored report.

Throughout the system list-based views provide the options outlined in the following Figure.

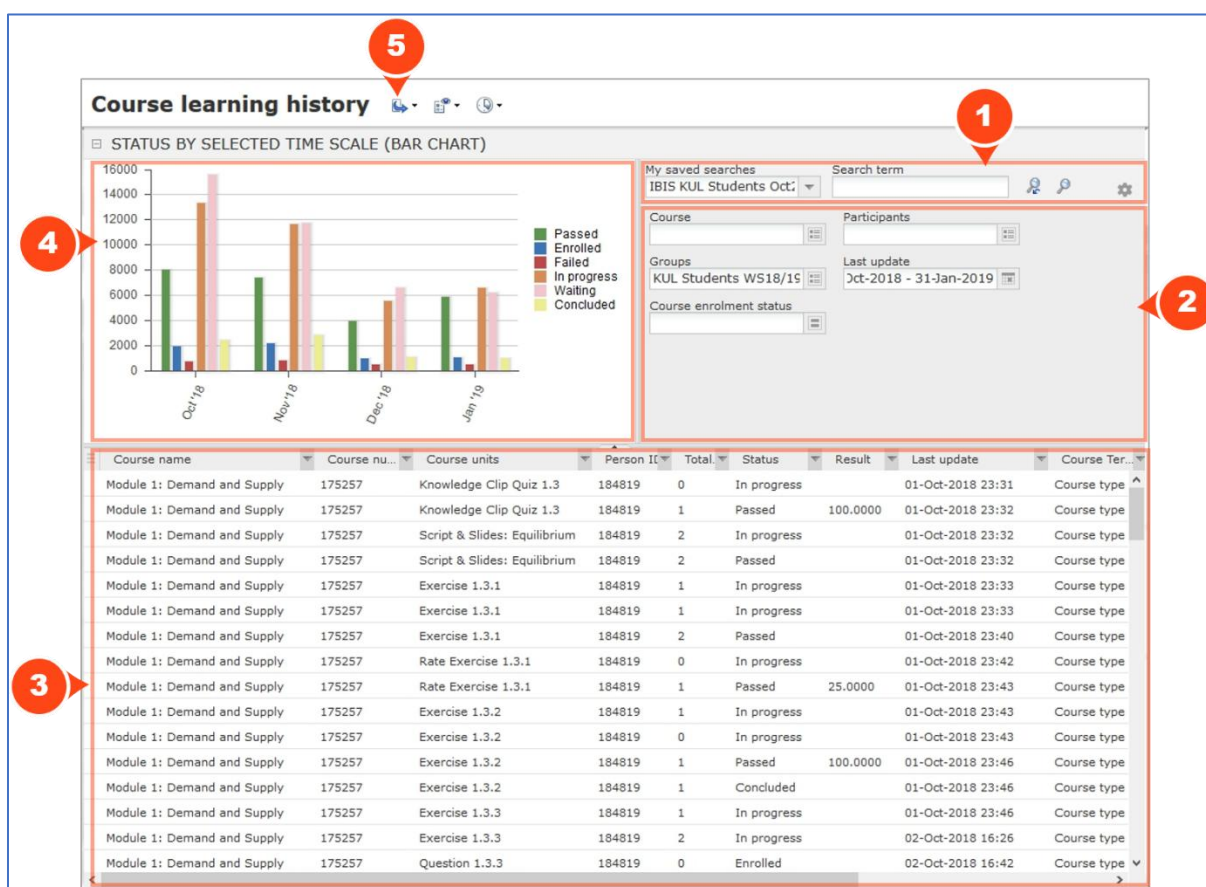


Figure 4 (Original GRAPHIC) Detailed view on a dashboard report

Source file: Module7-LMS_Learning-Analytics-dashboard-2.png

In the Figure above a detailed list-based view of a report is depicted. Each list-based view in IMC Learning Suite supports the following options:

1. **Primary search area:** You can restrict your search in a report by entering a search term. The search term can search in course names or course numbers, Person IDs, Last or First name of a user.
In the "My saved searches" area you can save search parameters of the primary and advanced search area and store the filters for later use. This pre-defined search can even be used as default view when entering the list reporting interface again.
2. **Advanced search area:** Here you can set individual filters and make the search more specific. You can restrict your search e.g. to a specific course, to specific participants, to user groups,

time ranges and other criteria depending on the report. This area can be freely defined by adding or removing search filters and the filters can be arranged via drag & drop.

3. **List-based view of the reported data** (output table). Shows the search result in a tabular form. The list-based view can also be configured to show/hide specific data according to the needs of the user. The table can also be freely layout where the column order can be changed by drag & drop.
4. **Graphical representation of the reported data**. Shows a graphical overview of the search results depending on the primary search attributes and filters set in the advanced search area. Also, the scaling of the graphical representation (x-axis) can be changed, in the example above between day / month / year.
5. **Export of reported data**. List views can be exported as .csv or .xlsx and graphical representations can be exported as chart data (.xlsx) or as graphics (.png, .svg). Files can be saved locally or sent to the user via email.

[END OF PAGE]

(LO #7.1.2.3 HTML page) Role specific dashboard with graphical report panels

IMC Learning Suite provides the possibility to define role specific central reporting dashboards in the system. These dashboards are graphical interfaces that enable a direct access to reports a user has access rights to. The role-specific dashboard page also gives an administrative user a quick graphical overview of the data collected by the selected reports.

See the following Figure for an example of such a role-specific dashboard landing page:

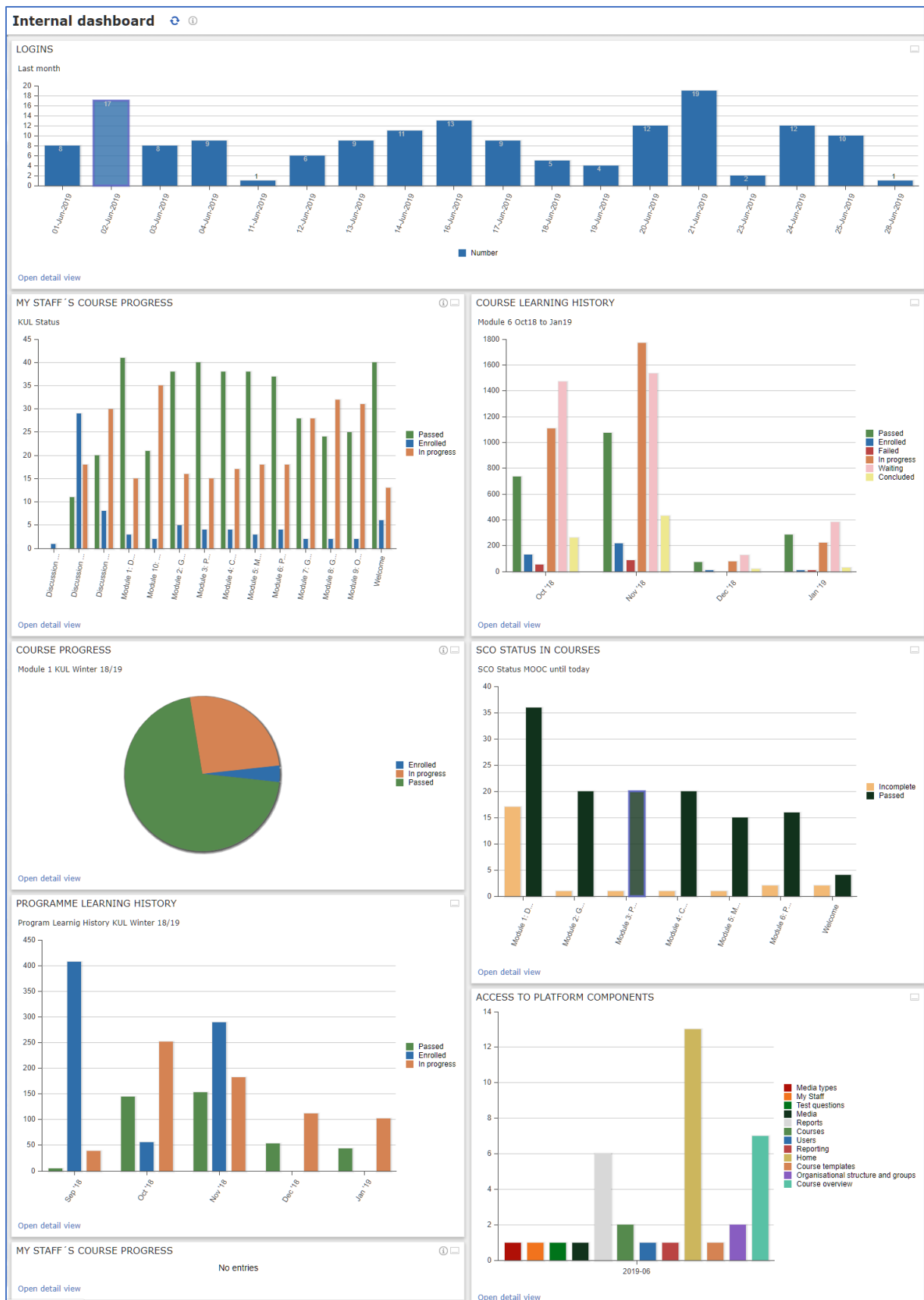


Figure 5 (Original GRAPHIC) Graphical report panels on a dashboard

Source file: Module7-LMS_Graphical report panels 2.jpg

The displayed report panels can be selected out of a set of available system panels and can be used to flexibly adapt the layout of the dashboard. If a report is put in such a panel, the graphical representation gives a nice overview at a glance and the user can access the list-based reporting view by clicking on the “Open detail view” to access a report.

The IMC Learning Suite provides the possibility to define numerous role specific dashboards in the system. Such a dashboard page can for example be configured as internal landing page for administrative users after their login to give them easy and direct access to the reports they are interested in.

[END OF PAGE]

(LO #7.1.2.4 HTML page) Learning Analytics Dashboard

The IMC Learning Suite provides a central Learning Analytics dashboard for direct access to all reports a user has access rights to. See the following Figure.



Figure 6 (Original GRAPHIC) Learning Analytics dashboard

Source file: Module7-LMS_Learning-Analytics-dashboard.png

@ Editor: Provide image also for download / enlargement

This Learning Analytics dashboard provides the following options:

1. User can customise the page in a 1 to 5 column layout, and drag & drop panels as needed.
2. Quick search allows direct report access.
3. Reports can be clustered in report categories to be represented as panel on the Learning Analytics page.
4. By clicking the star symbol, the report is added to the report favourites to support quicker access.
5. Different report icons represent different report types: Graphical report or list report with or without filters.
6. Any report marked as favourite will be listed in a corresponding panel "Report Favourites".

[END OF PAGE]

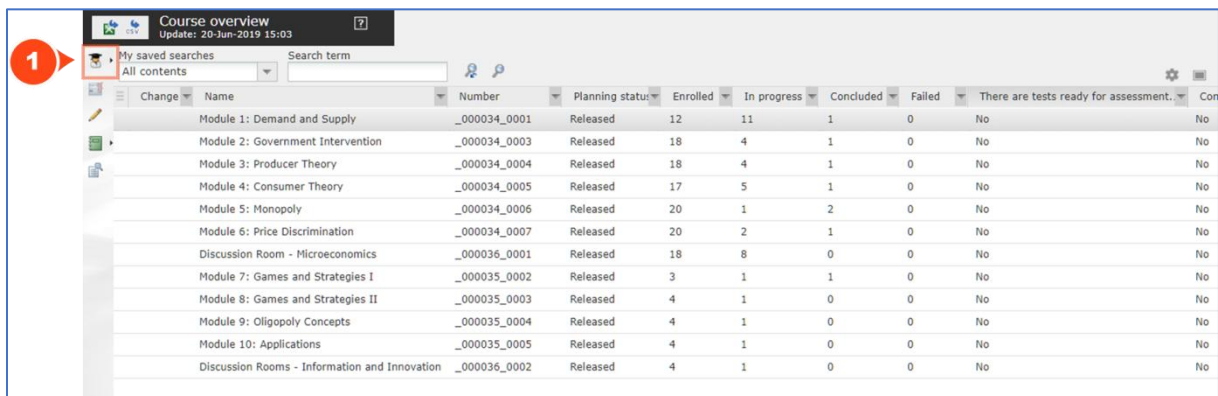
7.1.3. Tutor Centre - Accessing educational data for course supervision

(LO #7.1.3.1 HTML page) Introduction to the Tutor Centre

In the Learning Suite an administrator can assign one or more tutors to a course delivered through the Learning Suite. Tutors are responsible for organisational issues concerning the course. They can use analytics to monitor the progress of course participants, they can make media available for students to learn with, they can correct tests and evaluate participants. They can also take actions for students not achieving sufficient progress, e.g., sending an Email to a course participant. The available responsibilities of a tutor vary by course.

To support a tutor's responsibilities, the IMC Learning Suite provides the “**Tutor Centre**”. Among other functionalities, the Tutor Centre provides a specific point of entry to view and analyse student data tailored to a tutor's role.

In the Tutor Centre there is a “**Course overview**” page, as shown in the following Figure.



Change	Name	Number	Planning status	Enrolled	In progress	Concluded	Failed	There are tests ready for assessment.	Cor
	Module 1: Demand and Supply	_000034_0001	Released	12	11	1	0	No	No
	Module 2: Government Intervention	_000034_0003	Released	18	4	1	0	No	No
	Module 3: Producer Theory	_000034_0004	Released	18	4	1	0	No	No
	Module 4: Consumer Theory	_000034_0005	Released	17	5	1	0	No	No
	Module 5: Monopoly	_000034_0006	Released	20	1	2	0	No	No
	Module 6: Price Discrimination	_000034_0007	Released	20	2	1	0	No	No
	Discussion Room - Microeconomics	_000036_0001	Released	18	8	0	0	No	No
	Module 7: Games and Strategies I	_000035_0002	Released	3	1	1	0	No	No
	Module 8: Games and Strategies II	_000035_0003	Released	4	1	0	0	No	No
	Module 9: Oligopoly Concepts	_000035_0004	Released	4	1	0	0	No	No
	Module 10: Applications	_000035_0005	Released	4	1	0	0	No	No
	Discussion Rooms - Information and Innovation	_000036_0002	Released	4	1	0	0	No	No

Figure 7 (Original GRAPHIC) Course Overview (1) with supervision functions for tutors

[Source file: tutor-center-1.png](#)

In the tutor course overview (1), all courses to which a given tutor was assigned are listed. All functions required for performing tutor tasks are accessible from here. The tutor sees course names, for each course the number of **enrolled** participants, the number of students who still work on the course (**in progress**), the number of participants who finished all course components (**concluded** the course) and the number of students who **failed** the course. Besides that there are further columns in the overview table (not all visible in the screenshot) which indicate whether tests are available for assessment or other course specific tasks for the tutor. Further functionalities are accessible via the left panel and include managing news on course homepages, the administrative processing of courses and – what we are interested in here – course specific data and reports relevant for teaching and learning analytics.

The following figure shows, that from the Course overview a tutor can select a specific course (1) and open the “**Course instruction**” (2) for supervising and analysing that specific course.

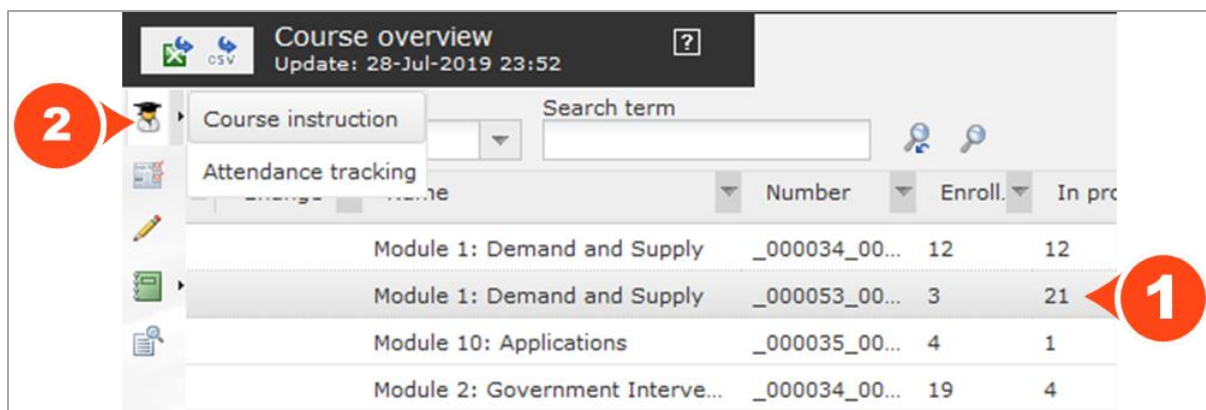


Figure 8 (Original GRAPHIC) Accessing course instruction in the tutor centre

Source file: tutor-center-course-instruction.png

As will be shown in the following sections, the Course instruction views allow the tutor to compare the course progress of multiple course participants, to correct free-text questions from tests or to access test certificates, for instance. In the following sections we focus on the tutor view of a course participant's learning data and the resulting instruction options for the tutor.

[END OF PAGE]

(LO #7.1.3.2 HTML page) Participants' progress in a specific course

In the “**Participants**” tab of the “Course progress” view (2) a tutor can see for every course participant if that participant has started, concluded, suspended a course, or if the course is locked for that participant. Under “Progress display” the tutor sees the proportion of course components the student has been working with. If at a certain time the tutor sees the student is making low progress, he or she can take direct actions from the tutor panel, e.g. sending an Email.

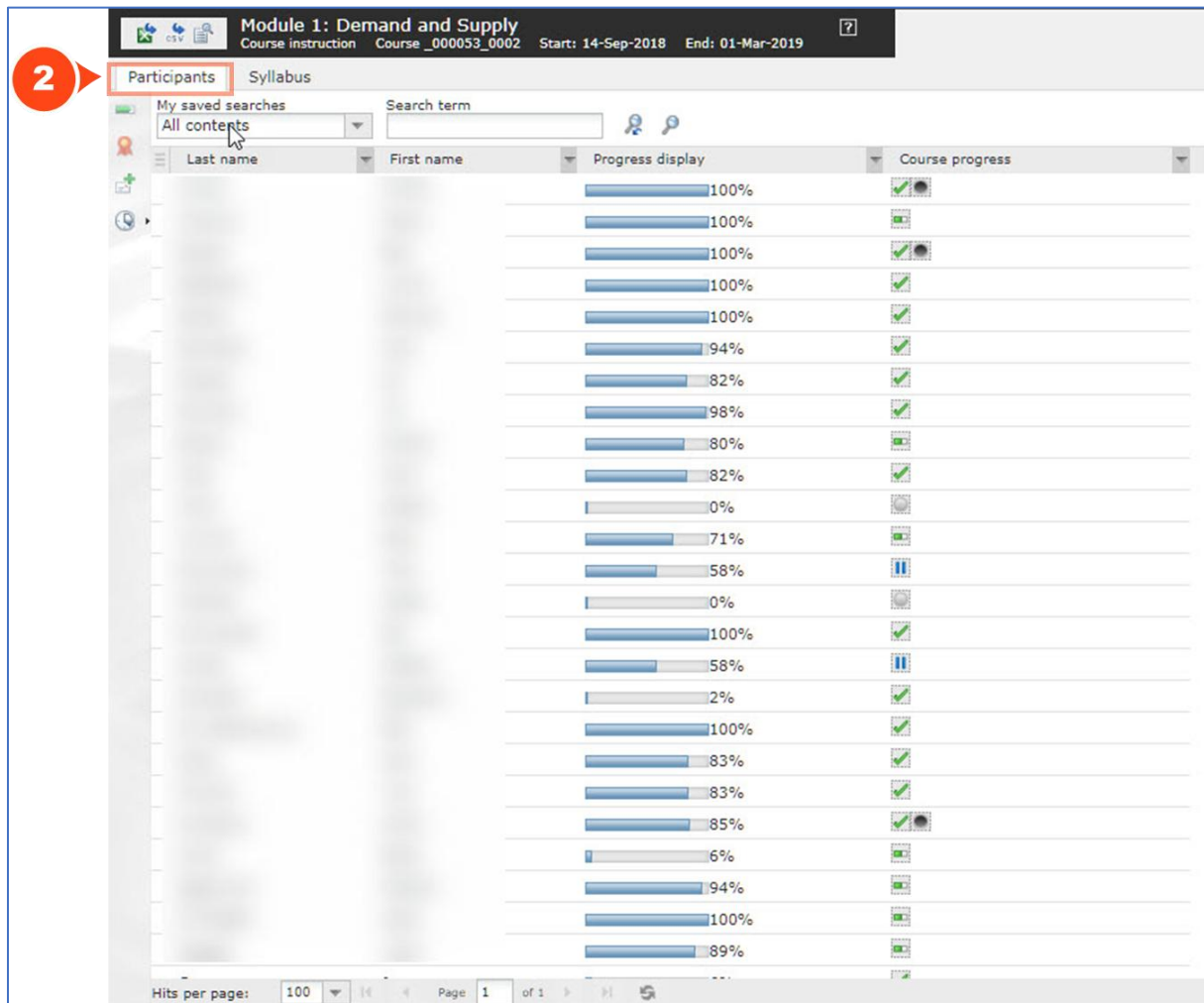


Figure 9 (Original GRAPHIC) Course instruction participants view (2) for tutor supervising a specific course (user names blurred for privacy reasons)

Source file: tutor-center-2.png

The icons under “Course Progress” in the above figure have the following meaning.

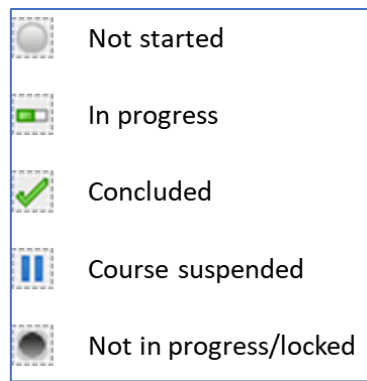


Figure 10 (Original GRAPHIC) Course progress icons

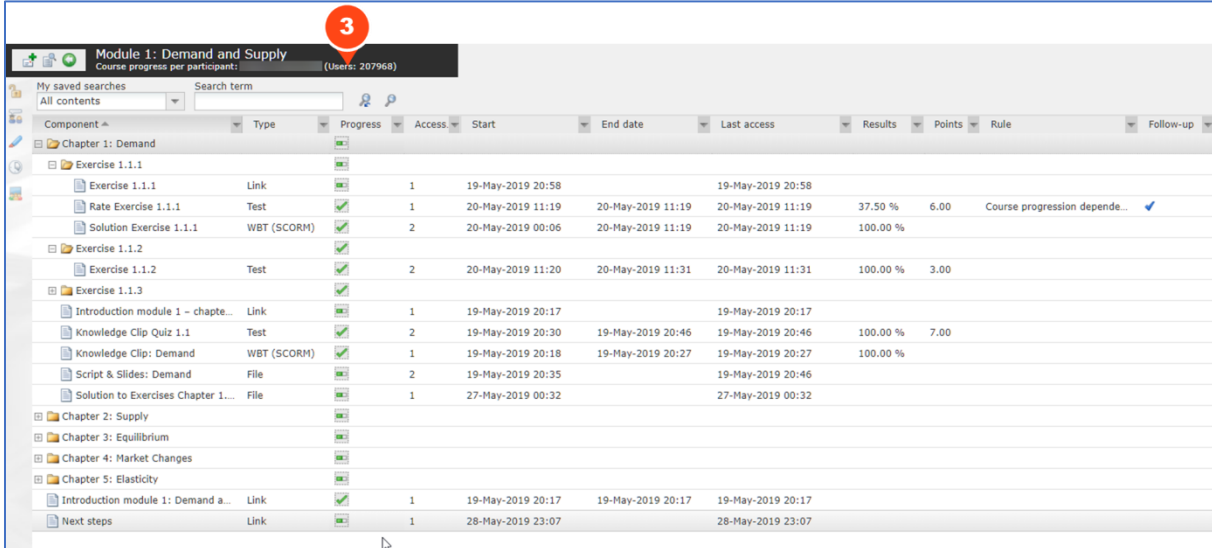
Source file: \tutor-center-1-6-sources\course-progress-icons.png

The tutor views can be downloaded as .csv or .xlsx files to save a snapshot of the progress status at a certain time or to do an offline analysis.

[END OF PAGE]

(LO #7.1.3.3 HTML page) Individual participant progress for course component

In the participants view of the course instruction, a tutor can select a specific learner (3) and monitor all details of this learner, including the progress on individual course components of the course's syllabus. This function is called **"Course progress per participant"**.



Component	Type	Progress	Access	Start	End date	Last access	Results	Points	Rule	Follow-up
Chapter 1: Demand										
Exercise 1.1.1										
Exercise 1.1.1.1	Link	100%	1	19-May-2019 20:58		19-May-2019 20:58				
Rate Exercise 1.1.1	Test	37.50%	1	20-May-2019 11:19	20-May-2019 11:19	20-May-2019 11:19	37.50 %	6.00	Course progression depende...	✓
Solution Exercise 1.1.1	WBT (SCORM)	100.00%	2	20-May-2019 00:06	20-May-2019 11:19	20-May-2019 11:19	100.00 %			
Exercise 1.1.2										
Exercise 1.1.2	Test	100.00%	2	20-May-2019 11:20	20-May-2019 11:31	20-May-2019 11:31	100.00 %	3.00		
Exercise 1.1.3										
Introduction module 1 - chapte...	Link	100%	1	19-May-2019 20:17		19-May-2019 20:17				
Knowledge Clip Quiz 1.1	Test	100.00%	2	19-May-2019 20:30	19-May-2019 20:46	19-May-2019 20:46	100.00 %	7.00		
Knowledge Clip: Demand	WBT (SCORM)	100.00%	1	19-May-2019 20:18	19-May-2019 20:27	19-May-2019 20:27	100.00 %			
Script & Slides: Demand	File	100%	2	19-May-2019 20:35		19-May-2019 20:46				
Solution to Exercises Chapter 1...	File	100%	1	27-May-2019 00:32		27-May-2019 00:32				
Chapter 2: Supply										
Chapter 3: Equilibrium										
Chapter 4: Market Changes										
Chapter 5: Elasticity										
Introduction module 1: Demand a...	Link	100%	1	19-May-2019 20:17	19-May-2019 20:17	19-May-2019 20:17				
Next steps	Link	100%	1	28-May-2019 23:07		28-May-2019 23:07				

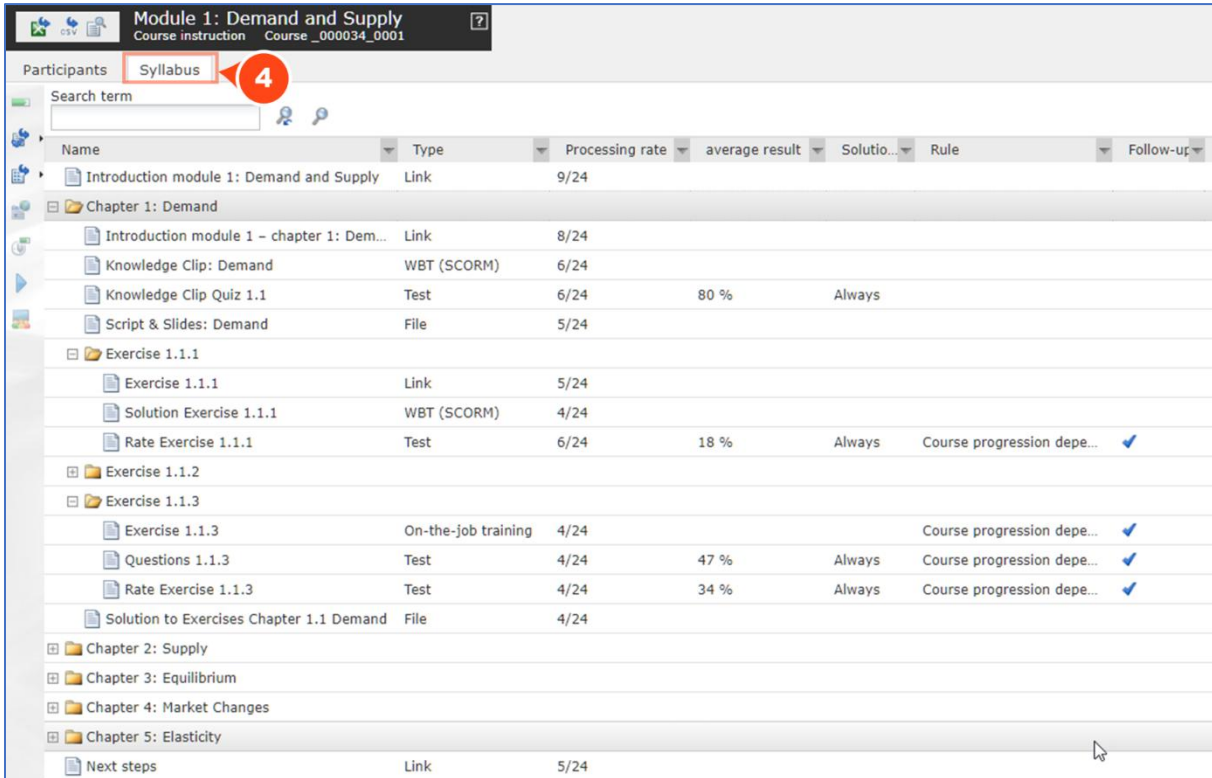
Figure 11 (Original GRAPHIC) Tutor can drill-down course progress for a selected user (3) to each content item

Source file: tutor-center-3.png

[END OF PAGE]

(LO #7.1.3.4 HTML page) Average progress of participants per component of the course

To get an overview of the average progress of all course participants per individual course component the tutor can use the “**Syllabus**” (4) tab of the course instruction.



Name	Type	Processing rate	average result	Solutio...	Rule	Follow-up
Introduction module 1: Demand and Supply	Link	9/24				
Chapter 1: Demand						
Introduction module 1 – chapter 1: Dem...	Link	8/24				
Knowledge Clip: Demand	WBT (SCORM)	6/24				
Knowledge Clip Quiz 1.1	Test	6/24	80 %	Always		
Script & Slides: Demand	File	5/24				
Exercise 1.1.1						
Exercise 1.1.1	Link	5/24				
Solution Exercise 1.1.1	WBT (SCORM)	4/24				
Rate Exercise 1.1.1	Test	6/24	18 %	Always	Course progression depe...	✓
Exercise 1.1.2						
Exercise 1.1.3						
Exercise 1.1.3	On-the-job training	4/24			Course progression depe...	✓
Questions 1.1.3	Test	4/24	47 %	Always	Course progression depe...	✓
Rate Exercise 1.1.3	Test	4/24	34 %	Always	Course progression depe...	✓
Solution to Exercises Chapter 1.1 Demand	File	4/24				
Chapter 2: Supply						
Chapter 3: Equilibrium						
Chapter 4: Market Changes						
Chapter 5: Elasticity						
Next steps	Link	5/24				

Figure 12 (Original GRAPHIC) Tutor can drill-down overall course progress of all users to each component of the course (4)

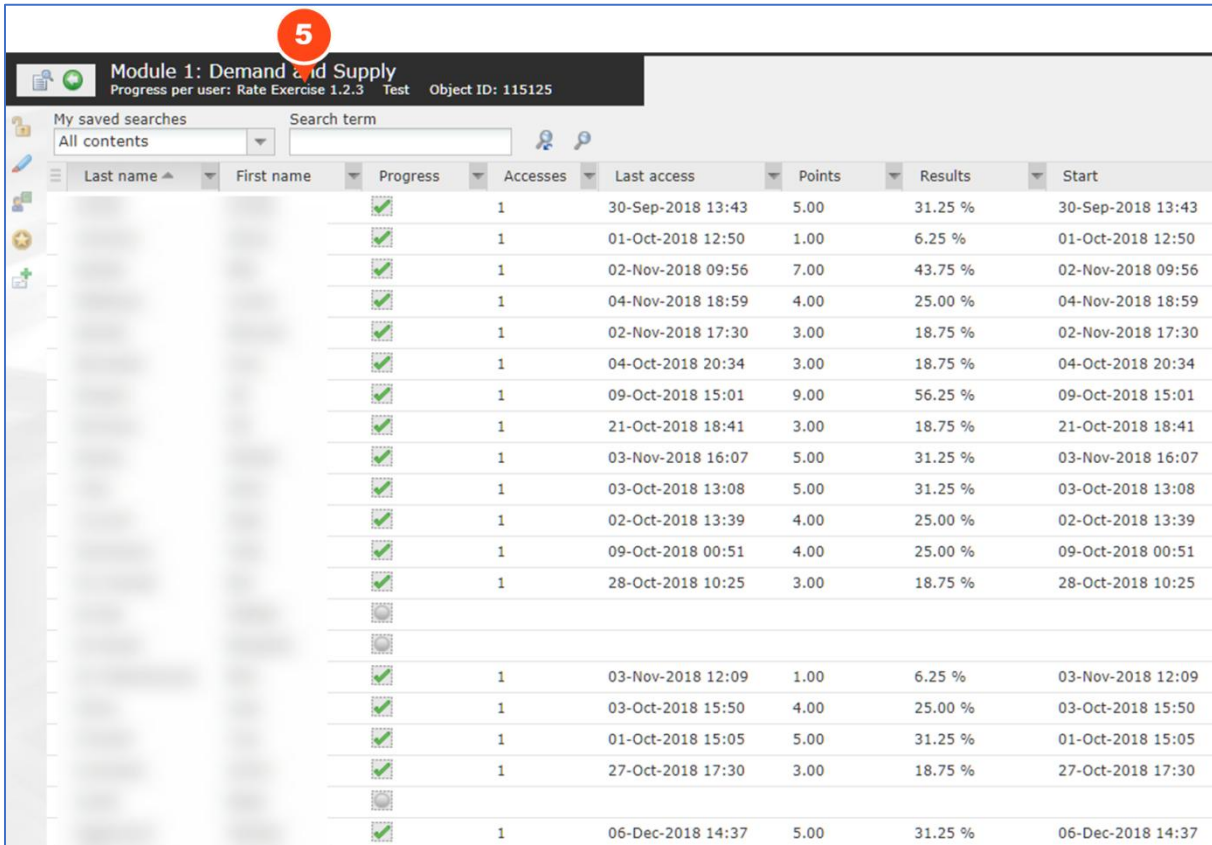
Source file: tutor-center-4.png

This tutor view can again be downloaded as .csv or .xlsx report for further offline processing or saving a snapshot at a certain date.

[END OF PAGE]

(LO #7.1.3.5 HTML page) Progress on a course component of each individual participant

If a tutor is interested how well every individual participant progresses with a course component, the tutor can select in the course progress - syllabus view the respective learning object (5), can click on “Progress per user” and will see for that learning object the status of every user.



Last name	First name	Progress	Accesses	Last access	Points	Results	Start
		✓	1	30-Sep-2018 13:43	5.00	31.25 %	30-Sep-2018 13:43
		✓	1	01-Oct-2018 12:50	1.00	6.25 %	01-Oct-2018 12:50
		✓	1	02-Nov-2018 09:56	7.00	43.75 %	02-Nov-2018 09:56
		✓	1	04-Nov-2018 18:59	4.00	25.00 %	04-Nov-2018 18:59
		✓	1	02-Nov-2018 17:30	3.00	18.75 %	02-Nov-2018 17:30
		✓	1	04-Oct-2018 20:34	3.00	18.75 %	04-Oct-2018 20:34
		✓	1	09-Oct-2018 15:01	9.00	56.25 %	09-Oct-2018 15:01
		✓	1	21-Oct-2018 18:41	3.00	18.75 %	21-Oct-2018 18:41
		✓	1	03-Nov-2018 16:07	5.00	31.25 %	03-Nov-2018 16:07
		✓	1	03-Oct-2018 13:08	5.00	31.25 %	03-Oct-2018 13:08
		✓	1	02-Oct-2018 13:39	4.00	25.00 %	02-Oct-2018 13:39
		✓	1	09-Oct-2018 00:51	4.00	25.00 %	09-Oct-2018 00:51
		✓	1	28-Oct-2018 10:25	3.00	18.75 %	28-Oct-2018 10:25
		✓	1	03-Nov-2018 12:09	1.00	6.25 %	03-Nov-2018 12:09
		✓	1	03-Oct-2018 15:50	4.00	25.00 %	03-Oct-2018 15:50
		✓	1	01-Oct-2018 15:05	5.00	31.25 %	01-Oct-2018 15:05
		✓	1	27-Oct-2018 17:30	3.00	18.75 %	27-Oct-2018 17:30
		✓	1	06-Dec-2018 14:37	5.00	31.25 %	06-Dec-2018 14:37

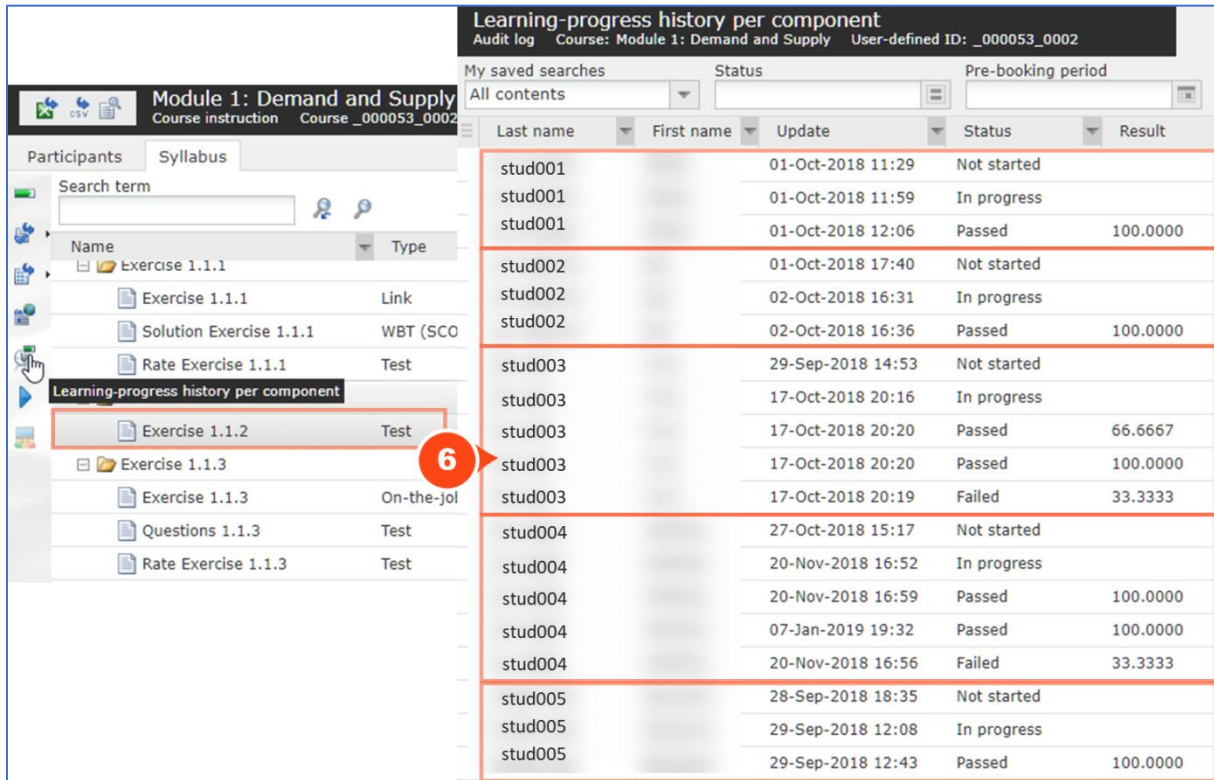
Figure 13 (Original GRAPHIC) Tutor can drill-down course progress for every user with respect to a selected learning object (5) in the syllabus.

Source file: tutor-center-5.png

[END OF PAGE]

(LO #7.1.3.6 HTML page) Learning-progress history per component

Finally, a tutor can also get a quick overview of the learning progress history regarding a selected component of the syllabus (6).



Learning-progress history per component				
Audit log Course: Module 1: Demand and Supply User-defined ID: _000053_0002				
My saved searches		Status	Pre-booking period	
All contents				
Last name	First name	Update	Status	Result
stud001		01-Oct-2018 11:29	Not started	
stud001		01-Oct-2018 11:59	In progress	
stud001		01-Oct-2018 12:06	Passed	100.0000
stud002		01-Oct-2018 17:40	Not started	
stud002		02-Oct-2018 16:31	In progress	
stud002		02-Oct-2018 16:36	Passed	100.0000
stud003		29-Sep-2018 14:53	Not started	
stud003		17-Oct-2018 20:16	In progress	
stud003		17-Oct-2018 20:20	Passed	66.6667
stud003		17-Oct-2018 20:20	Passed	100.0000
stud003		17-Oct-2018 20:19	Failed	33.3333
stud004		27-Oct-2018 15:17	Not started	
stud004		20-Nov-2018 16:52	In progress	
stud004		20-Nov-2018 16:59	Passed	100.0000
stud004		07-Jan-2019 19:32	Passed	100.0000
stud004		20-Nov-2018 16:56	Failed	33.3333
stud005		28-Sep-2018 18:35	Not started	
stud005		29-Sep-2018 12:08	In progress	
stud005		29-Sep-2018 12:43	Passed	100.0000

Figure 14 (Original GRAPHIC): Learning-progress history per component (6)

Source file: tutor-center-6-new.png

For each component a tutor can see when user last worked with the object. In our example, where the component is a test, the tutor can see when the user progressed, failed, or passed the test and what the result was. For other content types different status values and results are reported, e.g. a “file object” like a PDF can be passed (if marked as completed by the user), but delivers no result. A detailed explanation of the Status and Result descriptions follows in section 7.3.2 below when we discuss the underlying report of this tutor view.

[END OF PAGE]


7.2. Considering Teaching Analytics while designing a course in the Learning Suite


7.2.1. Designing an e-learning course in the Learning Suite

[\(LO #7.2.1.1 HTML page\) Designing a course in the IMC Learning Suite](#)

Teaching Analytics refers to methods and tools that enable those involved in educational design (instructional designers and/or educators) to analyse their designs, in order to better reflect on them (as a whole, or elements of them), with the aim of improving learning conditions for their targeted individual learners or groups of learners. Typically, the analysis of educational designs is combined with insights from their implementation (for example through learning analytics). In this section we describe how an instructional designer can design and set up a course in the IMC Learning Suite to best support teaching and learning analytics.

Instructional designers can create an e-learning course in the IMC Learning Suite if they are granted “content administrator” access rights by the system administrator. The IMC Learning Suite allows them to integrate their course topics, course information and more importantly learning objects as course components in a digital form. The Figure below shows an example of a hierarchical course structure (syllabus) in the IMC Learning Suite.


[Welcome](#)
[Help](#)
[MOOCs & Media](#)
[Learn](#)
[Uta Schwertel](#)



Module 3: Producer Theory

16 Jun 2019 17:58 to 16 Jun 2020 17:58

0%

Complete course

Syllabus Collapse all

Introduction module 3: Producer Theory

Chapter 1: Production Functions

In this chapter, we introduce the concept of production functions.

Introduction module 3 – chapter 1: Production Functions

Knowledge Clip: Production Functions

Knowledge Clip Quiz

Script & Slides: Production Functions

Exercise 3.1.1

Exercise 3.1.1

Solution Exercise 3.1.1

Rate Exercise 3.1.1

Exercise 3.1.2

Exercise 3.1.2

Exercise 3.1.3

Exercise 3.1.3

Rate Exercise 3.1.3

Solution to Exercises Chapter 3.1 Production Functions

Chapter 2: Profit Maximization


Chapter 3: Firm Behaviour

Chapter 4: Discounting

Chapter 5: Net Present Values

Feedback Module 3

Next steps



[Contact](#)
[Imprint](#)
[Terms of use](#)
[FAQ](#)

Figure 15 (Original GRAPHIC) Course structure of IBIS MOOC (selection)

Source file: ibis-syllabus-long.png

Media types. In the IMC Learning Suite, it is possible to use various types of learning resources which are called media. Along with the digital content formats like text, audio or video files and links you can plan offline activities such as events or offline exercises. You can easily add Web-Based-Trainings (WBTs) in different formats including SCORM (Shareable Content Object Reference Model) – the most popular standard.

What is SCORM?

SCORM (Shareable Content Object Reference Model) is a set of technical standards for eLearning products. It provides the communication method and data models that allow eLearning content and LMSs to work together. It tells programmers how to write code so that what they build will “play well” with other eLearning software. SCORM is the most widely used eLearning standard available.

Why SCORM?

“Sharable Content Object” indicates that SCORM is all about creating units of online training material that can be shared across systems. SCORM defines how to create “sharable content objects” or “SCOs” that can be reused in different systems and contexts.

What is a SCO?

A Sharable Content Object (SCO) is the most granular piece of training in a SCORM Object. You can consider it as a module, a chapter, a page or some other part of the more complex SCORM object. In terms of how the LMS treats it, this is the item shown separately in the table of contents and tracked separately from other items. It can contain its own bookmark, score and completion status.

Source of these explanations: <https://scorm.com/>

In the IMC Learning Suite SCORM learning objects offer fine-grained analytics and reporting opportunities, as explained later in chapter 7.3.

Also, external educational resources can be included using the LTI (Learning Tools Interoperability) Tool of the Learning Suite.

“Learning Tools Interoperability (LTI) is an IMS standard for integration of rich learning applications within educational environments.”

Source of this explanation: <https://www.imsglobal.org/spec/lti/v1p3/#terminology-0>

Media types are not restricted to the media types described above. The Learning Suite provides also a set of tools to create different kind of assignments, e.g. online tests or practical assignments to support on-the-job training scenarios. See in the Figure below a list of the possible question types available in the Learning Suite which can be combined to define online tests.

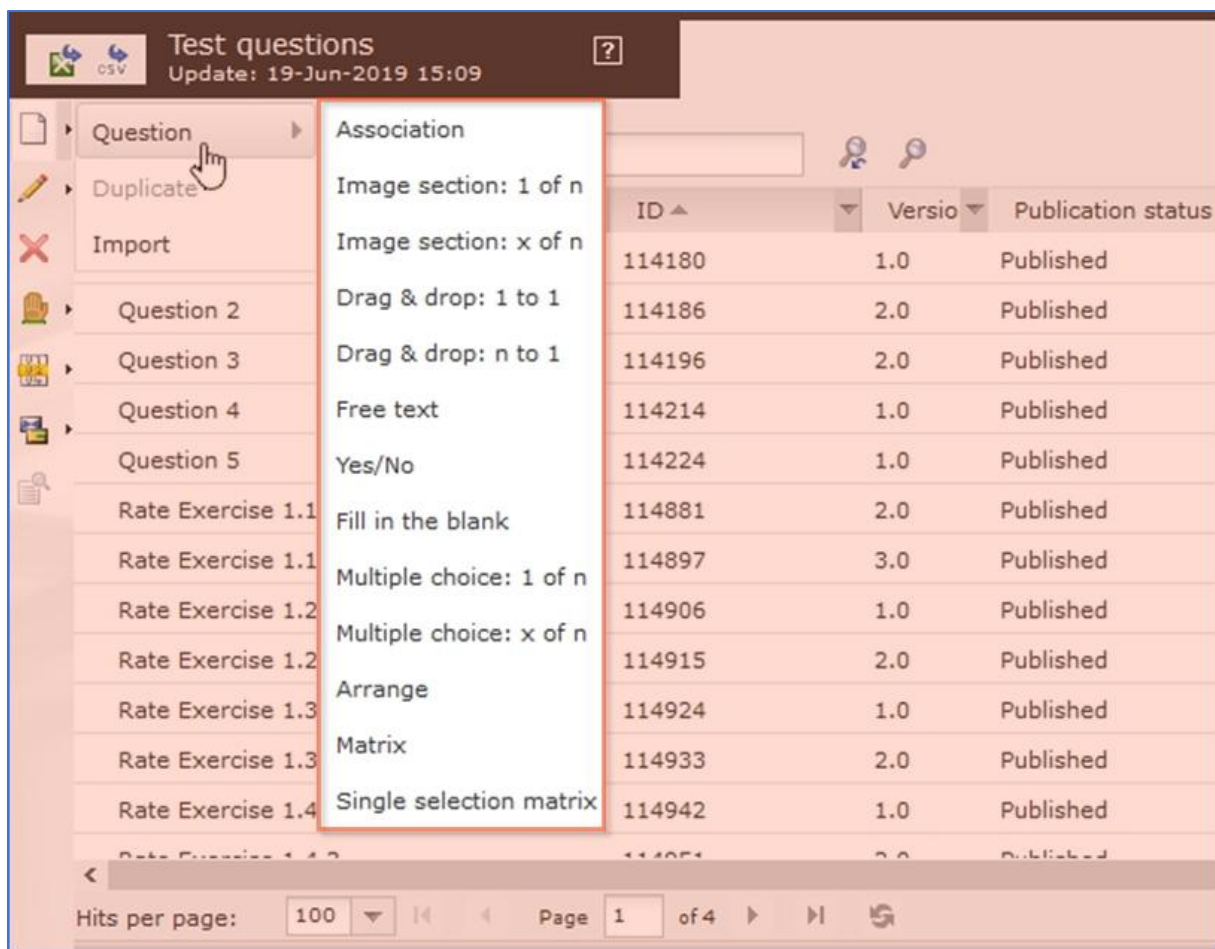


Figure 16 (Original GRAPHIC) Question types in the Learning Suite
 Source file: Module7-LMS-Test question types.png

Templates. Since the Learning Suite is highly customisable, it allows to create templates for various system elements with predefined data and meta information. Such templates can be created for learning materials, courses and other elements. Depending on the type of system elements various information can be predefined. Templates allow the instructional designer e.g. to quickly set up multiple course instances of a general course design, e.g. the same course delivered at a different time to a different learner group.

Including educational resources. The Learning Suite provides a text editor with the basic rich text formatting features to include learning content in a text form. The text editor allows also to include pictures and provides basic adjustment functions. Figure below depicts the default rich text editor of the Learning Suite.

Lesson Plan Template
Link

Languages Description Classifications Skills

Basic information [Top](#)

Name* (500 characters max.)
Lesson Plan Template

Description (16000 characters max.) ⓘ

Source B I U S Format [List Icons]

Title

- Title of the lesson.

Time

- Time required to complete the lesson.

Grade

- Grade level of the target group.

Summary

- A short description of the topic and the lesson content.

Objectives

- List of (behavioural or knowledge) objectives. This section may also include educational standards.

Preview image ⓘ
Max. image size: 1.5 MB

Figure 17 (Original GRAPHIC) Lesson Plan Template in the Text Editor
Source file: Module7-LMS_Lesson Plan Template_Editor.jpg

More advanced instructional designers can make use of the source-code view of the editor to design more sophisticated content using HTML.

Configurable educational objectives. The Learning Suite integrates a concept of skills and classifications which could correspond to the educational objectives or standards. To design a course and keep track of reaching its objectives corresponding skill and classifications can be configured and assigned to each media (learning object), test, course and program. This advanced feature will not be elaborated on in this course.

[END OF PAGE]

(LO #7.2.1.2 HTML page) Using a lesson plan in the Learning Suite

If you have a classroom teaching experience chances are high that you are familiar with the concept of a lesson plan.

A lesson plan is the teacher's guide for running a particular lesson, and it includes the goal (what the students are supposed to learn), how the goal will be reached (the method, procedure) and a way of measuring how well the goal was reached (test, worksheet, homework etc).

For the purpose of teaching analytics, you may want to share your lesson plan with other tutors. Or parts of the lesson plan may be relevant to know for your learners. To share your lesson plan throughout the Learning Suite you are better advised to use a simple HTML page.

A typical lesson plan includes following information:

- **Title**
Title of the lesson.
- **Time**
Time required to complete the lesson.
- **Grade**
Grade level of the target group.
- **Summary**
A short description of the topic and the lesson content.
- **Objectives**
List of (behavioural or knowledge) objectives. This section may also include educational standards, defined by the corresponding state bodies.
- **Learning Activities**
A description of the learning activities and their sequence before and during the lesson.
- **Assessment Procedure**
A description of an evaluation component to check for understanding.
- **Educational Resources / Materials**
List of educational resources and materials required for the topic. Online resources can be linked directly to the source.

You may create a single HTML page with all relevant information. If you want to use the same structure for your future lesson plans you may be interested to save it as a template. The Learning Suite allows you to create such a template page, which you can use for lesson plans regularly.

The Learning Suite does not provide a specific tool to define a lesson plan, but when setting up a course in the system, the information collected in the lesson plan will be needed to define and describe the respective learning and course objects.

[END OF PAGE]

7.2.2. Case Study: IBIS – Designing an Online Course to prepare Teaching and Learning Analytics

(LO #7.2.2.1 HTML page) About the IBIS Online Course

About IBIS

In the Erasmus+ co-funded project IBIS (Implementation of a Business and Innovation module in Science programmes: ibisproject.eu) the project consortium developed and piloted an interactive open online course on “Principles of Economics for Scientists” (ibismooc.eu). The course is designed for science students who – to become entrepreneurs – need to understand and be able to apply the basic principles of economics. The online course has been successfully piloted and positively evaluated at KU Leuven and VU Amsterdam in two academic years and is integrated into existing study programs. Furthermore, the course is available as a MOOC open for registration to everyone. The IBIS Online Course is delivered on the IMC Learning Suite and the IMC Learning Analytics features were central in design, evaluation and improvement of the course.



The IBIS MOOC was created as part of the Erasmus+ project IBIS (Implementation of a Business and Innovation module in Science programmes: www.ibisproject.eu). The project was funded with support from the European Commission (Project number: 2015-BE02-KA203-012261). The information in this project reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Background and motivation

In all science programmes at KU Leuven an elective minor Technology Entrepreneurship (TE) is offered. Part of that minor is a calculus-based introduction to economics. The course was originally offered as a traditional face-2-face course. The goal was to transfer this traditional calculus-based course into an online course. Motivation was to create a course which

- is flexible in terms of adoption across different science study programs
- reduces teacher-time
- motivates self-regulation
- uses learning analytics and gamification to enhance student motivation
- can be transferred from a small open online course (SPOC) into a widely offered MOOC format

In this case study we show how the course structure of the IBIS MOOC has been designed and set up.

[END OF PAGE]

(LO #7.2.2.2 HTML page) Design of IBIS Online Course

The [IBIS project \(www.ibisproject.eu\)](http://www.ibisproject.eu) has designed the MOOC “Principles of Economics for Scientists” based on a systematic structure that prepares the educational data analytics applied later in the course. The IBIS MOOC consists of two parts: Part 1 (6 modules) and Part 2 (4 modules).

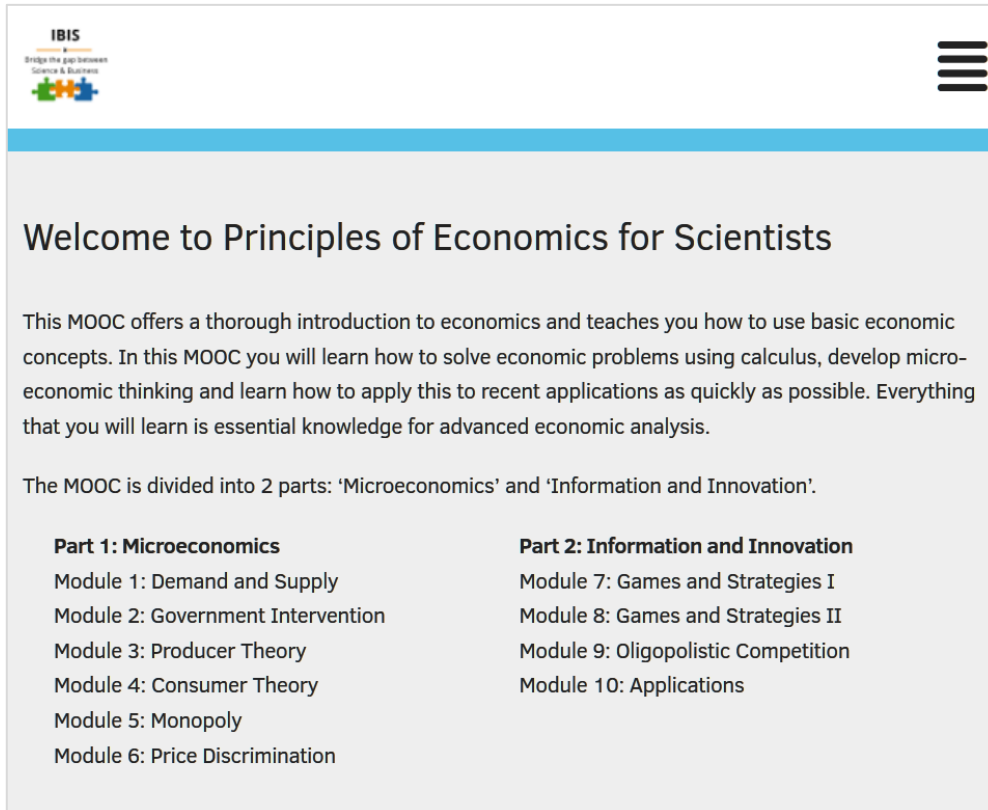
The image is a screenshot of the IBIS MOOC welcome page. At the top left is the IBIS logo with the tagline 'Bridge the gap between Science & Business'. At the top right is a hamburger menu icon. Below the header is a blue horizontal bar. The main heading is 'Welcome to Principles of Economics for Scientists'. The text describes the MOOC as offering a thorough introduction to economics and teaching how to use basic economic concepts, including solving problems with calculus and applying them to recent applications. It states that the MOOC is divided into two parts: 'Microeconomics' and 'Information and Innovation'. Below this, there are two columns of module titles. The first column lists modules 1 through 6 under 'Part 1: Microeconomics'. The second column lists modules 7 through 10 under 'Part 2: Information and Innovation'.

Figure 18: Overall IBIS MOOC structure ()

Part 1 and Part 2 of the course are each modelled as so called “programmes” (bundles of courses) in the IMC Learning Suite and each module is realized as a “course” in the Learning Suite.

Within each module of the IBIS MOOC, a knowledge clip highlights the main theory that is needed to understand the subject. The remainder of the module focuses on exercises as it is a highly calculus-based course. The exercises are devised so as to provide immediate feedback in the first stages to teach learners how to solve practical problems, while they gradually evolve to more open exercises that are linked to delayed feedback.

Each module contains several chapters which each use the following content items:

- Introductions: with brief summaries and specific learning outcomes
- Knowledge clips (with script and slides) & quizzes
- Exercises type 1 with solution video
- Exercises type 2 with immediate feedback
- Exercises type 3: upload required followed by feedback

These content items are represented by different content types in the Learning Suite, e.g. SCORM WBTs for knowledge clips, tests, feedbacks, HTML texts, links, videos etc. Delayed feedback is modelled using tests and self-reflection questions and locking succeeding objects by learning logic.

[END OF PAGE]

(LO #7.2.2.3 VIDEO) Learner view of overall programme structure in Learning Suite



Video 4 (Original VIDEO) Learner view of programme structure

Source file: IBIS-overall-programme-structure.mp4

This video shows how the IMC Learning Suite presents the overall structure of the IBIS programme “Part 1: Microeconomics” to the learner.

[END OF PAGE]

(LO #7.2.2.4 HTML page) Using exercises to prepare learning analytics

The exercises in the IBIS course are devised in a three-stage process so as to provide immediate feedback in the first stages to teach learners how to solve practical problems, while they gradually evolve to more open exercises that are linked to delayed feedback. The learning goal of the exercises was in the first place to demonstrate how a certain economic problem can be tackled and solved. Students are asked to try to complete the exercise themselves after which a solution video can be displayed if needed. Before continuing to the next exercise, the students get the chance to evaluate their own initial answer with a score from 0 to 5. Secondly, students receive exercises on the same topic in the form of a multiple-choice test with automated direct feedback. In a follow-up exercise the solution is explained in more detail. Thirdly, a more elaborate problem is presented. Students are asked to upload their solution for the problem the platform. After that, students can move on to a test to check their answer(s). In a follow-up test, students are guided through the exercise one step at a time after which they can fill in a self-evaluation form to assess their uploaded solutions.

This instructional design on the MOOC enables more elaborate Learning Analytics opportunities to test the hypotheses of an instructional designer. First, the questions test the student's ability to translate a small economic case study into a mathematical problem as economic problems need to be translated into concrete concepts and formulae. Second, the student's ability to calculate the correct answer is tested in one or more questions. This division is based on the hypothesis of the instructional designer that most students have difficulties with the first step, while the second step usually provides less of a challenge for science students who are adept at employing mathematics. This case study indicates how a careful instructional design of the course helps later teaching and learning analytics.

[END OF PAGE]

(LO #7.2.2.5 VIDEO) Learner view of detailed lesson plan of an IBIS module



Video 5 (Original VIDEO) Learner view of lesson plan

[Source file: IBIS-detailed-course-syllabus.mp4](#)

This video shows how the IMC Learning Suite presents the detailed lesson plan to the learner. Next to some content items you can see the symbol of a locked key. This means that you can only open this content item when you have finished the one(s) before it. For example, some solution files to exercises are locked. You can access the solutions only if you have completed the preceding exercises. This can be programmed using rules in the **learning logic** component of the IMC Learning Suite.

[END OF PAGE]

(LO #7.2.2.6 ACTIVITY) Discussion: Which analytics does the design of the IBIS course structure enable?

We invite you to reflect on how the instructional design of the IBIS course may be beneficial for later teaching and learning analytics activities of instructional designers and e-Trainers. Share your most important ideas in the discussion board below.

In what respect can the design of the IBIS course be beneficial for later teaching and learning analytics? Think of learning logic, use of tests, use of SCORM objects etc.

[END OF PAGE]

7.2.3. Using Gamification in your instructional design

(LO #7.2.3.1 HTML page) Introduction to Gamification

We have learned earlier that gamification is an advanced feature of the Learning Suite which exploits educational data. Gamification relates to the use of game elements and game design techniques in non-game contexts, in our case in the learning context. Gamification can be used to additionally boost the students' motivation. Students can collect experience points (XPs) and badges and when they learn in a group, they can immediately see their results on a leaderboard compared to other users. If you are an instructional designer and want to use these analytics features you have to decide which experience tracks to use, how many points you want to give students for which activity and what badges are available. In this module, we do not explain in detail how to design and set-up gamification in the Learning Suite, because this is an advanced feature of the Learning Suite. You should, however, know that this feature is available. By showing you a few examples, we want to give you an impression what you can do with gamification as an instructional designer. If you are not planning to use this feature in your instructional design you can skip the following sections.

[END OF PAGE]

(LO #7.2.3.2 HTML page) Experience Tracks and Experience Points (XPs)

In the IMC Learning Suite, you can define different types of experience tracks each recording different types of activities and progress a student makes. The student is thus enabled to track the progress of his/her own goals. To give you an example, in the IBIS case explained above the following **experience tracks** were implemented.

- **'Module' tracks:** Module tracks monitor a student's completion rate of a module. For each module there is one separate track. The student receives points for a module track if s/he completes a learning object of that module.
- **'Tests' track:** The test track monitors how many exercises and quizzes a student has successfully completed across all modules of the program. A student receives points for a test track if s/he successfully completes a test.
- **'Content' track:** The content track counts how many content items other than tests a student has completed (i.e. written materials where the student ticked the checkmark or videos which a student completely watched) across all modules of the programme. The student receives points for the content track for watching videos or viewing additional written material.
- **'Engagement' track:** The engagement track shows how much effort a student has put into learning on the platform. Points are awarded for completing quizzes and exercises, regardless of the student's result.

In this example, each experience track is divided into 5 **levels**. By accumulating experience points (XPs) a student can reach higher levels in an experience track. When a student opens a learning object, the system tells the student beforehand (using coin symbols) how many experience points the student is awarded in which XP track if s/he completes that object. The flexible management of experience points in the IMC Learning Suite is based on rules, which allow to either provide points for a specific action or to provide the same amount of points to a group of actions.

The following Figure shows the available Experience Tracks of our example.

My experience

Experience Badges

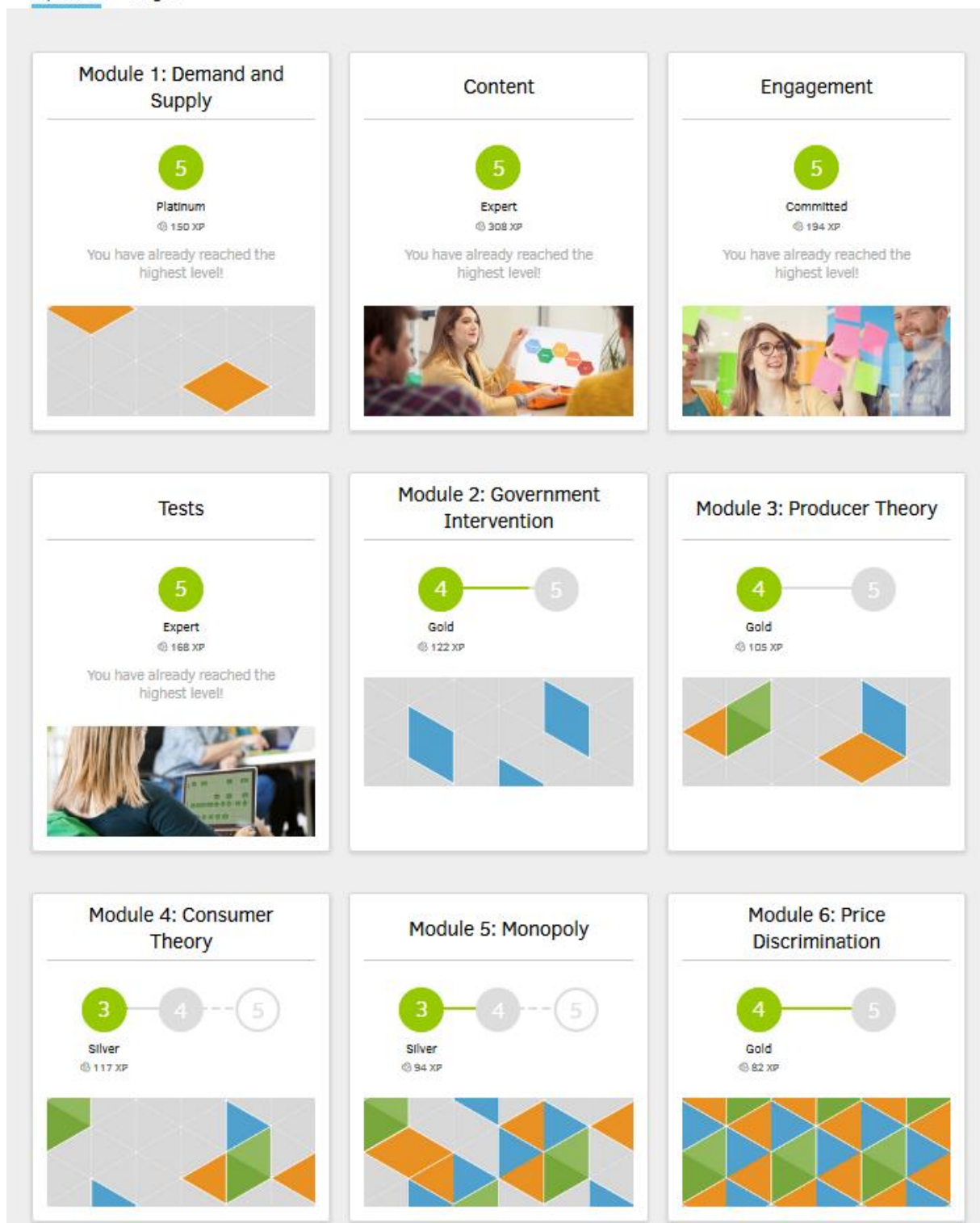


Figure 19 (Original GRAPHIC) Example for Experience Track Overview in the IMC Learning Suite.

Source file: ibis-experience-track-new.png

When you click on a track you will be able to see two things. Firstly, the names of the levels and the amount of what is called 'XP' points that you need to go to the next level are shown. Secondly, you can see a ranking. You can see where you are in the ranking compared to other students (this

information is anonymised so you cannot see the names of other students and they cannot see your name). In other words, if you are high in the ranking you have earned more points and hence have worked more on a particular part of the course when compared to other students and vice versa.

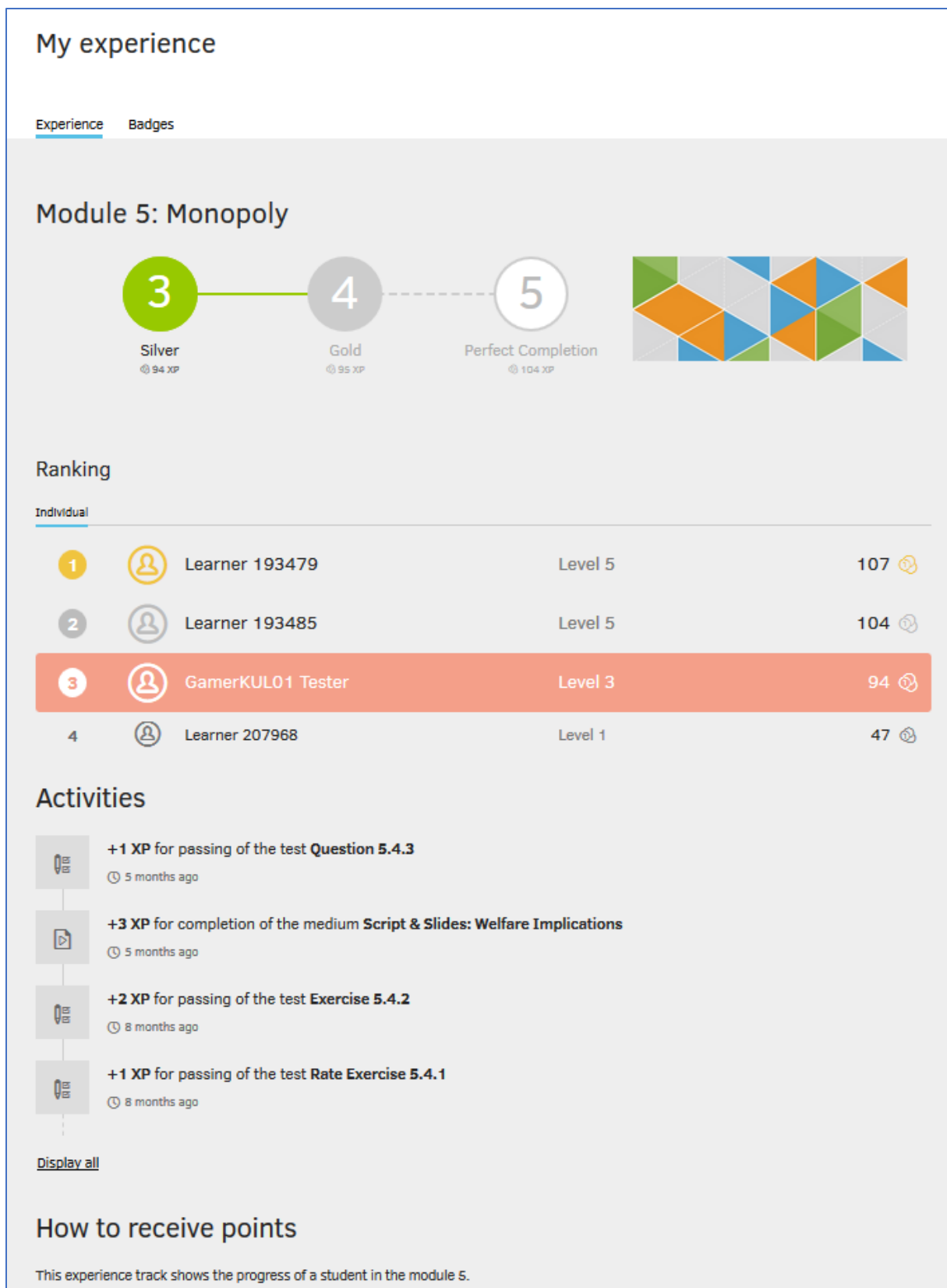


Figure 20 (Original GRAPHIC) Example for Experience Track detail view in the IMC Learning Suite.

Source file: experience-track-detail.png

[END OF PAGE]

(LO #7.2.3.3 HTML page) Badges

Unlike the experience tracks, the badges do not represent a process. On the 'Badges' tab you can find a list of your gained accomplishments and potential future accomplishments. Thus, learners get direct feedback about their achievements e.g. when they are concluding courses or passing a test with an excellent result. Like Experience Tracks the flexible management of badges is based on rules, which allow to either provide badges for a specific action or a number of actions. A student receives a badge once s/he has completed the requirements for that badge. The badges that the student has achieved will be displayed in bright colours. In our example scenario the following badges are available and displayed as shown in the below Figure.

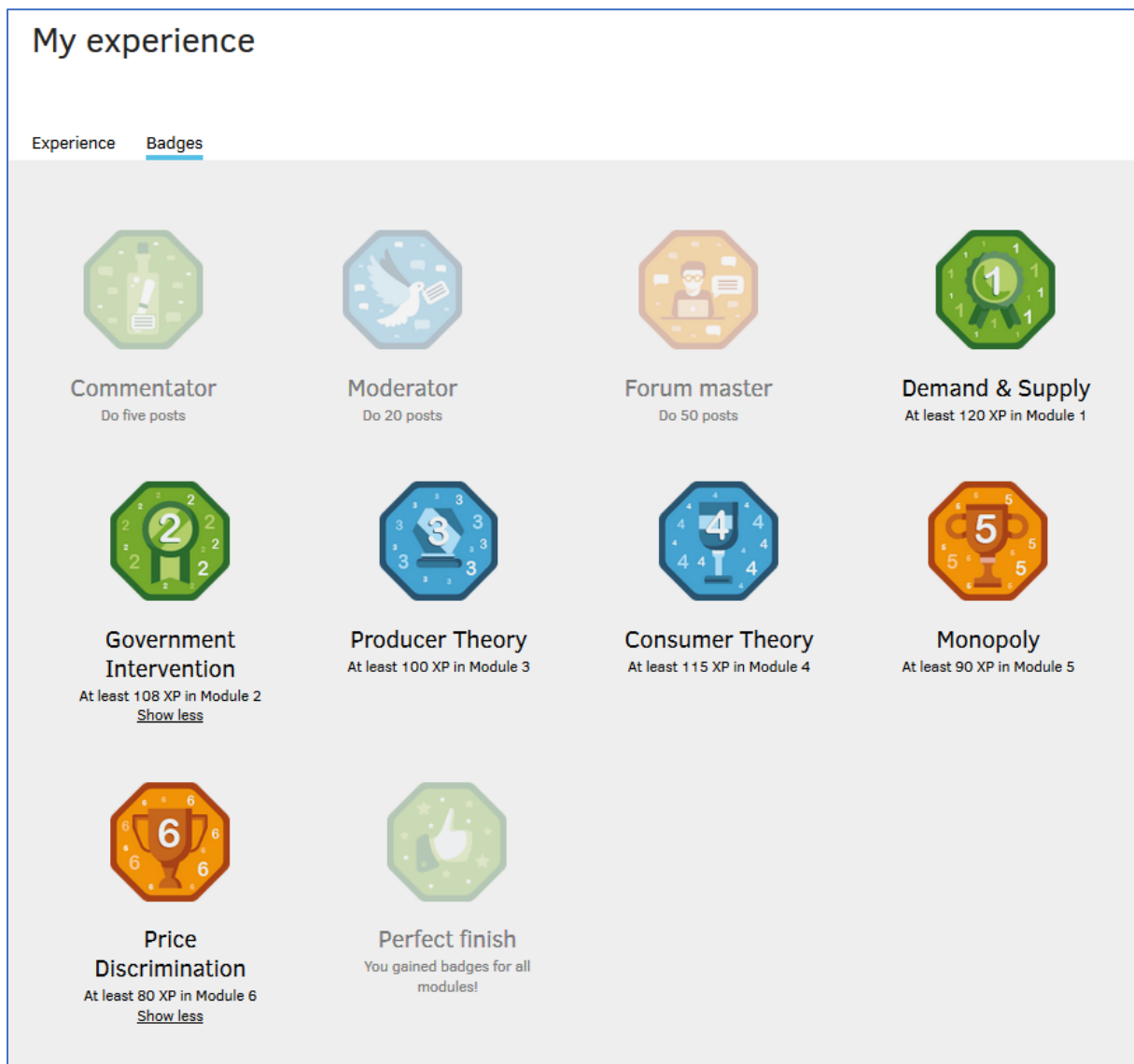


Figure 21 (Original GRAPHIC) Example for Badges in the IMC Learning Suite.

Source file: badges-new.png

[END OF PAGE]

7.3. Tools for Learning Analytics in the Learning Suite

7.3.1. Using the Learning Analytics dashboard of the Learning Suite

(LO #7.3.1.1 HTML page) Customization options of the Learning Analytics dashboard

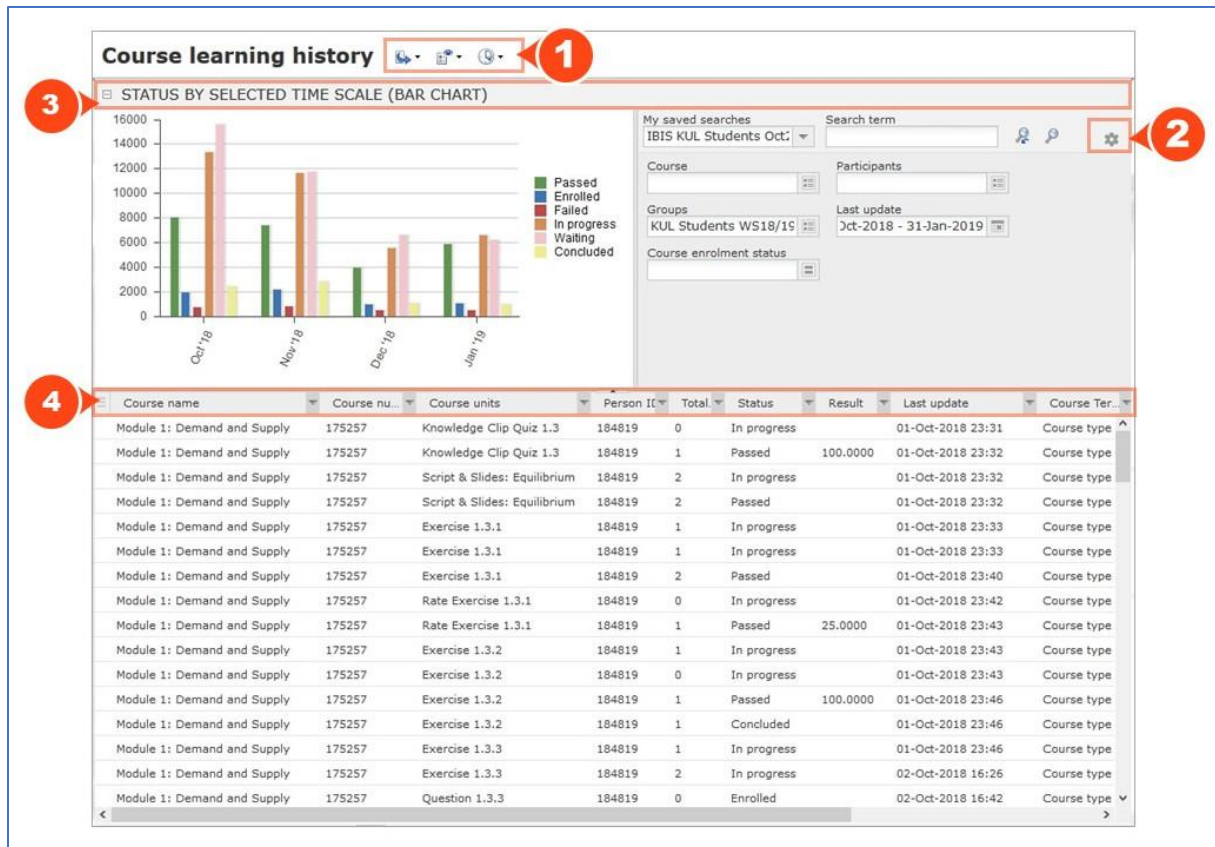


Figure 22 (Original GRAPHIC) Further customization options of the reports

Source file: Module7-LMS_Customization-options.jpg

As illustrated in the Figure above, each dashboard report in IMC Learning Suite supports additional customization options:

1. **Export options.** Each dashboard report has exporting functionality which allows to export reported data in XLS or CSV format. A graphical representation can be separately exported in PNG or SVG format. This feature also allows you to choose type of graphical representation.
2. **Advanced search.** Through advanced search functionality you can add further search criteria (also called filters). Predefined searches can be saved for later use, even as default view. If saved as default a graphical representation of this predefined search is also shown in the internal dashboard of a tutor, a supervisor or an administrator. The advanced search area can be arranged by the user via drag and drop of additional filters.
3. **Graphics and search areas** can be collapsed for better view of the table.
4. **Report table options.** The table output area can be arranged by the user via drag and drop. Further attributes can be made available via a person or metatag lists manager in IMC Learning Suite and then be added as needed by the report user. In addition, the table can be sorted or grouped for selected columns.

[END OF PAGE]

(LO #7.3.1.2 HTML page) Graphical representation of the reported data

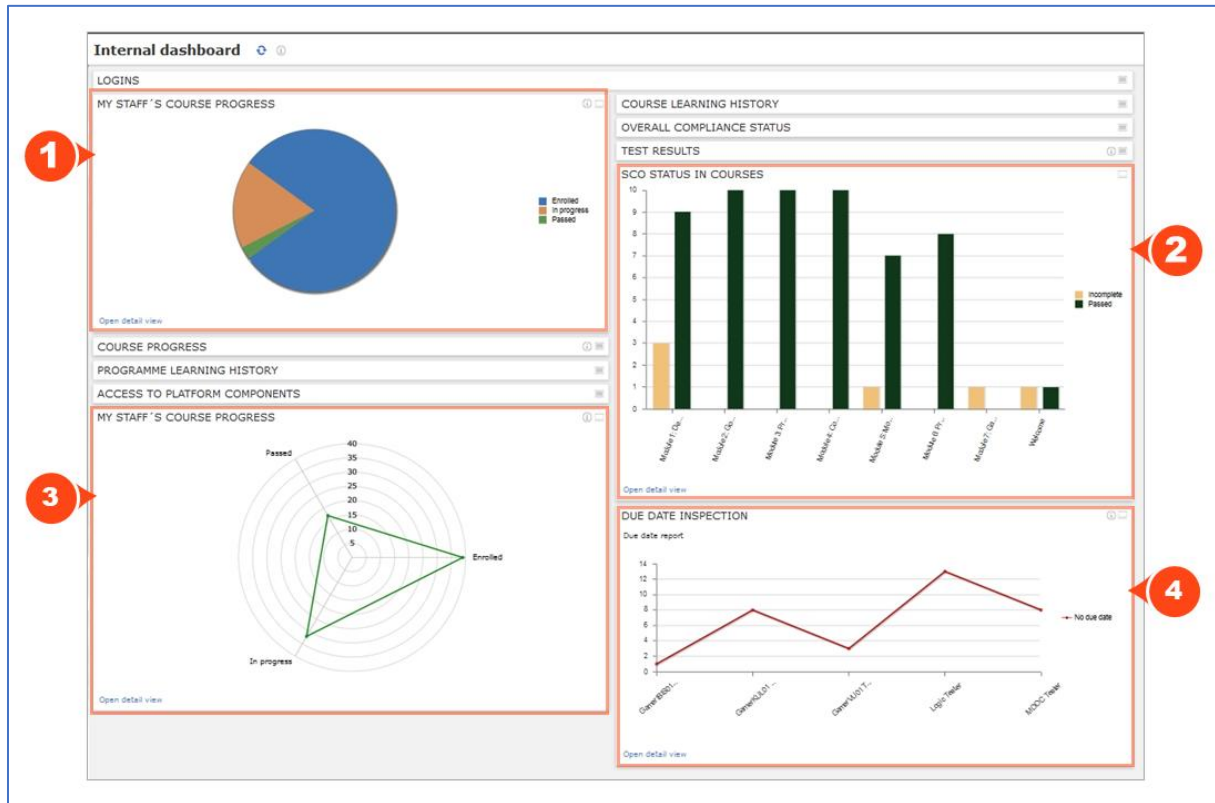


Figure 23 (Original GRAPHIC) Diagram types for dashboard reports

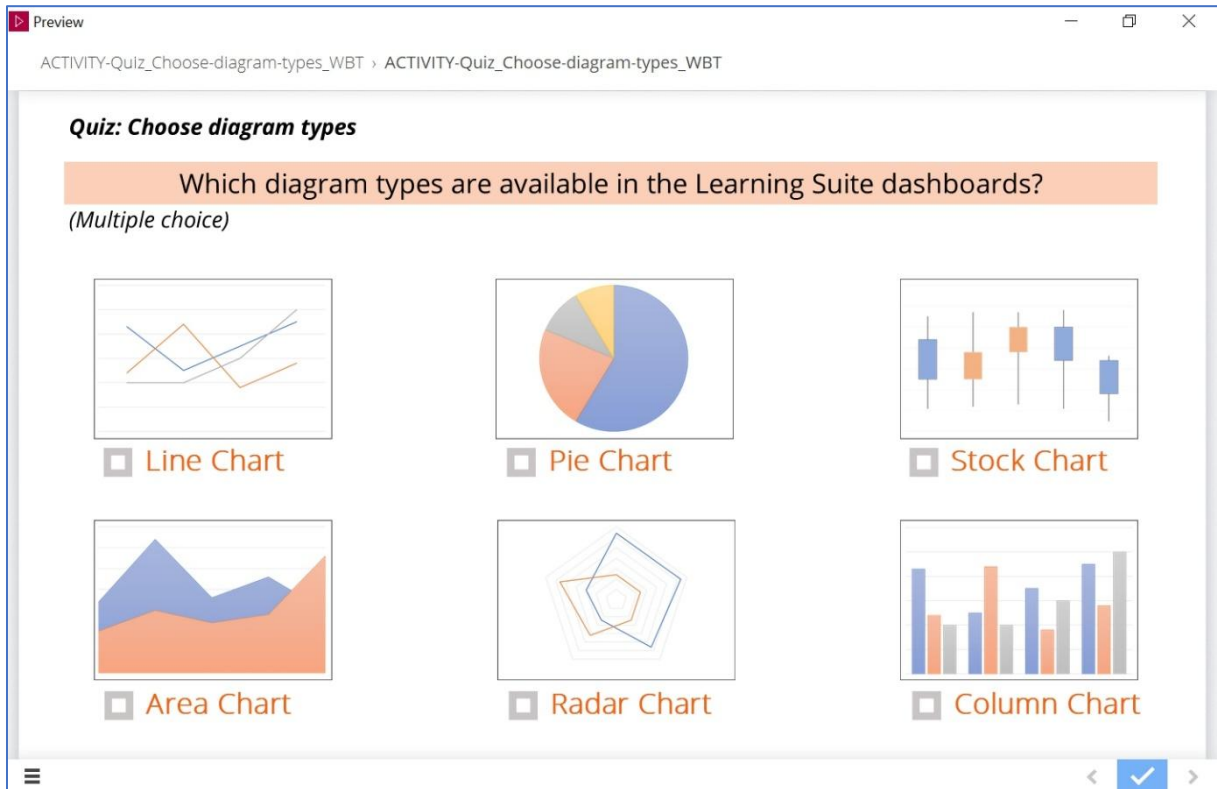
Source file: Module7-LMS_Types of diagrams.png

The Figure above illustrates the types of diagrams available for reports in the Learning Suite. Depending on the report type the Learning Suite offers 1 to 4 types of diagrams as graphical representation of the reported data. These are **pie chart (1)**, **column chart (2)**, **radar chart (3)** and **line chart (4)**. Not all reports have graphical representation as depending on the amount and type of data this can be not always rational.

[END OF PAGE]

(LO #7.3.1.3 ACTIVITY) Quiz: Choose diagram types

Which diagram types are available in the Learning Suite dashboards?
(Multiple choice as WBT)



Source file (image): ACTIVITY-Quiz_Chose-diagram-types_WBT.jpg

Source file (WBT): ACTIVITY-Quiz_Chose-diagram-types_WBT.zip

[END OF PAGE]

7.3.2. Collecting and retrieving learner data

(LO #7.3.2.1 [HTML page](#)) Static and dynamic data

We have learned above that static data of the learner is information which does not change at all or remains almost unchanged during the learning process. To static data belongs, for instance, the learner's identifying information like name, surname, birthdate, birthplace, nationality etc. Also, the learner's educational history like courses enrolled or taken, grade records, transcripts and other academic performances could be considered as static data.

Following Figure shows exemplary types of static data about the learner which can be collected in the Learning Suite.

New: Users
Users

Person Administration System

Title

First name* (100 characters max.)

Last name* (100 characters max.)

E-mail* (100 characters max.)

Gender

Institution

Country

Cost centre

Title of supervisor

First name of supervisor (50 characters max.)

Last name of supervisor (50 characters max.)

E-mail of supervisor (100 characters max.) ⓘ

Figure 24 (Original GRAPHIC) The new learner's profile page in the IMC Learning Suite.

Source file: Module7-LMS-New-user-profile.png

Dynamic data refers mainly to data generated from learner's activities during the learning process, and will be retrieved from the database through various reports. These reports can be accessed through the Learning Analytics dashboard in the Learning Suite.

In the following sections we will discuss several reports to retrieve dynamic data.

[END OF PAGE]

(LO #7.3.2.2 HTML page) Dynamic data on learning behaviour

Information on learning behaviour is important to decide whether to intervene the learning process or to take supportive actions towards some learners. Dynamic data expressing the learning behaviour is often classified as engagement, performance or interaction information.

Engagement data shows for example, how intense a learner is involved in the learning activities including usage of educational resources.

Performance data indicates how a learner is doing in assessment activities like tests and quizzes. This data is expressed mostly in scores or percentage.

Interaction data tracks for example whether and how often a learner is using or viewing educational materials like videos, Web-based trainings etc.

The IMC Learning Suite provides pre-defined reports to retrieve information about the learning behaviour.

The Figure below shows a list of such standard reports which can be accessed through the Learning Analytics Dashboard. In the Learning Analytics Dashboard, an administrator can group reports according to different categories. In our example in the Figure, the reports have been grouped into Activities, Achievements, Content etc. roughly corresponding to the above data types. **Activity Reports** deliver data about training activity (e.g. registrations, logins, completions of training objects, last time of accessing learning objects). **Achievement Reports** deliver data about performance and evaluation data such as test results, course progress and feedback summaries. **Content Reports** deliver data specific to SCORM or AU learning objects. You can click to enlarge the image.

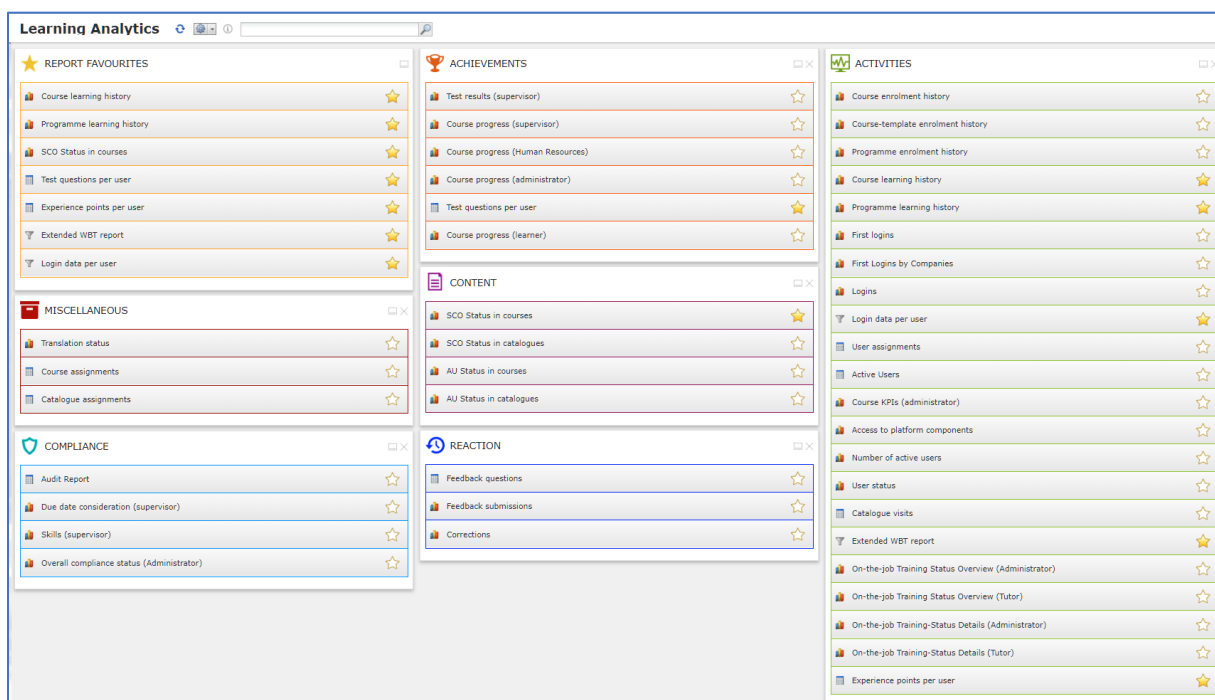


Figure 25 (Original GRAPHIC) Example report categories in the Learning Suite (Overview)

Source file: IBIS-Learning-Analytics.jpg

@ Editor: Make this figure available for enlargement. Text: Click to enlarge image.

In the following section you can download a formal description of each of the listed reports. In the sections following that section we will pick out a few reports important for instructional designers and e-trainers. We will describe the output data in detail and will then show with examples how the reports work in practice.

[END OF PAGE]

(LO #7.3.2.3 HTML page) Reports – Overview of important reports for instructional designers and e-Trainers

The IMC Learning Suite provides a large set of predefined standard reports available off-the shelf. A list of these predefined reports together with their high-level definition can be downloaded with the document “IMC Learning Suite Report Definitions” in the “References and Further Readings” section at the end of this module. From this list of standard reports, the following reports are most relevant for instructional designers and e-Trainers. We only briefly summarize them in this section, give a graphical view of the output and go into detail of some reports in the sections following.

Report: Logins

Shows the total number of logins to the platform in a specific time period. The report requester can decide whether to display the logins for the selected period on an hourly, daily, monthly or annual basis.

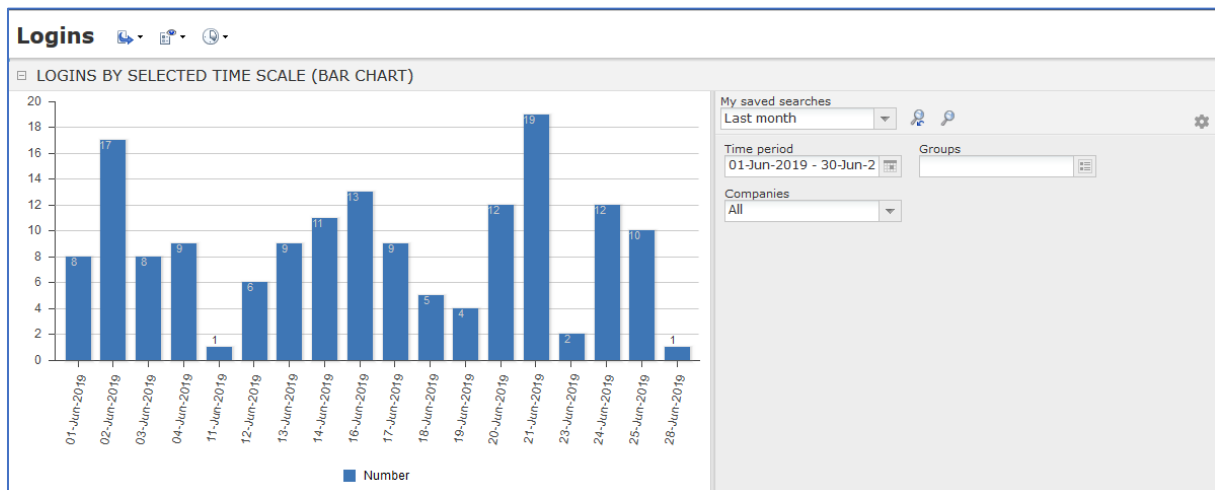


Figure 26 (Original GRAPHIC) Login report

Source file: logins-short.png

Report: Login data per user

This report lists for each user first login, last login and total number of logins.

Login data per user

General

Author

imc Super

Created

Monday, 29 July 2019 10:51

Query criteria

Result

login	firstname	lastname	firstlogintime	lastlogintime	countoflogins
acc900			2018-09-17 09:04:36.562	2018-12-19 16:23:30.858	126
ncu210			2018-09-14 18:00:48.696	2018-12-11 21:45:31.349	42
rcn790			2018-10-14 19:39:00.319	2018-12-19 16:58:19.675	71
lcn940			2018-09-15 17:22:12.24	2019-02-07 10:24:03.648	57
fdr380			2018-10-31 15:47:04.706	2018-12-16 16:16:18.228	50
jda880			2018-09-18 13:09:45.601	2018-12-20 07:58:39.672	144
aeb200			2018-10-01 18:08:19.206	2018-12-12 20:41:28.46	83
see250					0
teh600			2018-09-20 10:51:37.705	2018-12-19 18:42:56.517	59
cgs790			2018-09-18 15:34:17.832	2019-02-06 14:20:48.172	178
ggn460			2018-09-16 20:24:03.671	2018-12-19 20:47:28.818	75
ehp240			2018-09-19 13:13:47.362	2018-12-19 10:56:46.563	79
dhs213			2018-09-17 08:23:53.634	2019-04-18 14:57:59.524	61
wht320			2018-09-23 15:45:38.553	2018-12-19 23:44:21.336	83
rhn356					0
jjn226			2018-11-06 16:27:03.928	2018-11-28 17:56:15.053	9
zkg600			2018-11-01 12:27:58.775	2019-02-07 12:36:58.365	94
jma232			2018-11-06 13:29:23.686	2018-12-19 20:00:09.151	63
bma580			2018-12-18 13:52:14.333	2018-12-18 13:52:14.363	1
mmr305			2018-09-14 14:33:33.045	2018-12-19 17:03:05.575	135
bnk400					0

Figure 27 (Original GRAPHIC) Login data per user

Source file: login-data-per-user.png

Report: Course progress

This report displays detailed information on all course bookings (course enrolment status), in which the employees / students of the report requester are / were involved as learners.

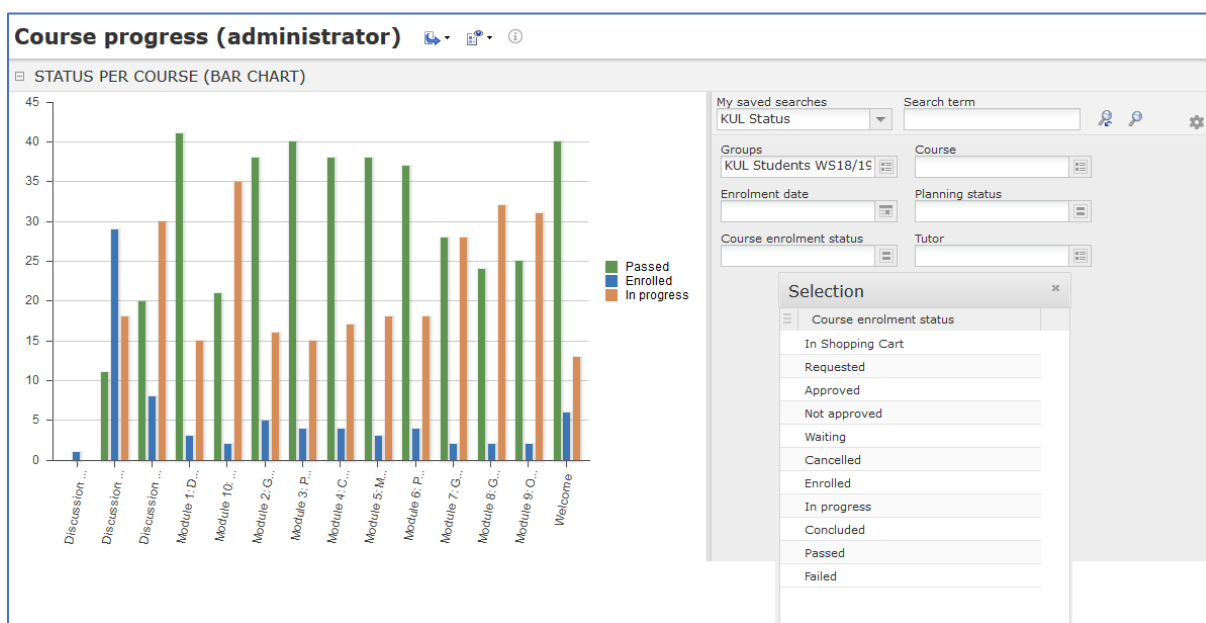


Figure 28 (Original GRAPHIC) Course progress report and available enrolment status values (bar chart shows status per course)

Source file: course-progress-short-enrolment-2.png

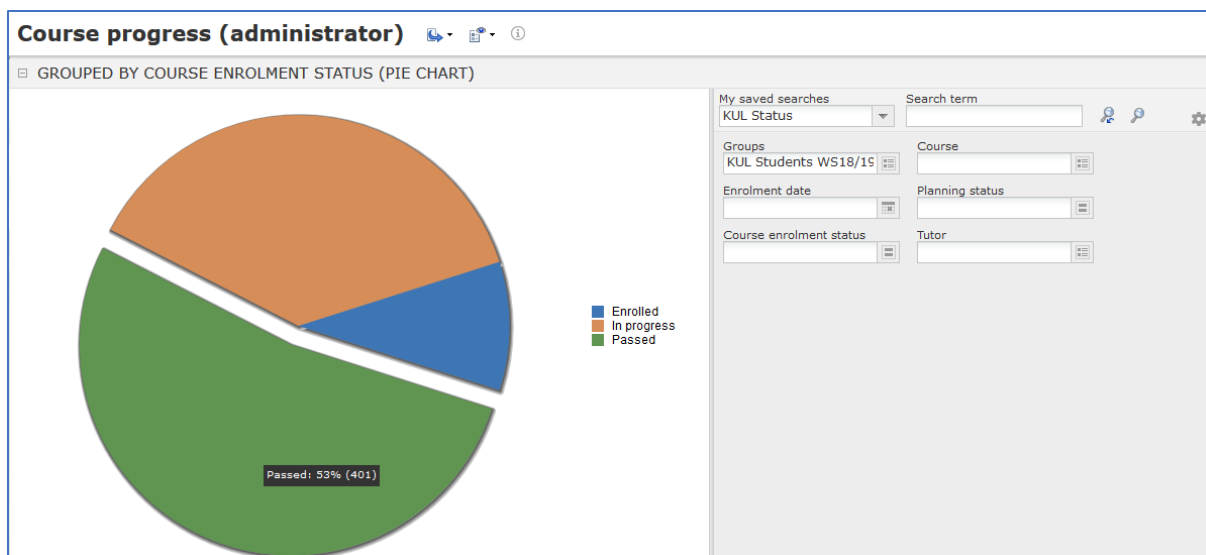


Figure 29 (Original GRAPHIC) Course progress report (pie chart groups users by course enrolment status)
 Source file: course-progress-pie-chart.png

Report: Course Learning History

This report analyses the learning history of users to their assigned courses and the associated course components.

This important report will be dealt with in depth in section 7.3.2.

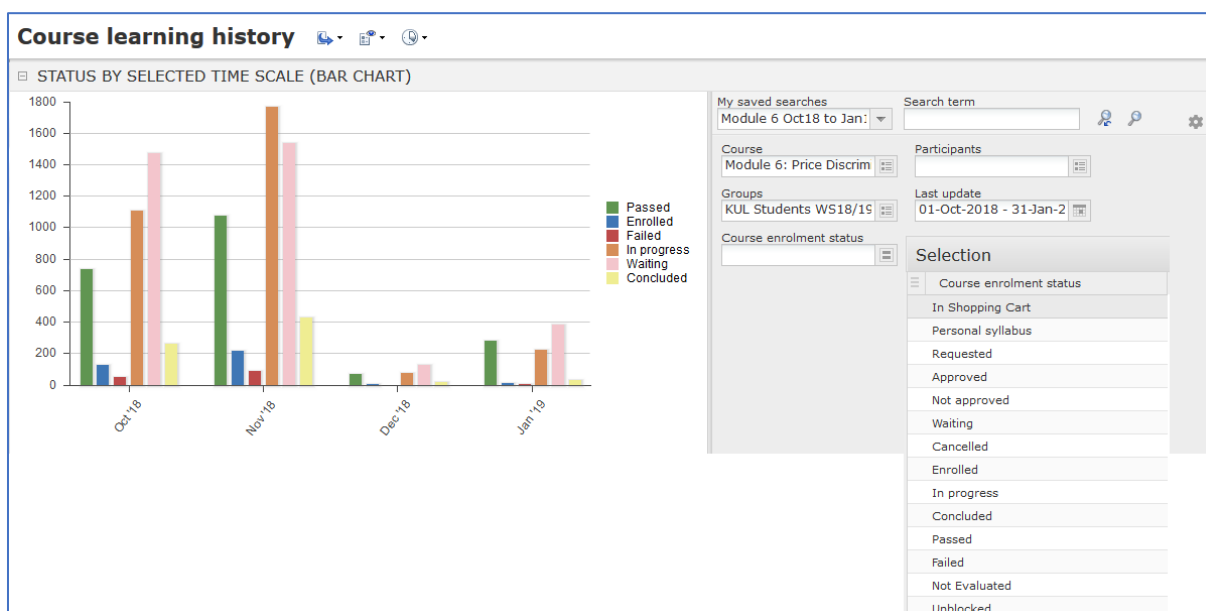


Figure 30 (Original GRAPHIC) Course learning history with enrolment status
 Source file: course-learning-history-with-enrolment.png

Depending the specific course and the booking processes defined for it in the Learning Suite there are various course enrolment status. The most important values for the course enrolment status will be explained below.

Report: SCO Status in Courses

The current processing status with respect to a SCORM WBT that users have received in a course is listed. This report will be dealt with in detail in section 7.3.4.

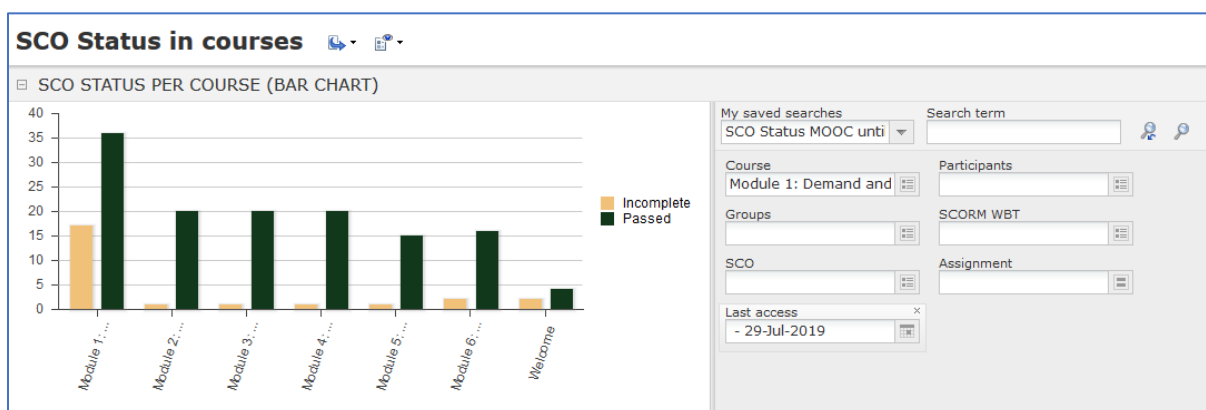


Figure 31 (Original GRAPHIC) SCO status in courses

Source file: sco-status-in-courses-short.png

Report: Extended WBT report

Provides a tree structure drill-down from the course level down to the WBT assignable units detailing the participant progress at each level, or a flatter WBT only view disregarding course relationship. This report will be dealt with in detail in section 7.3.4. It does not have a graphical output.

Report: Experience points per user

This report is available if gamification is used. The report provides an overview about the number of experience points per user for the different tracks. It lists for each learner and experience track the experience points, level achieved and points necessary to achieve next level.

Experience points per user								
My saved searches		Search term						
All contents								
Last name	First name	Personal ID	Experience track	Experience point	Level	Points required	Maximum Level	
Tester	GamerVU01	193479	Module 1: Dema...	128	4	9	5	
Tester	GamerVU01	193479	Content	311	5	0	5	
Tester	GamerVU01	193479	Engagement	192	5	0	5	
Tester	GamerVU01	193479	Tests	193	5	0	5	
Tester	GamerKUL01	193478	Module 1: Dema...	150	5	0	5	
Tester	GamerKUL01	193478	Content	308	5	0	5	
Tester	GamerIBIS01	193485	Module 1: Dema...	118	3	12	5	
Tester	GamerIBIS01	193485	Content	294	4	6	5	
Tester	GamerIBIS01	193485	Engagement	201	5	0	5	
Tester	GamerVU01	193479	Module 2: Gover...	133	5	0	5	
Tester	GamerIBIS01	193485	Tests	198	5	0	5	
Tester	GamerVU01	193479	Module 3: Produc...	115	4	3	5	
Tester	GamerVU01	193479	Module 4: Consu...	134	4	3	5	
Tester	GamerVU01	193479	Module 5: Monop...	107	5	0	5	

Figure 32 (Original GRAPHIC) Course learning history with enrolment status

Source file: experience-points-per-user.png

[END OF PAGE]

(LO #7.3.2.4 ACTIVITY) Discussion: How would you use the reports as an instructional designer or e-Tutor?

Recall the IBIS case-study earlier in this course.

Imagine you are an instructional designer. Select one of the above listed reports and think about how this report could maybe help you to analyse or improve your course design. Share your ideas in the discussion board below.

Imagine you are an e-Tutor. Select one of the above reports and think about how this report could help you to improve your course tutoring. Share your ideas in the discussion forum below.

- 1. Which report would you consider useful as an instructional designer? Elaborate on your selection.**
- 2. Which report would you consider useful as an e-Tutor? Elaborate on your selection.**
- 3. Which types of reports would you find useful in addition to the above-mentioned examples?**

[END OF PAGE]

7.3.3. Reports for Activity and Engagement Analysis

[\(LO #7.3.3.1 HTML page\) Reporting and supervision of the learner's engagement activities](#)

To retrieve information about the learner's engagement in a course the Learning Suite provides instructional designers and e-Tutors several reporting and supervision functionalities. Standard reports like the "Course learning history" help e.g. instructional designers to do a post-analysis and see how the course and the course components they have designed have been used by the learners. Course supervision functionalities for tutors provided through the course instruction functions of the tutor centre help the tutors of a course to retrieve information on the learning behaviour and progress of the learners while taking decisions on whether to intervene the learning process while the course is running.

To gain more insight on the learner interaction the reports allow you to use different filter functions. Filtering options allow, for example, to get customized reports selecting by learning material, by learner, by source and other criteria.

We will show examples and application scenarios in the following sections.

[END OF PAGE]

(LO #7.3.3.2 HTML page) Report: Course Learning History

To retrieve information about the learner's engagement the Learning Suite provides you with a standard report on the learning history of the course. This report shows all learners engaged in this course. By filtering the respective learner, you can gain data about an engagement of a specific learner.

Report Definition

Report name: Course Learning History

Description: The learning history of users to their assigned courses and the associated course components are analysed.

Target Audience: Administration / Management, Tutors, Instructional designers

Analysed Data: Learning history of course/person

Filter:

- Course
- Course template
- Participants
- Groups
- Update
- Course registration status
- Course usage (optional)

List Output:

- Course name
- Course number
- Course unit
- Last name
- First name
- Person ID
- Total number of attempts
- Status
- Result
- Last update
- Last edited by
- Course usage (optional)

Graphical Output: The graphical analysis can be influenced by the scaling, i.e. the user decides whether the history of the statuses is to be analysed on a daily, monthly or annual basis. The following default view is available here:

- Status by selected time scale (bar chart)

Report Examples

The following Figure shows a course learning history report.

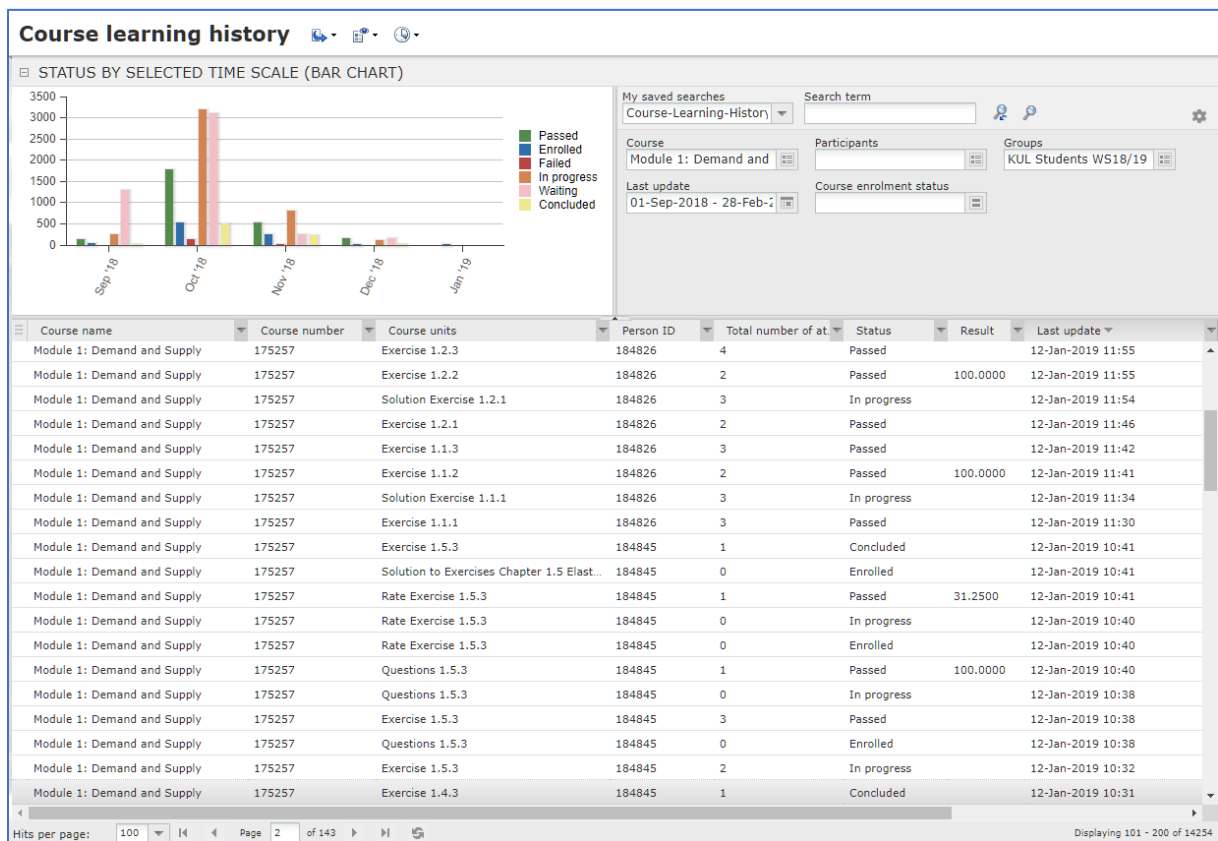


Figure 33 (Original GRAPHIC) Course Learning History (all learners)

Source file: course-learning-history.jpg/ png

The following Figure depicts a filtered state of the above report “cutting” it to the engagement of one specific learner.

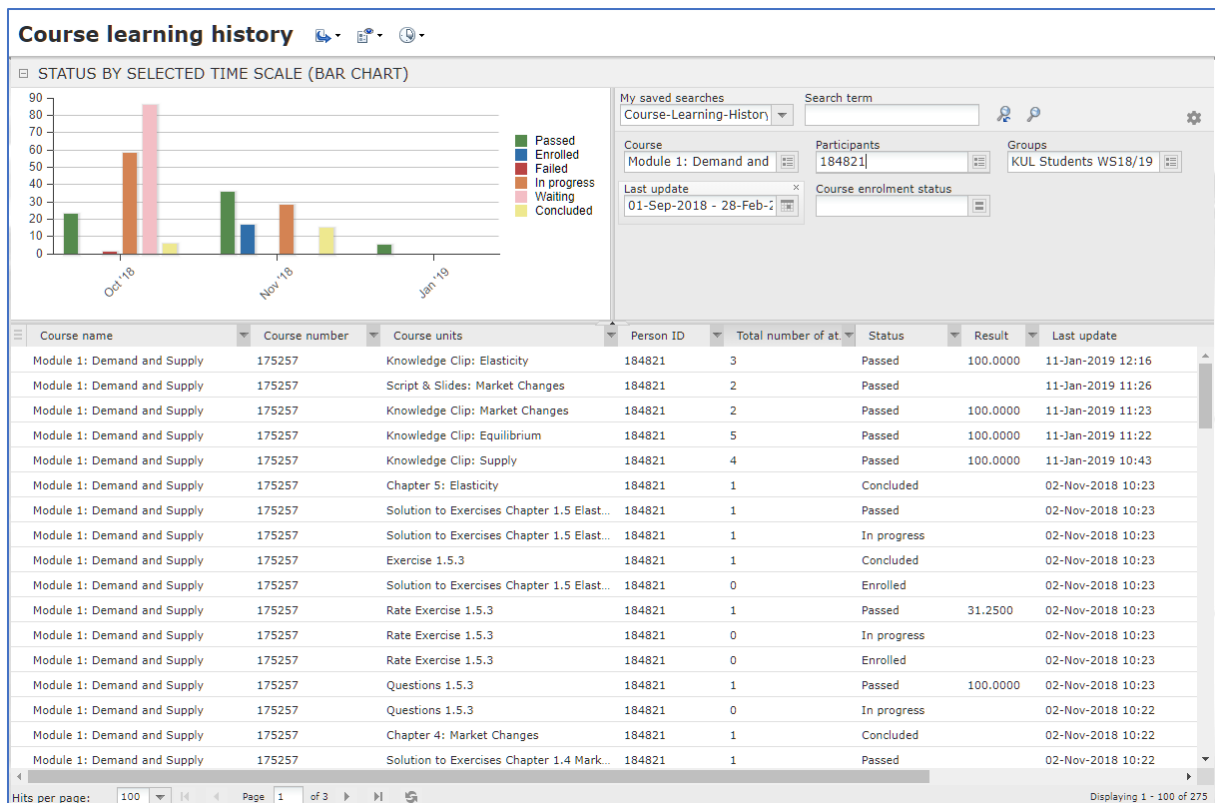


Figure 34 (Original GRAPHIC) Course Learning History single learner (with Person ID 184821)

Source file: course-learning-history-single-user.png

The following Figure indicates how a specific learner (Person ID 184837) interacted with a specific learning object (Course Unit “Exercise 1.3.3”). The learner attempted to solve the exercise three times and finally passed it after the third attempt. He first attempted it on 8th January 2019 at 11:18 and passed it on 11:23.

Course name	Course number	Course units	Person ID	Total number of at	Status	Result	Last update
Module 1: Demand and Supply	175257	Exercise 1.3.3	184837	0	Waiting		29-Oct-2018 21:42
Module 1: Demand and Supply	175257	Exercise 1.3.3	184837	1	In progress		08-Jan-2019 11:18
Module 1: Demand and Supply	175257	Exercise 1.3.3	184837	1	In progress		08-Jan-2019 11:18
Module 1: Demand and Supply	175257	Exercise 1.3.3	184837	3	Passed		08-Jan-2019 11:23
Module 1: Demand and Supply	175257	Exercise 1.3.3	184837	1	Concluded		08-Jan-2019 11:25
Module 1: Demand and Supply	175257	Exercise 1.4.1	184837	0	Waiting		29-Oct-2018 21:42

Figure 35 (Original GRAPHIC) Course Learning History single learner interacting with a specific learning object

Source file: course-learning-history-specific-to.png

“Concluded” in the above Figure refers to a higher-level course component with the same name as the individual exercise. It is a folder consisting of the individual learning objects “Exercise 1.1.3”, “Questions 1.1.3”, “Rate Exercise1.1.3”)

Comments on List Output parameters

In the following, we comment on the most important list output parameters which are likely interesting for an instructional designer or e-Trainer and where the meaning of the parameter is not self-explaining.

List Output: Total number of attempts

Meaning: How often has a course component been opened by a course participant within that

course.

Value type: Number

Comments and examples:

Status changes (see below about “status”) trigger new entries in the table, but the number won’t be increased after the user completed a component.

For tests, all submissions will be counted. Test submissions with status changes trigger a new entry in the table, submissions with worse result will be counted but not displayed as separate entry in the table.

List Output: Status

Meaning: Describes for a learner the processing status of a course component, e.g. if it has been started or completed at the listed time. Status changes are recorded as separate entries in the table. If the status has not changed but the user has accessed the component again, the last time of access is recorded.

Values: Waiting | In Progress | Passed | Failed | Concluded | Enrolled

Status “Waiting”: Course component has not yet been opened by a participant at the listed time, but participant has started / opened the course.

Status “In Progress”: Course component has been opened but has not yet been passed at the listed time.

Status “Passed”: Course component has been passed. The criteria for “passed” depend on the type of the course component.

- **For tests:** To pass a test, a course participant has to achieve the requested number of points specified in the definition of the test. Tests also have results (see below).
- **For SCORM WBTs:** The author of a SCORM WBT includes the requirements for passing within that WBT. Once passed within a course according to the built-in criteria, the WBT sends the status to the LMS, together with a result (see below).
- **For PDFs, Videos, HTML pages and other single objects:** User opened course component and explicitly marked course component as completed in the program, by clicking the check box. It is also possible to set the system to automatically pass an object as soon as a learner opens it. Then no manual confirmation is necessary. There are no other criteria for “passing” that learning object. Time spent on learning objects is not recorded.

Status “Failed”: Course component has been failed, viz. the criteria for passing have not yet been reached. This status is only possible for assessment objects, like tests or WBTs. If the system allows the course participant to repeat a test a new entry will be generated as soon as the user passes the test. See the history in the following Figure of the test “Exercise 6.1.2”. Note again, that the status “concluded” refers to a higher-level container object having accidentally the same name as the individual test Exercise 6.1.2 (see below).

Course name	Course number	Course units	Person ID	Total num.	Status	Result	Last update
Module 6: Price Discrimination	176317	Exercise 6.1.2	184824	0	Waiting		03-Nov-2018 17:08
Module 6: Price Discrimination	176317	Exercise 6.1.2	184824	1	In progress		04-Nov-2018 22:27
Module 6: Price Discrimination	176317	Exercise 6.1.2	184824	0	In progress		04-Nov-2018 22:27
Module 6: Price Discrimination	176317	Exercise 6.1.2	184824	1	Concluded		04-Nov-2018 22:28
Module 6: Price Discrimination	176317	Exercise 6.1.2	184824	2	Failed	33.3333	04-Nov-2018 22:28
Module 6: Price Discrimination	176317	Exercise 6.1.2	184824	3	Passed	100.0000	04-Nov-2018 22:29

Figure 36 (Original GRAPHIC) Course learning history of user 184824 with learning object Exercise 6.1.2

Source file: course-learning-history-specific-10.png

Status “Concluded”: This status applies to containers in the course (e.g. chapters consisting of several learning objects). Feedbacks also count as complex objects. They cannot be passed, but only concluded. The status is not available for single learning objects. A “container” is “concluded” if all its elements have been passed. A feedback is “concluded” if the user answers to all questions in the feedback and then submits the feedback.

Status “Enrolled”: This status relates to students who have been booked to the course after the course has started. You can ignore this status here.

Comments and examples:

The same learning objects can have several entries in the table with a different status and a different or same time. This is because the last update time is the time of the latest change of the status. E.g. if an object changes its status to “passed” there is an entry in the database. Also, if a user starts the whole course, but has not yet opened the object the status changes to “waiting” and the time is saved.

List Output: Last update

Meaning: Date/time of the last status change of that course component.

Value type: Date/time, e.g. 03-Dec-2018 16:18

Comments and examples: The last update time is the time of the latest change of the status of the learning object when a learner is working with it. E.g. if an object changes its status from “In Progress” to “Passed” there is a new entry in the database.

If the state “Passed” is reached, the date is “frozen”, viz. if a user looks at the object again this does not change anything in the database.

If an object is “In progress” but not yet “Passed” and the learner accesses the object later, the status remains “In Progress”, but the time of the “Last update” is updated and the status “Total number of attempts” increases by 1.

List Output: Result

Meaning: Records results of learning objects like tests or WBTs.

Value type: Percentage

Comments and examples:

Test result in percentage terms, e.g., points (reached/maximum) 50/60 = 83%, will be shown as 83.3333 in the table.

The result value of WBTs will be calculated within the object and sent to the LMS. In our IBIS example case, if a learner watches 90% of the video in a knowledge clip, the object is marked as passed and receives the result 100.

Feedback objects get the value 0.0000, this can be ignored.

For other learning objects the value of the result is empty.

Folders (container objects) have no result.

[END OF PAGE]

(LO #7.3.3.3 ACTIVITY) Quiz: Course Learning History

Download the following example course learning history report in .xlsx or .csv format.

- Course Learning History Example [.csv]
- Course Learning History Example [.xlsx]

[Internal comment: Files are on Seafile]

- course-learning-history-all-users-anon.csv
- course-learning-history-all-users-anon.xlsx

To work on this exercise, we recommend you use a table editing tool on your PC and use the filtering functions.

1. How many different students (distinguished by their Person ID) have concluded the learning object “Feedback Module 1”?

- 50
- 28 (correct answer)
- 33

2. Are there students who have started to work on “Feedback Module 1” (Status “In progress”), but have not concluded it?

- Yes (correct answer)
- No

Feedback if solution is shown:

50 Students have started to work with “Feedback Module 1”, but only 28 have concluded it. For example, the user with the Person ID 184824 has never concluded “Feedback Module 1”.

3. Who was the last student to conclude “Feedback Module 1”?

- 184831
- 184832
- 184836
- 184837 (correct answer)
- 184848
- 190674

Feedback when solution is shown:

The student with Person ID 184831 concluded “Feedback Module 1” on 28-Oct-2018 10:35, so he was last in 2018. However, there is one student with Person ID 184837 who concluded the “Feedback Module 1” in 2019, viz. on 08-Jan-2019 12:45. All other students listed above have not concluded the “Feedback Module 1”.

[END OF PAGE]

(LO #7.3.3.4 HTML page) Tutor view of learner engagement: “Course Instruction”

For e-Tutors having access rights to a course and to the participating learners the Learning Suite also offers a possibility to do a quick live supervision of learners’ progress and take actions if a tutor feels a learner lacks behind. The tutor can select a specific course and open the “Course Instruction” panel. The main functions of a tutor’s course instruction view have been introduced in section 7.1.3. where we explained the tutor centre.





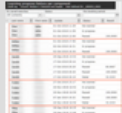
[END OF PAGE]

(LO #7.3.3.5 ACTIVITY) Quiz: Select the best tutor view for your task

Assume you are a tutor of an online course. The course is scheduled for 10 weeks, now 5 weeks have passed since the start of the course. Imagine the following tasks and select which "Course Instruction" view is best suited to solve your task.







1. The professor responsible for the course asks you as a tutor if there are students who lag significantly behind because he wants you to send them a motivation email.
2. The instructional designer of the course is already preparing an update for the second run of the course. The tutor tells him that students complained that one of the tests was very difficult. To find out more details, the instructional designer asks the tutor to find out how the students' average progress on this test was so far.
3. The instructional designer of the course asks you to contact the students who concluded a specific test but performed least because he wants you to ask these students for feedback regarding this specific test in the course.
4. The professor responsible for the course you are tutoring is asked by a student who takes part in the course if the student can write his Bachelor thesis with the professor on a topic of the course. The professor doesn't know the student and asks you to find out how well the student performed in the course. The professor is particularly interested in the student's results in exercises on a specific topic of the course.

Please click on the images to enlarge the different "Course Instruction" views. Then select which of the views is best suited to solve your respective task.

						
1. Identify students who are lagging behind.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Determine average progress on a learning object	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Identify students with lowest performance on a specific learning object.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Identify a specific student's performance on selected learning objects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Solution:

1. View: 2
2. View: 4
3. View: 5
4. View 3

						
1. Identify students who are lagging behind.	✓ ○	✓ ●	✓ ○	✓ ○	✓ ○	✓ ○
2. Determine average progress on a learning object	✓ ○	✓ ○	✓ ○	✓ ●	✓ ○	✓ ○
3. Identify students with lowest performance on a specific learning object.	✓ ○	✓ ○	✓ ○	✓ ○	✓ ●	✓ ○
4. Identify a specific student's performance on selected learning objects.	✓ ○	✓ ○	✓ ●	✓ ○	✓ ○	✓ ○

[END OF PAGE]

7.3.4. Reports for Achievement Analysis

(LO #7.3.4.1 HTML page) [Analysing a learner's assessment activities: Reports and Tutor Centre](#)

The Learning Suite provides several options to analyse how a learner is doing in **assessment activities**. If you are interested in whether a learner has passed a test and what the overall result was, then the above mentioned “course learning history” and “course instruction” views can be used and may be sufficient for your purpose. If, however, you want to analyse the results in more detail, then the Learning Suite offers you additional analytics functionalities that allow you to select specific test questions and to analyse all learners’ results and progress history on these questions. The analysis can be done using reports or using the tutor centre. Reports are suited for post-analysis of the assessment activities, e.g., if an instructional designer wants to see where he or she can improve the course design. Several views in the tutor centre are additionally suitable for tutors doing a supervision while the course is running.

[END OF PAGE]

(LO #7.3.4.2 HTML page) Report: Test questions per user

The report “Test questions per user” shows the analysis of test questions per user, not only of the overall test result, but also of each individual question of the test.

Report Definition

Report name: Test questions per user

Description: Shows the analysis of test questions per user.

Target Audience: Administration, Tutors, Instructional designers, e-Tutors

Analysed Data: List of tests, contained test questions, answers and results of answers to test questions per user

Filter:

- Participants
- Authentication status
- Groups
- Course
- Course template
- Planning status (course)
- Course Terms
- Submission date
- Test
- Test result
- Test question
- Test question type
- Result (test question)
- Classification (question)

List Output:

- Course name
- Course number
- Test name
- Test version
- Overall points for the test
- Minimum quota (%)
- Last name
- First name
- Person ID (in xls output)
- Score (test)
- Percentage achieved
- Interval reached
- Assessment level reached
- Question name
- Version (question)

- Question number
- Level of education
- Question type
- Question Text
- Answer
- Correct Answer
- Maximum number of points
- Score (question)

Graphical Output: This report does not have a graphical output

Report Examples

The report allows a fine-granular drill-down using numerous filters as shown in the following figure.

The screenshot shows the 'Test questions per user' report filter options. The interface includes a title bar with the report name and a search bar. Below the search bar, there are several filter categories arranged in a grid:

- My saved searches:** A dropdown menu showing 'All contents'.
- Search term:** A text input field.
- Participants:** A text input field.
- Authentication status:** A dropdown menu showing 'All'.
- Groups:** A text input field.
- Course:** A text input field.
- Course template:** A text input field.
- Planning status (course):** A text input field.
- Course Terms:** A text input field.
- Submission date:** A date range selector showing '24-May-2019 - 23-Jun-2'.
- Test:** A text input field.
- Test result:** A text input field.
- Test question:** A text input field.
- Test question type:** A text input field.
- Result (test question):** A text input field.
- Classification (question):** A text input field.

Figure 37 (Original GRAPHIC): Report "Test questions per user": Filter options

Source-file: test-questions-per-user-filters.png

Using the filters you can e.g., select a specific course, choose a single user or a group of users which you want to analyse, you can restrict your analysis to a certain time period, you can select a specific test only or even drill down into individual questions of a test. Moreover, the types of questions (multiple-choice, matrix, arrange etc.) can be used as filters.

In the following example we have selected a specific test "Questions 1.5.3" of the IBIS course "Module 1: Demand and Supply" restricting the results to a group of students who submitted the test between September 2018 and March 2019. To run the same search again we have saved the settings as "Test: Questions 1.5.3". The search will deliver the following output (split into two figures).

Test questions per user									
<div> <div>My saved searches</div> <div>Test: Questions 1.5.3</div> <div>Search term</div> <div></div> </div>									
<div> <div>Participants</div> <div>Authentication status</div> <div>All</div> <div>Groups</div> <div>KUL Students WS18/19</div> <div>Course</div> <div>Module 1: Demand and</div> <div>Submission date</div> <div>01-Sep-2018 - 31-Mar-2019</div> </div>									
<div> <div>Test</div> <div>Questions 1.5.3</div> <div>Test question</div> <div></div> <div>Test result</div> <div></div> <div>Classification (question)</div> <div></div> </div>									
Course name	Test name	Question name	Question ID	Overall points	Score (test)	Person ID	Percentage	Assessment level	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3a	94	7.00	7.00	184839	100.00	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3b	96	7.00	7.00	184839	100.00	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3c	97	7.00	7.00	184839	100.00	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3d	95	7.00	7.00	184839	100.00	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3a	94	7.00	5.00	184837	71.43	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3b	96	7.00	5.00	184837	71.43	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3c	97	7.00	5.00	184837	71.43	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3d	95	7.00	5.00	184837	71.43	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3a	94	7.00	7.00	184842	100.00	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3b	96	7.00	7.00	184842	100.00	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3c	97	7.00	7.00	184842	100.00	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3d	95	7.00	7.00	184842	100.00	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3a	94	7.00	6.00	184860	85.71	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3b	96	7.00	6.00	184860	85.71	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3c	97	7.00	6.00	184860	85.71	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3d	95	7.00	6.00	184860	85.71	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3a	94	7.00	7.00	184858	100.00	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3b	96	7.00	7.00	184858	100.00	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3c	97	7.00	7.00	184858	100.00	Passed	
Module 1: Demand and	Questions 1.5.3	Question 1.5.3d	95	7.00	7.00	184858	100.00	Passed	

Figure 38 (Original GRAPH: Output of report "Test questions per user" (1/2)

File: test-questions-1.5.3.png

Test questions per user									
<div> <div>My saved searches</div> <div>Test: Questions 1.5.3</div> </div> <div> <div>Search term</div> <div></div> </div> <div> <div>Participants</div> <div></div> </div> <div> <div>Authentication status</div> <div>All</div> </div> <div> <div>Groups</div> <div>KUL Students WS18/19</div> </div> <div> <div>Course</div> <div>Module 1: Demand and</div> </div> <div> <div>Submission date</div> <div>01-Sep-2018 - 31-Mar-</div> </div> <div> <div>Test</div> <div>Questions 1.5.3</div> </div> <div> <div>Test question</div> <div></div> </div> <div> <div>Test result</div> <div></div> </div> <div> <div>Classification (question)</div> <div></div> </div>									
Person ID	Question name	Question type	Question	Answer	Correct answer	Maximum n...	Score (ques...	Result (test question	Submission d
184839	Question 1.5.3a	Fill in the blank	Suppose...	4 3	4 3	2.00	2.00	All points	04-Nov-2018
184839	Question 1.5.3b	Yes/No	Suppose...	Yes	Yes	1.00	1.00	All points	04-Nov-2018
184839	Question 1.5.3c	Yes/No	Suppose...	Yes	Yes	1.00	1.00	All points	04-Nov-2018
184839	Question 1.5.3d	Fill in the blank	Suppose...	4 40 26.7	4 40 26.7	3.00	3.00	All points	04-Nov-2018
184837	Question 1.5.3a	Fill in the blank	Suppose...	4 3	4 3	2.00	2.00	All points	08-Jan-2019
184837	Question 1.5.3b	Yes/No	Suppose...	Yes	Yes	1.00	1.00	All points	08-Jan-2019
184837	Question 1.5.3c	Yes/No	Suppose...	Yes	Yes	1.00	1.00	All points	08-Jan-2019
184837	Question 1.5.3d	Fill in the blank	Suppose...	3 30 26.7	4 40 26.7	3.00	1.00	Partial points	08-Jan-2019
184842	Question 1.5.3a	Fill in the blank	Suppose...	4 3	4 3	2.00	2.00	All points	16-Oct-2018
184842	Question 1.5.3b	Yes/No	Suppose...	Yes	Yes	1.00	1.00	All points	16-Oct-2018
184842	Question 1.5.3c	Yes/No	Suppose...	Yes	Yes	1.00	1.00	All points	16-Oct-2018
184842	Question 1.5.3d	Fill in the blank	Suppose...	4 40 26.7	4 40 26.7	3.00	3.00	All points	16-Oct-2018
184860	Question 1.5.3a	Fill in the blank	Suppose...	5 3	4 3	2.00	1.00	Partial points	27-Oct-2018
184860	Question 1.5.3b	Yes/No	Suppose...	Yes	Yes	1.00	1.00	All points	27-Oct-2018
184860	Question 1.5.3c	Yes/No	Suppose...	Yes	Yes	1.00	1.00	All points	27-Oct-2018
184860	Question 1.5.3d	Fill in the blank	Suppose...	4 40 26.7	4 40 26.7	3.00	3.00	All points	27-Oct-2018
184858	Question 1.5.3a	Fill in the blank	Suppose...	4 3	4 3	2.00	2.00	All points	04-Nov-2018
184858	Question 1.5.3b	Yes/No	Suppose...	Yes	Yes	1.00	1.00	All points	04-Nov-2018
184858	Question 1.5.3c	Yes/No	Suppose...	Yes	Yes	1.00	1.00	All points	04-Nov-2018
184858	Question 1.5.3d	Fill in the blank	Suppose...	4 40 26.7	4 40 26.7	3.00	3.00	All points	04-Nov-2018

Figure 39 (Original GRAPHIC): Output of report "Test questions per user" (2/2)

Source-fig. test-questions-1.5.3-2.png

For each test, each test question and each user you can see the detailed results, answers given, maximal and actual points received etc. The output of the report shows the final best test result of a user. You cannot track the history of the user completing the test, e.g. if your course allows several attempts. Only the best attempt is logged. For a history of attempts, you have to use the course learning history report although this report does not give a fine-granular drill-down. In our example, most students have finally passed the test because in the IBIS scenario students were allowed to repeat the test as often as they needed.

[END OF PAGE]

(LO #7.3.4.3 ACTIVITY) Quiz: Working with the report “Test questions per user”

Download the following export of the preciously described report “Test: Questions 1.5.3”.

- xlsx: test-questions-per-user-test-1.5.3-v2.xlsx
- csv: test-questions-per-user-test-1.5.3-v2.xlsx

@ editor: These are updated files, please replace the old ones.

Use a table editing tool of your PC to work on the following tasks.

1. How often was an answer to a test question submitted which achieved as a result zero points.

[Multiple Choice 1 of n]

- 3
- 4
- 5
- 6 [correct answer]
- 7

2. Which test questions were answered with a result of zero points by at least two different users.

[Multiple Choice x of n]

- Question 1.5.3a
- Question 1.5.3b [correct]
- Question 1.5.3c
- Question 1.5.3d [correct]

[END OF PAGE]

7.3.5. Reports for content interaction analysis

(LO #7.3.5.1 HTML page) Report: SCO status in courses

To analyse the interaction of the learner with the components of a course you can again use the course learning history report to get a high-level overview. More complex content interaction analyses are only possible in the Learning Suite for specific learning object types, mainly for SCORM WBTs. See section 7.2.1 for an introduction to SCORM WBTs. SCORM WBTs allow you to record the time spent on the object and other details depending on the structure of the WBT. In your instructional design, you should consider if detailed interaction information is important for you. If it is important, you should design your content mainly as SCORM WBTs which can be easily embedded in courses in the IMC Learning Suite and can also be transferred to most other LMSs. To find out how a learner is using SCORM based WBTs you can use the standard report “**SCO status in courses**” accessible directly from the Learning Analytics dashboard.

Report Definition

Report name: SCO status in courses

Description: The current processing status with respect to a SCORM WBT that users have received in a course is listed.

Target Audience: Administration, Tutors, Instructional designers

Analysed Data: SCORM WBTs which are assigned to persons within courses.

Filter:

- Course
- Course template
- Participants
- Groups
- SCORM WBT
- SCO
- Assignment
- Last access
- Course usage (optional)

List Output:

- Course name
- Course number
- SCORM WBT Title
- Object ID (SCORM WBT)
- Version (SCORM WBT)
- SCO name
- Assignment
- Last name
- First name
- Person ID

- Processing time
- SCO-Status
- Component-Status
- Course-Status
- Score
- Last access
- Required result
- Course usage (optional)
- Score (question)

Graphical Output: The report shows the status of the SCOs per course.

- SCO status per course (bar chart)

Report Examples

The following figure illustrates how such a report looks like. The report lists for all SCORM WBTs of the IBIS course “Module 1: Demand and Supply” the SCO status of the learners in the period September 2018 to end of February 2019.

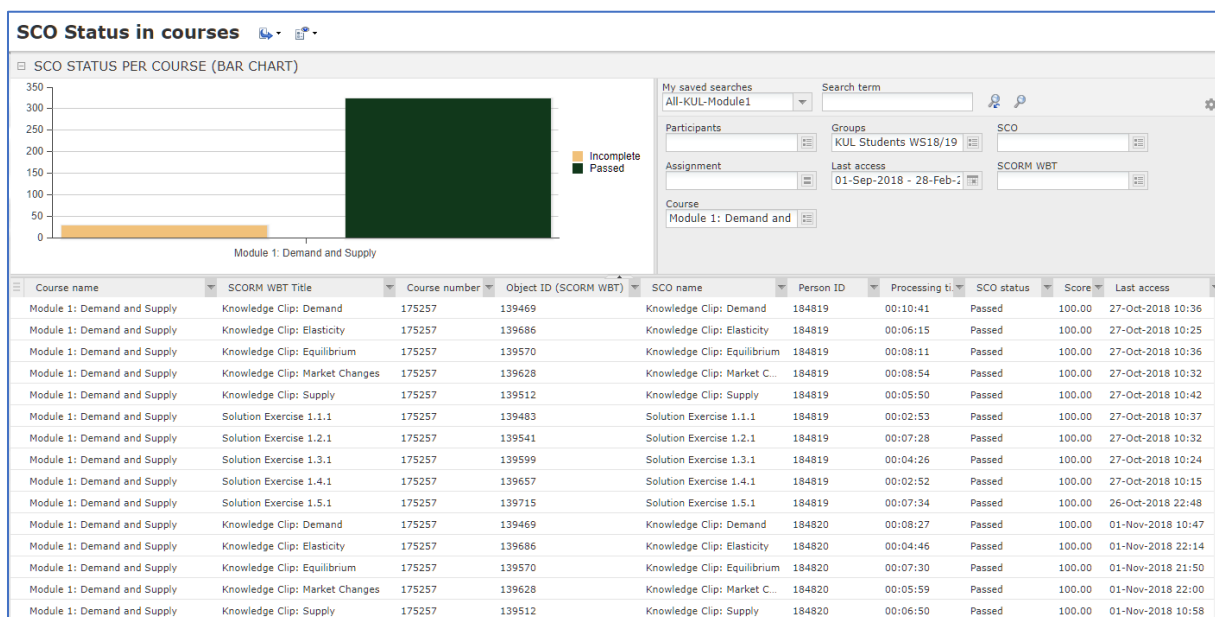


Figure 40 (Original GRAPHIC): SCO status in courses for IBIS Module 1

Source file: sco-status-in-courses-module1-all.png

You can have a look at the source files of the example report by downloading the reports as .xlsx or .csv files.

⇒ Links to files: sco-status-in-courses-KUL-all-anon.xlsx / .csv

One interesting aspect of SCORM WBTs is that they enable to accumulate time of the learner spent on the learning object. If the learner looks at the object several times, the time spent on it is added on the previous duration of use.

Remark 1: SCORM WBTs are complex objects that usually allow more complicated reporting functions if e.g. they include tests, learning logic or a complex page structure. Then you can analyse for each object within the WBT more content interaction details.

Remark 2: If you are interested to learn more about how to generate SCORM WBTs for the Learning Suite with an IMC authoring tool you can have a look at IMC Content Studio: <https://www.imc.com/learning-technologies/authoring/content-studio/>.

Comments on List Output parameters

In the following we comment on the most important list output parameters which are likely interesting for an instructional designer or e-Trainer and where the meaning of the parameter is not self-explaining.

List Outputs: SCORM WBT Title vs. SCO name

Meaning: The “**SCORM WBT Title**” is the internal name of the complex SCORM WBT within the course context. The SCORM WBT also has a “**SCO name**”. This internal name refers to the object itself, independent of the course it is embedded in.

Value type: String

List Output: Processing time

Meaning: Total time spent with a SCORM WBT in the course. The time is accumulated if a learner accesses the object multiple times.

Value type: hh:mm:ss

List Output: SCO status

Meaning: The SCO status states if a user has successfully completed the SCORM WBT as a whole.

Values: Incomplete | Passed | Fail

- **Incomplete:** Not all slides of the SCORM WBT have been completed. Completion of a slide is defined by the programmer of the SCORM WBT.
- **Fail:** WBT contains a slide with a test or other assessment that has been failed.
- **Passed:** Course component has been passed. The criteria for “passed” depend on the WBT. The author of a SCORM WBT includes the requirements for passing within that WBT. Passed could e.g. mean that each slide receives an intended processing time and if a learner as spent at least 60 % of that time on the slide, the slide is completed / passed. If all slides are completed the WBT is passed. Once passed within a course according to the built-in criteria, the WBT sends the component status to the LMS, together with a result (see below).

List Output: Component status

Meaning: A “component” is a part of a course in the IMC Learning Suite. This parameter lists, if this component has been started within that course. Similar to the parameter “Status” in the Course Learning History report.

Values:

- **Waiting:** Component has never been opened within a specific course, but participant has started the course.
- **In progress:** Component has been opened within a specific course context, but is not yet completed / passed.
- **Passed:** Component has been successfully passed within the listed course context. The criteria for passed
- **Failed:** Component has been failed in the context of that course.

Comments and examples

The same SCORM WBT can be used in different courses in the IMC Learning Suite. It remains the same “SCO” but then becomes a different “component”.

Implication: If a SCORM WBT is embedded in Course A and Course B, and if it has been passed by a learner in Course A, but not in Course B, the WBT can have the **SCO status** “passed” not only in “Course A” but also in “Course B”. At the same time the SCORM WBT can have the **component status** “waiting” in Course B (because the learner has passed the SCO in Course A, but has never opened it within Course B).

List Output: Score

Meaning: Measure for completion of a WBT / Completion rate of a WBT with respect to the mandatory SCOs (slides / pages) in that object.

Values: Number

24.00 means that 24 % of the mandatory slides have been completed.

100.00 means that 100 % of the mandatory slides have been completed. In that case the WBT receives the SCO status “passed”.

Comments and examples

- Score is specific to a learner and a SCO. It remains constant over different courses (if used as different component)

List Output: Last access

Meaning: Last time the WBT has been opened / accessed by the learner.

Values: Date & Time, e.g. 03-Jun-2016 22:51

Further output parameters exist depending on the complexity of the respective WBT. We have only listed the most important parameters here.

[END OF PAGE]

(LO #7.3.5.2 ACTIVITY) Discussion: Why record processing time of a learning object?

Recall the IBIS course design where each Knowledge Clip and each solution video has been realized as a SCORM WBT with just one slide embedding a video. In the Learning Suite, this allows tracking of a learner's processing time of the embedded video.

In the discussion below we invite you to share your ideas regarding the insights you want to generate from the processing time of a learning object. Please add your comments to the below topic of the discussion forum.

As an instructional designer, why would you find it useful to record the processing time of various WBTs in your course? Explain and give examples.


[END OF PAGE]

(LO #7.3.5.3 HTML page) Detailed content analysis of WBTs

Beyond the SCO Status in Courses the Learning Suite also offers so-called “Extended WBT reports” which provide a tree structure drill-down from the course level down to the WBT assignable units (AU) detailing the participant progress at each level, or a flatter WBT only view disregarding course relationship. This report is in particular helpful when your course consists of components which are complex WBTs. If you are not familiar with WBT based content you can have a look at the following example taken out of a course on Young Onset Dementia developed within the project RHAPSODY (<http://www.rhapsody-project.eu/>). The WBT has been created using IMC Content Studio as authoring tool and has later been integrated into a curriculum as shown in the below RHAPSODY Case Study.

[END OF PAGE]

PART 3: COGNITIVE PROBLEMS




Memory


Social cognition and executive problems

Language

Orientation


Vision






Recognising memory problems


Supporting memory



 **Cognitive stimulation and memory training**

A word about cognitive stimulation and memory training:

- These are effective for people with a mild degree of cognitive difficulty
- May be computer-assisted
- Can be particularly enjoyable in group format
- This may be provided by psychologists or staff in memory clinics







Video 6 (Existing VIDEO / WBT) WBT: Part 3 of RHAPSODY program

Source-file WBT: Part_3.zip

Source-file-preview: rhapsody-wbt-preview.png (for script only, not necessary for ILS)

[END OF PAGE]

(LO #7.3.5.5 HTML page) Report: Extended WBT report

Assume a course consists of several complex WBTs as shown in the previous example. With the Extended WBT report you can create detailed analyses of how a learner interacted with your content. In general, the Extended WBT reports list for each user, WBT and each slide of a WBT detailed numbers regarding (cumulative) processing time, score of completion etc. Reports are available at various levels of detail. Each report can be exported as .csv or .xlsx.

Report Definition

Report name: Extended WBT report

Description: Provides a tree structure drill-down from the course level down to the WBT assignable units (AU) detailing the participant progress at each level, or a flatter WBT only view disregarding course relationship.

Target Audience: Administration / HR, Instructional designers

Analysed Data: Course status, WBT progress, user data

Filter:

- Overall report: Name
- Participant report: User field filters are configurable

List Output:

- **Overall summary report**
 - Course name
 - Course start and end date
 - WBT name
 - Number passed
 - Number failed
 - Progress (%)
- **Content report**
 - Number and percentage in status (open, OK, failed)
 - Points/progress
 - Half correct
 - Half false
 - Required (yes/no)
- **Participant report**
 - Configured personal attributes
 - Learning time
 - Content (%)
 - Exercises (%)
 - Points (%)
 - Progress (%)
 - Status

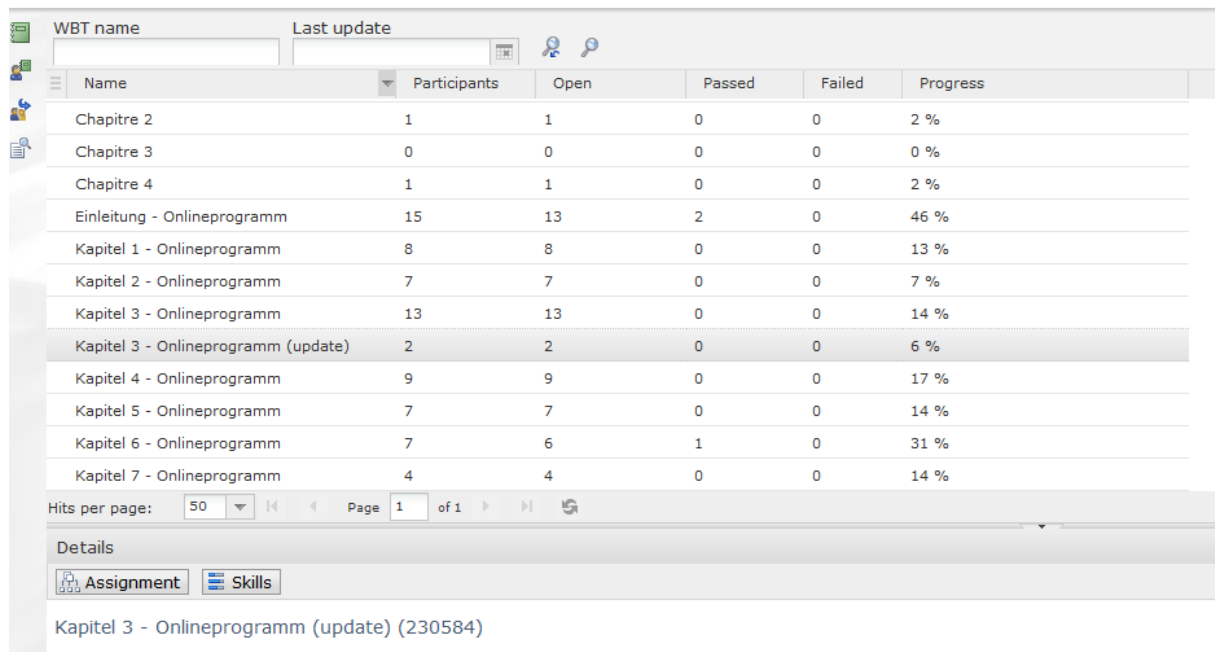
Graphical Output: Not applicable

Report Examples

Reports are available at various levels of detail exemplified in the following figures

The **Extended WBT overall summary report** lists for each WBT an overview regarding participation and progress with respect to all participants of that WBT.

Extended WBT report



WBT name	Last update	Name	Participants	Open	Passed	Failed	Progress
		Chapitre 2	1	1	0	0	2 %
		Chapitre 3	0	0	0	0	0 %
		Chapitre 4	1	1	0	0	2 %
		Einleitung - Onlineprogramm	15	13	2	0	46 %
		Kapitel 1 - Onlineprogramm	8	8	0	0	13 %
		Kapitel 2 - Onlineprogramm	7	7	0	0	7 %
		Kapitel 3 - Onlineprogramm	13	13	0	0	14 %
		Kapitel 3 - Onlineprogramm (update)	2	2	0	0	6 %
		Kapitel 4 - Onlineprogramm	9	9	0	0	17 %
		Kapitel 5 - Onlineprogramm	7	7	0	0	14 %
		Kapitel 6 - Onlineprogramm	7	6	1	0	31 %
		Kapitel 7 - Onlineprogramm	4	4	0	0	14 %

Hits per page: 50 Page 1 of 1

Details

Assignment Skills

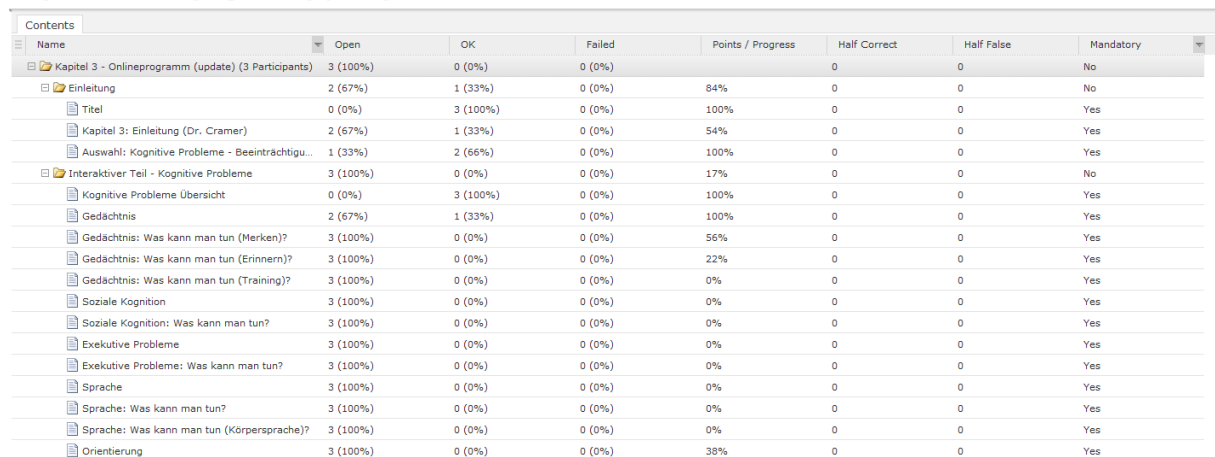
Kapitel 3 - Onlineprogramm (update) (230584)

Figure 41: (Original GRAPHIC): Extended WBT report (Summary)

Source file: extended-wbt-report-overview.png

You can then select a specific WBT and create an **extended WBT content report**. This report lists for each slide of a specific WBT the number of users and progress rates as proportions.

Kapitel 3 - Onlineprogramm (update)



Contents	Name	Open	OK	Failed	Points / Progress	Half Correct	Half False	Mandatory
	Kapitel 3 - Onlineprogramm (update) (3 Participants)	3 (100%)	0 (0%)	0 (0%)		0	0	No
	Einleitung	2 (67%)	1 (33%)	0 (0%)	84%	0	0	No
	Titel	0 (0%)	3 (100%)	0 (0%)	100%	0	0	Yes
	Kapitel 3: Einleitung (Dr. Cramer)	2 (67%)	1 (33%)	0 (0%)	54%	0	0	Yes
	Auswahl: Kognitive Probleme - Beeinträchtigt...	1 (33%)	2 (66%)	0 (0%)	100%	0	0	Yes
	Interaktiver Teil - Kognitive Probleme	3 (100%)	0 (0%)	0 (0%)	17%	0	0	No
	Kognitive Probleme Übersicht	0 (0%)	3 (100%)	0 (0%)	100%	0	0	Yes
	Gedächtnis	2 (67%)	1 (33%)	0 (0%)	100%	0	0	Yes
	Gedächtnis: Was kann man tun (Merken)?	3 (100%)	0 (0%)	0 (0%)	56%	0	0	Yes
	Gedächtnis: Was kann man tun (Erinnern)?	3 (100%)	0 (0%)	0 (0%)	22%	0	0	Yes
	Gedächtnis: Was kann man tun (Training)?	3 (100%)	0 (0%)	0 (0%)	0%	0	0	Yes
	Soziale Kognition	3 (100%)	0 (0%)	0 (0%)	0%	0	0	Yes
	Soziale Kognition: Was kann man tun?	3 (100%)	0 (0%)	0 (0%)	0%	0	0	Yes
	Exekutive Probleme	3 (100%)	0 (0%)	0 (0%)	0%	0	0	Yes
	Exekutive Probleme: Was kann man tun?	3 (100%)	0 (0%)	0 (0%)	0%	0	0	Yes
	Sprache	3 (100%)	0 (0%)	0 (0%)	0%	0	0	Yes
	Sprache: Was kann man tun?	3 (100%)	0 (0%)	0 (0%)	0%	0	0	Yes
	Sprache: Was kann man tun (Körpersprache)?	3 (100%)	0 (0%)	0 (0%)	0%	0	0	Yes
	Orientierung	3 (100%)	0 (0%)	0 (0%)	38%	0	0	Yes

Figure 42 (Original GRAPHIC): Extended WBT report: Content

Source file: extended-wbt-report-content.png

In the **Extended WBT report participant overview report** you see for each of the participants of the WBT the individual progress with respect to the WBT as a whole.

Kapitel 3 - Onlineprogramm (update)

Search term	Last name	First name	Number	Learning time	Content %	Exercises %	Points / Progress	Progress	Status
	Bienias	Jens	148054	00:02:56	5 %	0 %	6/100 (6 %)	6 %	⊙
	Schmidt	Mareike	110214	00:05:34	3 %	0 %	3/100 (3 %)	3 %	⊙
	Schwertel	Uta	220279	00:32:52	11 %	0 %	11/100 (11 %)	10 %	⊙

Figure 43 (Original GRAPHIC): Extended WBT report with overview per participant

Source file: extended-wbt-report-participant-overview.png

The **most granular view of the Extended WBT report** lists for a specific user for each slide of a specific WBT the real progress of that user with respect to that slide.

John Doe				« Zurück zur Programmübersicht	
Contents	Name	Status	Points / Progress	Kapitel 3	
	Kapitel 3 - Onlineprogramm (update)	Open		10% abgeschlossen	
	Einleitung	OK	100 %	100% abgeschlossen	
	Titel	OK	100 %	✓ Abgeschlossen	
	Kapitel 3: Einleitung (Dr. Cramer)	OK	100 %	✓ Abgeschlossen	
	Auswahl: Kognitive Probleme - Beeinträchtigung...	OK	100 %	✓ Abgeschlossen	
	Interaktiver Teil - Kognitive Probleme	Open	17 %	16% abgeschlossen	
	Kognitive Probleme Übersicht	OK	100 %	✓ Abgeschlossen	
	Gedächtnis	OK	100 %	✓ Abgeschlossen	
	Gedächtnis: Was kann man tun (Merken)?	Open	57 %	✓ Abgeschlossen	
	Gedächtnis: Was kann man tun (Erinnern)?	Open	22 %	■ Unvollständig	
	Gedächtnis: Was kann man tun (Training)?	Open	0 %	□ Nicht gestartet	
	Soziale Kognition	Open	0 %	□ Nicht gestartet	
	Soziale Kognition: Was kann man tun?	Open	0 %	□ Nicht gestartet	
	Exekutive Probleme	Open	0 %	□ Nicht gestartet	
	Exekutive Probleme: Was kann man tun?	Open	0 %	□ Nicht gestartet	
	Sprache	Open	0 %	□ Nicht gestartet	
	Sprache: Was kann man tun?	Open	0 %	□ Nicht gestartet	
	Sprache: Was kann man tun (Körpersprache)?	Open	0 %	□ Nicht gestartet	
	Orientierung	Open	38 %	■ Unvollständig	
	Orientierung: Was kann man tun? (Seite 1)	Open	0 %	□ Nicht gestartet	
	Orientierung: Was kann man tun? (Seite 2)	Open	0 %	□ Nicht gestartet	
	Sehen (Seite 1)	Open	0 %	□ Nicht gestartet	
	Sehen (Seite 2)	Open	0 %	□ Nicht gestartet	
	Sehen: Was kann man tun?	Open	0 %	□ Nicht gestartet	
	Körperliche Gesundheitsprobleme	Open	0 %	0% abgeschlossen	
	Beeinträchtigung von Alltagstätigkeiten	Open	2 %	0% abgeschlossen	
	Abschluss	Open	46 %	50% abgeschlossen	
	Kapitel 3: Abschluss (Dr. Cramer)	Open	73 %	✓ Abgeschlossen	
	Ausblick auf Kapitel 4	Open	20 %	■ Unvollständig	

Figure 44: (Original GRAPHIC): Extended WBT report each user (left) and report for the user within a SCORM WBT created by IMC Content Studio (right)

Source-files: extended-wbt-report-user-detail-combined.png based on

extended-wbt-report-user-detail.png AND extended-wbt-report-user-detail-wbt-view.png

[END OF PAGE]

(LO #7.3.5.6 ACTIVITY) Drag & Drop Exercise: Categorize reports

Preview

ACTIVITY-Exercise_Categorize-reports_WBT > ACTIVITY-Quiz_Categorize reports_WBT

Learning Analytics

Drag & Drop Exercise: Categorize reports

As we have seen there are different kinds of educational data available for reporting.

Depending on the data character (for example engagement, performance or interaction data) of such data reports can be grouped in different categories in the Learning Suite.

In this dashboard from the Learning Suite, however, some categories are missing.

Could you please take the category names listed below and put them in the right place on the Learning Analytics dashboard?

- ACHIEVEMENTS
- ACTIVITIES
- COMPLIANCE
- CONTENT
- REACTION

REPORT FAVOURITES

- Course learning history
- Programme learning history
- SCO Status in courses
- Test questions per user
- Experience points per user
- Extended WBT report
- Login data per user

MISCELLANEOUS

- Translation status
- Course assignments
- Catalogue assignments

Test results (supervisor)

- Course progress (supervisor)
- Course progress (Human Resources)
- Course progress (administrator)
- Test questions per user
- Course progress (learner)

Course enrolment history

- Course-template enrolment history
- Programme enrolment history
- Course learning history
- Programme learning history
- First logins
- First Logins by Companies
- Logins
- Login data per user
- User assignments
- Active Users
- Course KPIs (administrator)
- Access to platform components
- Number of active users
- User status
- Catalogue visits
- Extended WBT report
- On-the-job Training Status Overview (Administrator)

Audit Report

- Due date consideration (supervisor)
- Skills (supervisor)
- Overall compliance status (Administrator)

Feedback questions

- Feedback submissions
- Corrections

Source file (image): ACTIVITY-Exercise_Categorize-reports_WBT.jpg

Source file (WBT): ACTIVITY-Exercise_Categorize-reports_WBT.zip

[END OF PAGE]

7.3.6. Notes on historical data and processing times in the Learning Suite

(LO #7.3.6.1 HTML page) How to deal with historical data in the Learning Suite

Notes on historical data

While the Course Learning History stores some historical data of a user, it will not allow you to directly reconstruct the learner's exact dates and times when s/he worked with the objects. The reason is that the database only stores the latest updates of the status and does not keep old entries in the database. The same is true for reports related to SCORM WBTs. If a SCORM WBT is opened a second time or more the learning log data are extended with the new data. Certain values are overwritten in that case, e.g. we do not store precisely when did someone what for how long on an absolute basis, but only store e.g. the latest access time, or the latest time a status has changed, or we sum up the total duration and the number of times a user was working with the SCORM. That means, historical data (when did someone what for how long) are not stored and therefore not directly available in the reports. This tracking would require to systematically use a Learning Record Store (see e.g. <https://xapi.com/learning-record-store/>) for all learner data, an approach which is currently only partially available in the Learning Suite. As an option to simulate historical data for the moment, you can generate and export some of the reports on a regular (e.g. daily) basis at a fixed time, so some historical data stay available and are like sufficient for your advanced analytics requirements.

Notes on processing times

For SCORM WBTs, time spent on working with a WBT is summed up on different visits. That means if a learner works with the WBT on Monday for 10 minutes and on Tuesday for 15 minutes, the report will show a total processing time of 15 minutes. However, this parameter is only available for WBTs, not for other learning objects such as PDFs or videos, nor for time spent on the portal as a whole.

[END OF PAGE]

7.3.7. Case study: RHAPSODY – Analytics in action

(LO #7.3.7.1 HTML page) RHAPSODY Overview

The following case study shows you an example of how reports can be used to analyse the learner behaviour in a course that mainly consists of the WBTs.

In the project RHAPSODY (Research to Assess Policies and Strategies for Dementia in the Young) researchers from six European countries (France, Germany, the Netherlands, Portugal, Sweden, United Kingdom) collaborated to improve care for people with young onset dementia (YOD, i.e. symptoms occurring before the age of 65 years) by providing an internet-based information and skill-building programme for their informal carers. This programme was realized and delivered as an online course in the IMC Learning Suite. The course includes 7 modules focusing on medical information, managing problem behaviours, dealing with role change, obtaining support, and looking after oneself. The online programme is available in three languages (English, French, German)). It was evaluated in a multi-national pilot study using a mixed randomized design with a wait-list control group. Participants were 61 carers of people with dementia in Alzheimer's disease or behavioural-variant Frontotemporal degeneration. The overall rating of the programme by the participants was favourable in terms of length, detail of information, usefulness and language style.

Learning analytics of the programme revealed e.g. that on average, participants accessed the programme approximately once a week and consulted 31 % of the large entire content. Further results from evaluating additional questionnaires outside the online course suggest that use of the programme may be associated with improvements in caregivers' perceived stress and emotional reactions to memory problems after 6 weeks. However, a definitive larger trial is needed to validate these findings.

	© Rhapsody. RHAPSODY is an EU Joint Programme - Neurodegenerative Disease Research (JPND) project. The project has been supported through the following funding organisations under the aegis of JPND - www.jpnd.eu				
					

[END OF PAGE]

(LO #7.3.7.2 HTML) RHAPSODY Analytics at a glance

In the “References and Further Readings” section at the end of this module we offer you the document “RHAPSODY Analytics at a glance” for download. In this document you find examples of possible analyses that can be done using the dynamic reporting data of the IMC Learning Suite and further post-processing with basic knowledge of a table calculation program. The further processing has been done outside the IMC Learning Suite. The following Figure shows an example which compares the average processing time of SCORM WBTs in different languages embedded in two courses (one for German and one for French users). The data for this comparison are extracted from the “SCO status in courses” reports of the IMC Learning Suite.

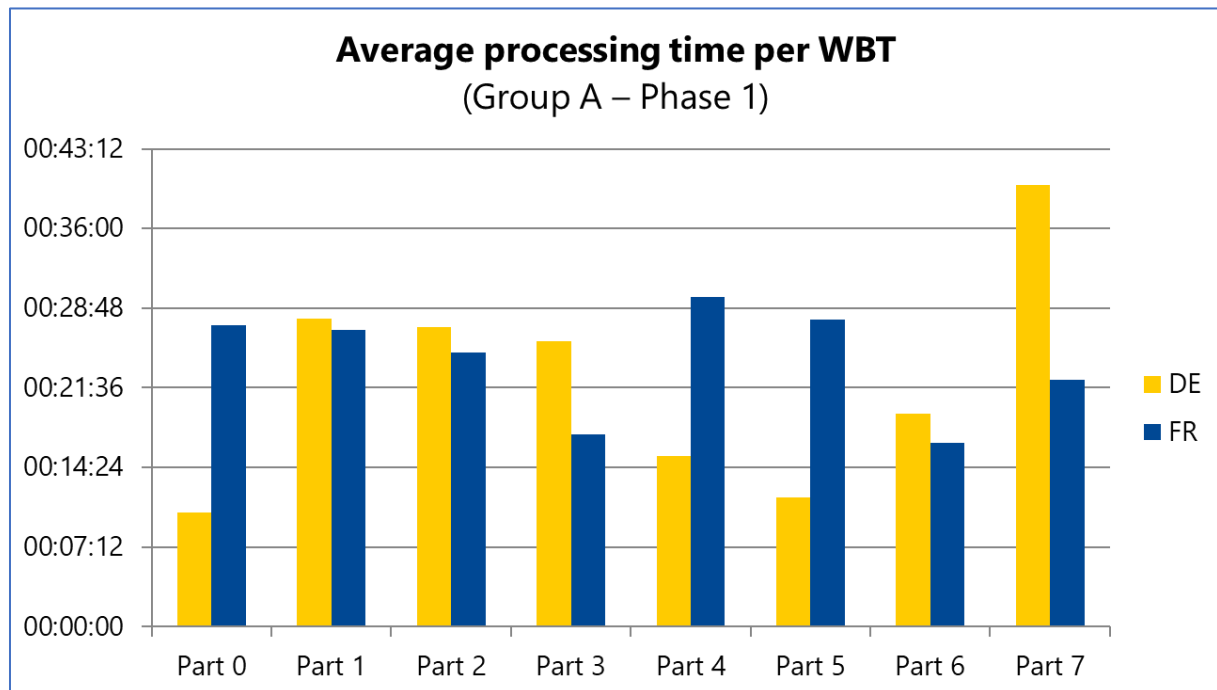


Figure 45 (Original GRAPHIC): SCO status in courses
Source file: rhapsody-case-study-example.png

Given this comparison, you could now e.g. reflect on why German users spent significantly more time on Part 7 than French users.

For the full evaluation of the RHAPSODY pilot study further analyses of the raw data delivered by the Learning Suite report (.csv files) were done by statisticians and complemented the analytics tools of the IMC Learning Suite. This advanced analysis of data scientists is not presented here.

[END OF PAGE]

7.3.8. Data protection and GDPR

[\(LO #7.3.8.1 HTML page\) Data protection and GDPR - Overview](#)

As data protection is one of the important issues within the educational data analytics it is worth to discuss this topic in this section. The Learning Suite provides also tools to help educational institutions to comply with strict data protection regulations, especially with the General Data Protection Regulation (GDPR) of the EU.

According to the GDPR individuals have following rights:

- The right to be informed (about types and purposes of data collected about them)
- The right of access (their personal data)
- The right to rectification (of data, if it seems not to be correct)
- The right to erasure (of data collected about them)
- The right to restrict processing (of data regarding some processing purposes)
- The right to data portability (so that they have an opportunity to move their data from one service to another service easily)
- The right to object (to the processing of their personal data)
- Rights in relation to automated decision making and profiling.

The Learning Suite complies with the GDPR. Hence it provides tools and functions which help the learners make use of all their above-mentioned rights regarding data protection. For instance, below Figure shows a personal data request page which gives an overview of data types collected or potentially collectable about the learner.

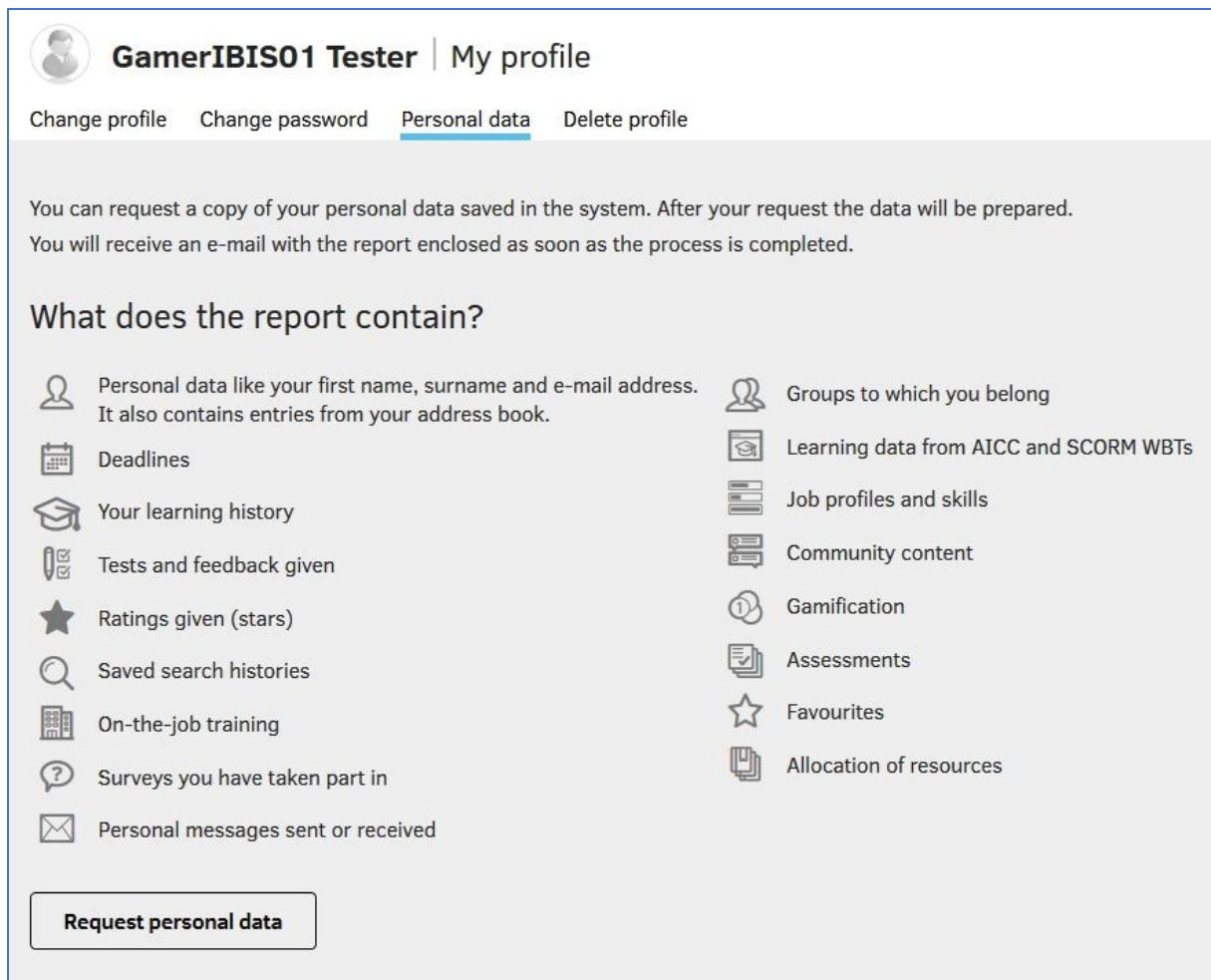


Figure 46 (Original GRAPHIC): Personal data request page

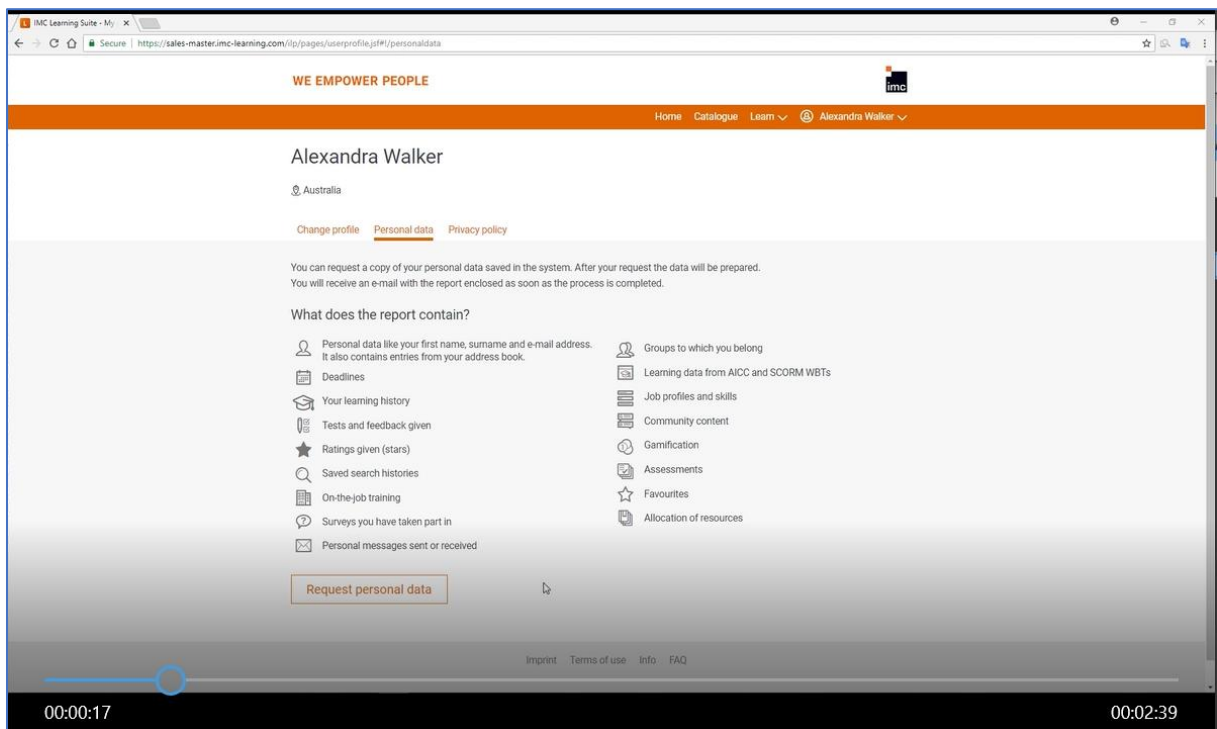
Source file: Module7-LMS-learner-personal-data.jpg

Learners are also able to delete their profile if their want. For this they have to push the “**Delete profile**” Button on their profile Page (see Figure above).

IMC Learning Suite meets also international security concepts like [OWASP](#) standards (open web application security project) to ensure maximum privacy protection. Thus, a complex authorization system prevents personal data from leaking.

[END OF PAGE]

(LO #7.3.8.2 VIDEO) Data Protection in the Learning Suite



Video 7: (Original VIDEO) Data Protection in the Learning Suite

Source file: Module7-LMS_Data-protection-video.jpg

Source file video: Data Protection.mp4

This video explains the main functions of the Learning Suite in regard to the data protection, especially new features developed in compliance with the GDPR.

[END OF PAGE]

7.3.9. Advanced reporting options of the Learning Suite

(LO #7.3.9.1 HTML page) Beyond standard reports

While the standard reports available in IMC Learning Suite provide a wide range of options and saving of different views, the generation of a new report from scratch is also supported by the Learning Suite Report Designer. The Report Designer allows you to generate customized lists and tables. These data can then be exported in CSV or HTML file formats. This option, however, requires advanced technical skills mostly in SQL data management and excellent knowledge of the underlying data structures of the report. This is not part of this basic course.

[END OF PAGE]

(LO #7.5 ACTIVITY) Discussion: Express your impressions and attitude towards IMC Learning Suite

In the beginning of this Module you were asked a question about your expectations regarding the IMC Learning Suite. Based on the information you gained from this Module we would now like to invite you to let us know if your expectations were met. You may reply to the topics in the discussion board below.

1. Did the features of IMC Learning Suite regarding educational data analytics meet your expectations?

Please explain your answer Which features of the IMC Learning Suite met your expectations, where do you see room for improvement?

2. Ask yourself also if you would like to work with the IMC Learning Suite?

Please explain your answer.

[END OF PAGE]

7.4. References and Further Readings

[\(LO #7.4.1 File to download\) Report definitions of IMC Learning Suite](#)

(Existing File): IMC-Learning-Suite-Report-Definitions-Appendix.pdf

In the above document “Report definitions of IMC Learning Suite” you find a list of predefined standard reports in the IMC Learning Suite together with their high-level report definition. If you are interested in specific details of a report you can download this file as a reference.

[END OF PAGE]

[\(LO #7.4.2 HTML page and File to download\) Case-study: RHAPSODY Analytics at a glance](#)

(Original File): Rhapsody-Case-Study-for-L2A.pdf

The above presentation gives you an example of possible analyses that can be done using the dynamic reporting data of the IMC Learning Suite and further post-processing with basic knowledge of a table calculation program. The further processing has been done outside the IMC Learning Suite. The example is taken from the RHAPSODY case-study discussed earlier in this module.

For the full evaluation of the RHAPSODY pilot study further analyses of the raw data (.csv files) delivered by the IMC Learning Suite reports were done by statisticians and complemented the analytics tools of the IMC Learning Suite. This advanced analysis done by data scientists is not presented in this module.

[END OF PAGE]

(LO #7.4. 3 HTML page and File to download) References and Further Readings

(Original File): L2A-further-readings-IMC.pdf

References

IBIS Erasmus+ Project (2019). *Implementation of a Business & Innovation Module in Science Programmes*. Retrieved August 12th, 2019 from <http://ibisproject.eu>.

IBIS MOOC Platform (2019). *Principles of Economics for Scientists. A Business & Innovation Module In Science Programmes*. Retrieved August 12th, 2019 from <https://ibismooc.eu>.

IMC Worldwide (2017, October 16). *IMC Learning Suite - Tutorial*. Retrieved August 12th, 2019 from <https://youtu.be/Dkkl3ajGMA0>.

IMS Global Learning Consortium (2019). *Learning Tools Interoperability Core Specification 1.3*. Retrieved August 12th, 2019 from <https://www.imsglobal.org/spec/lti/v1p3/#terminology-0>.

Patterson, David (2017, October 02). *IMC LMS Review: Complete Learning Suite for Online & On The Job Training*. Retrieved August 12th, 2019, from <http://www.learninglight.com/imc-lms-review/>.

SCORM.com Homepage (2019). *What is SCORM and How it Works*. Retrieved August 12th, 2019 from <https://scorm.com/>.

Further Readings

IMC AG (2019a). Company Website. Retrieved August 12th, 2019 from <https://www.im-c.com/>.

IMC AG (2019b). *The Learning Management System (LMS) for all training activities*. Retrieved August 12th, 2019 from <https://www.im-c.com/learning-technologies/learning-management/>.

IMC AG (2019c). *Learning Suite Report Definitions* [Technical documentation]. Available for download in Module 7 of the Learn2Analyze MOOC.

Schwertel, Uta (2017). *Case Study: Analysing data of RHAPSODY program* [Presentation]. Available for download in Module 7 of the Learn2Analyze MOOC.

[END OF PAGE]

7.5. Module 7: Multiple-Choice Quiz

This quiz contributes to the final assessment for receiving the Learn2Analyse MOOC **Certificate of Achievement**. Your grade in the course is calculated based on your replies to **100 multiple choice quizzes** distributed to the 6 core modules. In order to successfully complete this course and gain your Certificate of Achievement you must gain a mark of **60% or greater** overall to all 100 quizzes.

The quiz of Module 7 consists of **10 questions**, including:

- multiple choice with one correct answer;
- multiple choice with more than one correct answer; and
- true/false questions.

It is "open book" and there is no set time limit.

You will have **two attempts** to answer all quiz questions except for the "true/false" questions. When you click "Check", it will register as your first attempt. If your answer is incorrect, try again and then click "Final Check".

It should take less than **30** minutes of your time to complete this quiz.

Question 7.1 Which of the following statements are correct? (Multiple answers are allowed.)

1. Reports in the IMC Learning Suite can be viewed directly in the system or exported as .csv/.xlsx files.
2. Every report requester of the IMC Learning Suite sees the same report panels in the graphical report dashboard.
3. The IMC Learning Suite offers list-view based reports and graphical report panels.
4. Every user requesting a report with the same search and filter parameters receives a report which contains the same output data.
5. The IMC Learning Suite offers only pre-defined standard reports.

Question 7.2 Which of the following statements about list-based reports in the IMC Learning Suite are correct? (Multiple answers are allowed.)

1. For a specific report, the list-based view of the reported data (output table) always shows all available data columns, independent of the configuration choices of the report requester.
2. To restrict the search to a specific user group you can enter the name of the group in the primary search area.

3. To restrict the search to a specific user you can enter the last name of the user in the primary search area.
4. You can change the scaling of the graphical representation of the reported data.

Question 7.3. Which statements about the functionalities of the gamification module in the IMC Learning Suite are correct? (Multiple answers are allowed.)

1. In its gamification module, the IMC Learning Suite offers always the same Experience Tracks.
2. It is possible to flexibly define how many experience points (XPs) students are awarded for a specific action.
3. Badges represent gained accomplishment of students and cannot be taken away.
4. In the experience track detail view a student can see his or her ranking with respect to other students in that track.

Question 7.4 Assume you are a participant of an online course in the IMC Learning Suite and see a locked key icon next to a learning object within the course. What does that mean?

1. The administrator of the system forgot to assign to you the access rights to view the learning object.
2. You can access the locked learning object if you have successfully completed one or more preceding learning objects in the course.
3. You have to spend money to unlock the learning object.
4. You have to ask your tutor to give you access rights to the learning object.

Question 7.5 What is the correct description of the report “Course Learning History”?

1. Detailed information on all course bookings (course enrolment status), in which the employees / students of the report requester are / were involved as learners are analysed.
2. The complete learning history of users on their assigned programmes is provided.
3. Lists the complete booking history of users on courses.
4. The learning history of users to their assigned courses and the associated course components are analysed.
5. Shows information on the booking capacities of courses. For example, requesters can see at a glance which courses still have capacity and which courses have waiting lists.

Question 7.6 Which statements are correct for the report “Course Learning History”? (Multiple answers are allowed.)

1. For a specific course participant, every course component is listed only once in the report.

2. The Course Learning History report shows which result a course participant has achieved in a test which is a component of the course.
3. The Course Learning History report shows for each test question of a test the result a course participant has achieved.
4. If the processing status of a course component changes for a specific course participant, the date and time of this status change is listed in the course learning history.
5. If a SCORM WBT is a course component, the report requester can see in the Course Learning History the processing time of a user for that WBT.
6. In the Course Learning History report a report requester can see all dates and times when a course participant opened a specific course component.

Question 7.7 A learner's processing time of a learning object can be extracted by standard reports for learning objects of the following type(s):

1. Videos
2. Tests
3. PDF documents
4. SCORM WBTs
5. HTML pages

Question 7.8 The advantage of SCORM WBTs as learning object types are that SCORM WBTs (multiple answers are allowed):

1. can be re-used in different SCORM compliant LMSs
2. enable transfer of a student's content interaction data to the LMS which can then be used for evaluating the learner behaviour.
3. allow an analysis of a student's learning time with that learning object.
4. allow the instructional designer not to define assessment criteria, because the assessment rules come for free when using the SCORM standard.

Question 7.9 To view the overall number of logins of a user the Learning Suite offers the following report:

1. Logins
2. Login data per user
3. First logins
4. First logins per company

Question 7.10 According to the EU GDPR individuals have the following rights (multiple answers are allowed):

1. The right to be informed (about types and purposes of data collected about them)
2. The right to object (to the processing of their personal data)
3. The right to erasure (of data collected about them)
4. The right to participate in a course without consenting to the platform's data privacy settings.
5. The right to rectification (of data, if it seems not to be correct)

[END OF PAGE]

Learn2Analyze

Knowledge Alliances (Key Action 2)

AGREEMENT NUMBER: 2017 - 2733 / 001 – 001

PROJECT NUMBER: 588067-EPP-1-2017-1-EL-EPPKA2-KA

WP3. Learn2Analyse MOOC Design and Development

Result 6a Learn2Analyze MOOC version 1 Learning Materials

Module 8: Concluding the MOOC

Module 8

Concluding the MOOC

Congratulations

Congratulations on making it to the end of the course!

We've come a long way since we started. In the previous Modules we offered you an introduction to:

- the core issues of *Educational Data* as well as, *Learning and Teaching Analytics*;
- the use of educational data analytics in three different e-learning platforms, namely, the *Moodle*, the *eXact Suite* and the *IMC Learning Suite*.

By completing this Course, we hope that you have developed the basic competences for Educational Data Analytics of Online and Blended teaching and learning.

In this final Module, we will give you time to finalise the requirements for receiving a **Certificate of Achievement**. Please remember that successful completion of the course requires:

- completing the **Multiple Choice Questions Assessment** with **60% success**
- completing the **Pre-course** and the **Post-course Survey**

You may also take time to reflect on your learning experience in the forum of the course and share with others an educational data analytics tool that you have found useful for your work.

[END OF PAGE]

Evaluating data analytics technologies

In Modules 5-7, we examined *educational data analytics technologies* that can help you to analyze Educational Data and improve your *Blended and Online Teaching*.

In this final Module, we would like you to select one or more of the educational data analytics tools identified in this course that appeal to you (or other tools that you currently use) and **evaluate** them. The following criteria are likely to be useful in evaluating the tool you select.

- Name of the technology
- Function of the technology and specific data analysis purpose
- Compatibility with other teaching and learning technologies
- Ease of use and technical ability required
- Availability and organisational support
- Value of the data to your specific needs

ACTIVITY: DISCUSSION FORUM

We encourage you to share your tool evaluation and thoughts with fellow learners on the discussion board. Please note that there is no grade associated with this activity, but it will help you to round off what you have learned in this course, and apply it in a practical way.

[END OF PAGE]

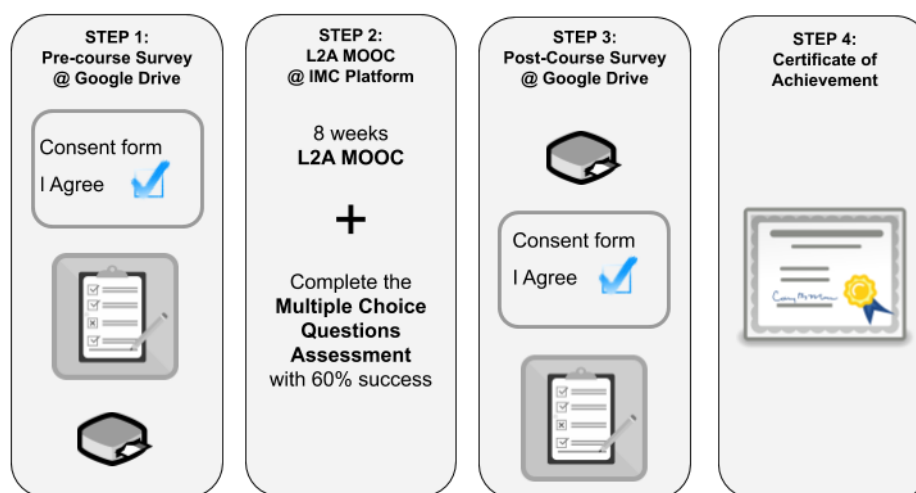
Post-Course Survey

The Post-Course Survey is expected to take approximately 20 minutes to complete and it is a requirement for the Certificate of Achievement.

In the Post-Course Survey you will be asked questions about your level of satisfaction and learning experience per module, as well as the overall learning experience of the Learn2Analyze (L2A) MOOC. Finally you will report on your achieved competence level per “Educational Data Literacy (EDL) Competence Profile (CP) Statement” for each competence dimension of the Learn2Analyze EDL Competence framework, after attending the Learn2Analyze (L2A) MOOC.

To start the Post-Course Survey you will need a “ticket”. The ticket is the **verification code** you have received in your email after the submission of the Pre-Course Survey. Thus, the participation in Learn2Analyze MOOC Post-course survey Questionnaire requires that you first complete the Learn2Analyze MOOC Pre-course survey and receive the “verification code”.

After submitting the Post-Course Survey you will receive your personalised Certificate of Achievement by email, as presented in the following figure. **For detailed guidelines/steps, please also refer to Module 1.**



We greatly appreciate your willingness to share your time by participating. Your responses to this survey will help us to improve the quality of the learning experience and to better our course offerings, acknowledging your insights will prove invaluable.

You can enter the Post-Course Survey by clicking on the hyperlink below:

shorturl.at/alzW9

(https://docs.google.com/forms/d/e/1FAIpQLScIiPIRT89z7TZc67vuVXN0uJJCkje9FZZh_16xGmXeFqtGuw/viewform?usp=sf_link)

The link will be available till 31/12/2019.

Once again, on behalf of the Learn2Analyze Consortium, we express our sincere thanks for your interest in and engagement with our course. We do hope that you have enjoyed working through this course and encourage you to continue exploring developments in teaching and learning analytics.

[END OF PAGE]

Appendix A: Learn2Analyse MOOC v1 Learning Materials Statistics

		Modules								Relevance to WP3 Performance Indicators	
		1	2	3	4	5	6	7	8		TOTAL
		UPRC, IMC	UPRC	NTNU	UMA	eN	LL	IMC	UPRC		
HTML (Text & Graphics) pages		9,00	67,00	30,00	41,00	64,00	40,00	42,00	3,00		296,00
GRAPHICS: original	(Graphics Originally Developed for the L2A Module to support HTML Text pages)	3,00	26,00	18,00	0,00	67,00	35,00	41,00		PI3.2.2 Number of Original Graphics	190,00
GRAPHICS: existing	(Graphics Existing Open Access used for the L2A Module to support HTML Text pages)		22,00	25,00	17,00	30,00	31,00	2,00			127,00
VIDEO pages			30,00	9,00	8,00	18,00	14,00	7,00			86,00
VIDEOS: original	(Videos Originally Developed for the L2A Module to support HTML Text pages)	1,00	-	-	-	4,00	12,00	4,00		PI3.2.3 Number of Original Videos	21,00
VIDEOS: existing	(Videos Existing Open Access used for the L2A Module to support HTML Text pages)		30,00	10,00	8,00	15,00	2,00	3,00			68,00
ACTIVITY pages			31,00	15,00	17,00	15,00	10,00	12,00		PI3.3 Number of MOOC learning activities developed	100,00
ACTIVITIES: Poll & Discussion		1,00	13,00	7,00	6,00	0,00	3,00	6,00	1,00		37,00
ACTIVITIES: Poll			13,00	8,00	8,00	9,00					38,00
ACTIVITIES: Other			5,00	-	3,00	6,00	7,00	6,00			27,00

MULTIPLE CHOICE QUESTIONS			25,00	15,00	15,00	25,00	10,00	10,00		PI3.4 Number of MOOC assessment activities developed	100,00
Total Number of Learning Objects	<i>HTML Text Pages (including Graphics and Videos) + ACTIVITY Pages + MCQ (1 per Module)</i>	9,00	129,00	55,00	67,00	98,00	65,00	62,00	3,00	PI3.2 Number of MOOC learning materials developed in different types (e.g. educational videos, presentation slides, further readings, case studies etc)	488,00
Total Words	<i>(For the entire Module)</i>	2.748	25.410	16.290	15.189	24.295	19.642	17.671	639	PI3.2.1 Original Text developed (in Word Count)	121.844,00
Topics			4,00	4,00	3,00	8,00	7,00	4,00			30,00
Subtopics			21,00	11,00	8,00	10,00	20,00	19,00			89,00
EDL-CP Statements			10,00	8,00	7,00	8,00	6,00	7,00		PI3.1 Completeness of accommodation for proposed professional competence profiles from the educational objectives of the MOOC modules	100% (17/17)

	M1	M2	M3	M4	M5	M6	M7	M8		
Estimated Effort to Complete (in Hours)	4,00	12,00	8,00	8,00	12,00	10,00	8,00	6,00		68,00
	5,88%	17,65%	11,76%	11,76%	17,65%	14,71%	11,76%	8,82%	<i>Average Number of Hours per Week of Study:</i>	8,50
Text Volume (in words)	2.748	25.410	16.290	15.189	24.255	19.642	17.67	639		121.844
	2,26%	20,85%	13,37%	12,47%	19,91%	16,12%	14,50%	0,52%	<i>Average Number of Words per Page:</i>	154,62
Total Pages (in .doc)	16	192	91	81	170	123	111	4		788
	2,03%	24,37%	11,55%	10,28%	21,57%	15,61%	14,09%	0,51%	<i>Average Number of Pages per Week of Study:</i>	98,50
Assessment Quizzes		25,00	15,00	15,00	25,00	10,00	10,00			100,00
		25,00%	15,00%	15,00%	25,00%	10,00%	10,00%			

Appendix B: Learning Objectives vs Learn2Analyse Educational Data Literacy Competence Profile (L2A-EDL-CP) Statements

L2A EDL Competence Dimension (6)	L2A EDL Competence Statements (17)	M1	M2	M3	M4	M5	M6	M7	M8	
1. Data Collection	1.1 Know - understand - be able to obtain, access and gather the appropriate data and/or data sources		3	1	1	1	1	1		8
	1.2 Know - understand - be able to apply data limitations and quality measures (e.g., validity, reliability, biases in the data, difficulty in collection, accuracy, completeness)		1	1	1					3
2. Data Management	2.1 Know - understand - be able to apply data processing and handling methods (i.e., methods for cleaning and changing data to make it more organized – e.g., duplication, data structuring)		1					1		2
	2.2 Know - understand - be able to apply data description (i.e., metadata)		1							1
	2.3 Know - understand - be able to apply data curation processes (i.e., to ensure that data is reliably retrievable for future reuse, and to determine what data is worth saving and for how long)		1							1
	2.4 Know - understand - be able to apply the technologies to preserve data (i.e., store, persist, maintain, backup data), e.g., storage mediums/services, tools, mechanisms		1							1
3. Data Analysis	3.1 Know - understand - be able to apply data analysis and modeling methods (e.g. application of descriptive statistics, exploratory data analysis, data mining).			1		1	1			3
	3.2 Know - understand - be able to apply data presentation methods (e.g., pictorial visualization of the data by using graphs, charts, maps and other data forms like textual or tabular representations)			1		1		1		3

4. Data Comprehension & Interpretation	4.1 Know - understand - be able to interpret data properties (e.g., measurement error, outliers, discrepancies within data, key take-away points, data dependencies)			1						1
	4.2 Know - understand - be able to interpret statistics commonly used with educational data (e.g., randomness, central tendencies, mean, standard deviation, significance)			1						1
	4.3 Know - understand - be able to interpret insights from data analysis (e.g., explanations of patterns, identification of hypotheses, connection of multiple observations, underlying trends)			1		1	1	1		4
	4.4 Be able to elicit potential implications/links of the data analysis insights to instruction				1	1	1	1		4
5. Data Application	5.1 Know - understand - be able to use data analysis results to make decisions to revise instruction		1		1	1	1	1		5
	5.2 Be able to evaluate the data-driven revision of instruction		1		1		1			3
6. Data Ethics	6.1 Know - understand - be able to use the informed consent		1			1				2
	6.2 Know - understand - be able to protect individuals' data privacy, confidentiality, integrity and security		1	1	1	1		1		5
	6.3 Know - understand - be able to apply authorship, ownership, data access (governance), re-negotiation and data-sharing				1					1
Total L2A-EDL-CP Statements covered (non-unique)			12	8	7	8	6	7		48
Total L2A-EDL-CP Statements covered (unique)			10	8	7	8	6	7		17

Appendix C: Internal Peer Review Reports

Based on the agreed quality assurance process as defined in WP3 Implementation Handbook, Version 2 (9.2.2019), an internal peer review of each module for the L2A MOOC v1 (Result 6a) was conducted between 3-13.5.2019.

The internal peer review included

- completing the internal peer review report template with criteria developed to follow the principles of Appendix VI.d: MOOC Quality Assurance Checklist for QUALITY ASSURANCE-1 Phase (Modules), WP3 Implementation Handbook, Version 2, 9.2.2019)
- detailed feedback on the word files of each module.

The assignments for each module were as follows:

	Developed by	Reviewed by (#comments)	
Module 2	UPRC	NTNU (94)	eN (144)
Module 3	NTNU	UPRC (31)	eN (130)
Module 4	UMA	UPRC (34)	NTNU (21)
Module 5	eN	UPRC (61)	LL (73)
Module 6	LL	UMA (66)	IMC (3)
Module 7	IMC	NTNU (132)	LL (29)

Appendix Resources							
Personnel Days	P1	P2	P3	P4	P5	P6	P7
Total	7.50	2.50	7.50	0.50	5.00	5.00	2.00
(#Days, # Module Reviews)	(3)	(1)	(3)	(1)	(2)	(2)	(Guide)
	30.00						

Internal Peer Review Criteria

(Appendix VI.d: MOOC Quality Assurance Checklist for QUALITY ASSURANCE-1 Phase (Modules), WP3 Implementation Handbook, Version 2, 9.2.2019)

Educational Design Review: an educational designer expert to review the educational design of each module in relation to design considerations captured in Appendix IV.a & IV.b of the WP3 Implementation Handbook	This part is secured by adopting a commonly agreed educational design template, however, the internal reviewer may comment on this part too, in case of notable inconsistencies with the initial design, as well as, offer recommendation for improvements.
Content Review: a subject domain expert to review the content (learning objects, learning activities and assessment activities) of each module including the accuracy of information presented, coverage of learning	This is the main scope of the internal peer review. I would suggest as peer

objectives, and the constructive alignment of the assessment activities and the learning objectives of the module.

reviewer to use track changes and comments at the word version of the module that you review to provide your feedback.

Use of English Language Review: a native speaker editor will conduct full proof reading and editing of each module.

Each partner is responsible to ensure this QA requirement.

IPR and Copyright clearance

- for all pre-existing images, photos, graphics, videos
- similarity check report of text

Each partner is responsible to ensure this QA requirement.

Indicative Content Review Criteria

Indicative Content Review Criteria	
Is the definition of the learning objective consistent to the L2A EDL-CP Dimensions & Statements?	
Do the topics, subtopics and their content cover well the targeted learning objectives <i>[relevant to PI3.1 Completeness of accommodation for proposed professional competence profiles from the educational objectives of the MOOC modules]</i>	
Is the content of the subtopics accurate and well presented	
Does the module include adequate number of learning materials (original and existing) <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video to cover the topics and subtopics <i>[relevant to PI3.2 Number of MOOC learning materials developed in different types (e.g. educational videos, presentation slides, further readings, case studies etc)]</i>	
Does the module include a good balance between originally developed and pre-existing <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video to support the topics and subtopics	
Does the module include adequate number of learning activities to stimulate the engagement of the participants and support their practice (when relevant)? <i>[relevant to PI3.3 Number of MOOC learning activities developed]</i>	
Does the module include adequate number of assessment activities to assess the expected learning outcomes? <i>[relevant to PI3.4 Number of MOOC assessment activities developed]</i>	
Are the assessment activities well aligned to the learning objectives of the module ?	

Module 2 Internal Peer Review Reports

Internal Peer Review	Module 2 (UPRC)
Internal Peer Reviewers	Deborah Couëdelo (eN)
Date	10.5.2019

Is the definition of the learning objective consistent with the L2A EDL-CP Dimensions & Statements?

Yes – having reviewed the learning objective, I believe they are consistent. See my comments in the next section re possible addition of a further learning objective.

Do the topics, subtopic and their content cover well the targeted learning objectives?

All learning objectives listed for this Module 2 Educational Data are well covered by sections 2.2, and 2.3.

I felt that the content presented in section 2.1 was not represented in the list of learning objectives. This might be discouraging to a learner, having gone through quite a lengthy section, not to have met at least one learning objective.

Having gone through this section myself, my main takeaway points were:

- The growing availability of educational data its importance in driving decision making
- How educational data can be used by Instructional Designers, eTutors and Teachers to provide personalised and adaptive learning to improve learner outcomes.
- The importance of data literacy and how the Learn2Analyze Educational Data Literacy Competence Framework aims to improve this.

As these 3 points align very closely with the Data Application dimension from the L2A EDL-CP Dimensions & Statements, my suggestion is that an additional learning objective be included in section 2.0.3 of this module to reflect the emphasis of the learning materials presented in section 2.1

Is the content of the subtopics accurate and well presented?

In general, I found the content of the subtopics very well presented and comprehensive. There was a good mix of text, video, and infographics to keep the reader focussed and it was clear where the trajectory of each subtopic was leading. Even quite technical topics (i.e. metadata and data curation) were presented in an engaging manner. Some general comments and suggestions for improvement are listed below:

Reference/Further Readings/Infographics/Video: section in each subtopic.

Under Reference, only include those items that were actually referred to in the text of the subtopic. Other items should be included under Further Readings.

For consistency, either include all Infographics listed in the subtopic text in the Infographics section, or only include additional Infographics.

For consistency, either include all Videos linked from the subtopic text in the Videos section, or only include additional Videos.

2.1.4 How Educational Data can help School Teachers of Blended (Flipped Classroom) Courses

The title of this section refers specifically to Flipped Classroom courses. However, apart from section 2.1.4.2 (which explains what the Flipped Classroom model is) and the pre and post module polls and discussions, all other sections seem to refer to educational data helping schools generally, with no references to the flipped classroom model. For example, the videos seem to illustrate more

traditional classroom settings rather than any type of online learning
Perhaps some more references to the Flipped Classroom model could be incorporated into sections 2.1.4.3 to 2.1.4.6. For example, the video “Why Personalized Learning: 4 stories from 4 school Districts” (which extols the advantages of the Blended Teaching) is listed in the References section 2.1.4.8, but not referenced in the text of the subtopic.

Does the module include adequate number of learning materials (original and existing)

- text (html pages)
- graphics and/or
- video

to support the topics and subtopics

Sections have a good mix of text, infographics and videos

Does the module include a good balance between originally developed and pre-existing

- text (html pages)
- graphics and/or
- video

to support the topics and subtopics

Text

Most of the text for this module is original text. Some direct quotes from other sources are included where relevant. I found the mix of original text and quotation/reference to be effective. (See detailed feedback section below - some instances where quote marks are used, but enclosed text is not a direct quote).

Graphics

According to the module summary, 25 graphics from other sources are included in the Module, as compared to 45 original graphics created specifically for this module. This almost 2:1 ratio of newly created vs. existing graphics means that the information presented is very relevant to the topics and subtopics.

Video

No original video recordings are included in this module. However, the pre-existing videos referenced in the topics and subtopics are very relevant and of good quality so I do not believe this is any lack.

Does the module include an adequate number of learning activities to stimulate the engagement of the participants and support their practice (where relevant)?

Yes - Polls and Discussion forums are included for all topics.

This type of activity will encourage the learner to reflect on their current practice and understand how they might proceed in the future. The provision of forums for each topic should encourage learners to interact with and learn from their peers.

Topic 2.3 also includes some non - assessed short questions. These should be effective in ensuring that learners have absorbed and remembered the more technical terms and concepts that are presented in this final topic of the module.

Does the module include an adequate number of assessment activities to assess the expected learning outcomes?

A Multiple Choice Quiz is included at the end of the Module. There are 33 questions – split into 3 sections one for each of topics 2.1, 2.2 and 2.3. The range and type of the questions is such that I

believe they are a good assessment of the degree to which the learner has understood the content of the module and therefore, to what degree they have achieved the expected learning outcomes.

One suggestion I would make is to split up the quiz into the 3 topics and present a separate quiz at the end of each topic. The overall module will take some time for a learner to complete and I believe that it would be more re-assuring and motivating to the learner to have passed an assessment of their knowledge on each topic before proceeding to the next.

If a final assessment is required at the end of the complete module, I would suggest also having a final quiz with a number of new questions drawn from the complete module as well as a number of questions randomly suggested from the 33 question-bank above.

Are assessment activities well aligned to the learning objectives of the module.

Yes.

Additional detailed comments were offered on the text (**total 97**)

Internal Peer Review	Module 2 (UPRC)
Internal Peer Reviewers	Chara Papamitsiou (NTNU)
Date	11.5.2019

Internal Review Form	
Is the definition of the learning objective consistent to the L2A EDL-CP Dimensions & Statements?	The definition of the learning objective is consistent to the L2A EDL-CP Dimensions & Statements.
Do the topics, subtopics and their content cover well the targeted learning objectives <i>[relevant to PI3.1 Completeness of accommodation for proposed professional competence profiles from the educational objectives of the MOOC modules]</i>	The module consists of 3 Topics and 14 sub-topics, with 204 Learning Objects. The topics, sub-topics and their content cover the learning objectives. Specifically, most of the sub-topics are addressing the learning objectives sufficiently. However, some of the sub-topics are more detailed than necessary and some are out of the scope of the module (up-to a point). Furthermore, some of the sub-topics might need to be re-ordered to better fit the topic they address, some of the sub-topics could be moved to module 3 (they are about Learning Analytics), and some of the sub-topics are more “data-oriented” than “educational data oriented” and need more extensive revision (or can be removed).
Is the content of the subtopics accurate and well presented	The content of the sub-topics is - in most cases - accurate (some revisions and clarifications have been requested, and some of the videos are not relevant). Regarding the presentation, some additional examples could improve readability. Revisions are also recommended for some of the graphics.

<p>Does the module include adequate number of learning materials (original and existing)</p> <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video <p>to cover the topics and subtopics</p> <p><i>[relevant to PI3.2 Number of MOOC learning materials developed in different types (e.g. educational videos, presentation slides, further readings, case studies etc)]</i></p>	<p>The module includes 70 html pages (with 70 graphics – 45 original, 25 existing), as well as 32 existing videos and 17 activities, in total. The number of learning materials is – in most cases – higher than could be efficiently studied within the 6 hours anticipated learner time (one week). Furthermore, some of the materials (e.g., graphics) need to be revised as well, because they are very dense and information rich, whereas some of the videos are out-of-the-scope of the sub-topic they are expected to address.</p>
<p>Does the module include a good balance between originally developed and pre-existing</p> <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video <p>to support the topics and subtopics</p>	<p>The balance between originally developed and pre-existing materials is well maintained in the module.</p>
<p>Does the module include adequate number of learning activities to stimulate the engagement of the participants and support their practice (when relevant)?</p> <p><i>[relevant to PI3.3 Number of MOOC learning activities developed]</i></p>	<p>Yes. The activities are relevant (need to be revised, though, to align with the suggested revisions of the content).</p>
<p>Does the module include adequate number of assessment activities to assess the expected learning outcomes?</p> <p><i>[relevant to PI3.4 Number of MOOC assessment activities developed]</i></p>	<p>Yes</p>
<p>Are the assessment activities well aligned to the learning objectives of the module ?</p>	<p>The assessment activities need to be revised according to the revisions in the final version of the module.</p>
<p>Additional detailed comments were offered on the text (total 144)</p>	

Module 3 Internal Peer Review Report

Internal Peer Review	Module 3 (NTNU)
Internal Peer Reviewers	Deborah Couëdelo (eN)
Date	10.5.2019

Internal Peer Review Report	
Is the definition of the learning objective consistent to the L2A EDL-CP Dimensions & Statements?	Yes
Do the topics, subtopics and their content cover well the targeted learning objectives	Yes
<i>[relevant to PI3.1 Completeness of accommodation for proposed professional competence profiles from the educational objectives of the MOOC modules]</i>	

Is the content of the subtopics accurate and well presented	Overall, yes, but some long sentences could be broken up to help understanding.
Does the module include adequate number of learning materials (original and existing) <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video to cover the topics and subtopics <i>[relevant to PI3.2 Number of MOOC learning materials developed in different types (e.g. educational videos, presentation slides, further readings, case studies etc)]</i>	Yes <ul style="list-style-type: none"> • text (html pages): 30 • graphics original:18 existing:24 • video original:0 existing:10 Case studies need to be more clearly identified as such.
Does the module include a good balance between originally developed and pre-existing <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video to support the topics and subtopics	Yes Would need an original talking head video if it is required as per template.
Does the module include adequate number of learning activities to stimulate the engagement of the participants and support their practice (when relevant)? <i>[relevant to PI3.3 Number of MOOC learning activities developed]</i>	Yes, polls and discussion activities for each subtopic.
Does the module include adequate number of assessment activities to assess the expected learning outcomes? <i>[relevant to PI3.4 Number of MOOC assessment activities developed]</i>	Not yet. One MC quiz to be added.
Are the assessment activities well aligned to the learning objectives of the module ?	N/A
Additional detailed comments were offered on the text (total 130)	

Internal Peer Review	Module 3 (NTNU)
Internal Peer Reviewers	Dimitra Vinatsella & Sofia Mougiakou (UPRC)
Date	8.5.2019

Internal Review Form	
Is the definition of the learning objective consistent to the L2A EDL-CP Dimensions & Statements?	The definition of the learning objective is consistent to the L2A EDL-CP Dimensions & Statements. Nevertheless, the syllabus needs to be updated accordingly (as per suggested track changes).
Do the topics, subtopics and their content cover well the targeted learning objectives <i>[relevant to PI3.1 Completeness of accommodation for proposed professional competence profiles from the educational objectives of the MOOC modules]</i>	The topics, subtopics and their content cover well the targeted learning objectives. The module consists of 4 Topics and 11 Subtopics, with 53 Learning Objects. We would suggest developing further the subtopic 3.3.2 (e.g. adding an initial activity poll and a discussion forum at the end of the

	subtopic).
Is the content of the subtopics accurate and well presented	The content of the subtopics is accurate and well presented, using useful examples and well-prepared graphics.
Does the module include adequate number of learning materials (original and existing) <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video to cover the topics and subtopics <i>[relevant to PI3.2 Number of MOOC learning materials developed in different types (e.g. educational videos, presentation slides, further readings, case studies etc)]</i>	The module includes adequate number of learning materials to cover the topics and subtopics for 6 hours anticipated learner time (one week). It includes in total 30 text (html) pages, with 42 graphics, as well as 10 existing videos and 14 activities.
Does the module include a good balance between originally developed and pre-existing <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video to support the topics and subtopics	The module includes an adequate balance between originally developed and pre-existing learning materials to support the topics and subtopics. All 30 text (html pages) are originally developed, including 18 original and 24 existing graphics. Finally, issues related with the clearance with copyrights of the existing graphics need to be clarified.
Does the module include adequate number of learning activities to stimulate the engagement of the participants and support their practice (when relevant)? <i>[relevant to PI3.3 Number of MOOC learning activities developed]</i>	The module includes adequate number of learning activities. More specifically, the module includes 7 learning activities: polls to stimulate the engagement of the participants, as well as 7 activities: polls/discussions, to support learners' practice.
Does the module include adequate number of assessment activities to assess the expected learning outcomes? <i>[relevant to PI3.4 Number of MOOC assessment activities developed]</i>	Multiple Choice Quiz Questions are missing.
Are the assessment activities well aligned to the learning objectives of the module ?	Multiple Choice Quiz Questions are missing.
Additional detailed comments were offered on the text (total 31)	

Module 4 Internal Peer Review Report

Internal Peer Review	Module 4 (UMA)
Internal Peer Reviewers	Dimitra Vinatsella & Sofia Mougiakou (UPRC)
Date	8.5.2019

Internal Review Form	
Is the definition of the learning objective consistent to the L2A EDL-CP Dimensions & Statements?	The definition of the learning objective is consistent with the L2A EDL-CP Dimensions & Statements
Do the topics, subtopics and their content cover well the targeted learning objectives <i>[relevant to PI3.1 Completeness of accommodation for proposed professional competence profiles from the educational objectives of the MOOC modules]</i>	The topics, subtopics and their content cover well the targeted learning objectives. The module consists of 3 Topics and 8 Subtopics, with 99 Learning Objects.
Is the content of the subtopics accurate and well presented	The content of the subtopics is accurate and well presented
Does the module include adequate number of learning materials (original and existing) <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video to cover the topics and subtopics <i>[relevant to PI3.2 Number of MOOC learning materials developed in different types (e.g. educational videos, presentation slides, further readings, case studies etc)]</i>	The module includes an adequate number of learning materials to cover the topics and subtopics for 6 hours anticipated learner time (one week). It includes in total 42 text (html) pages, with 17 existing graphics, as well as 8 existing videos for studying and 9 activities (polls, discussions, reflections, workshops).
Does the module include a good balance between originally developed and pre-existing <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video to support the topics and subtopics	The 42 text (html pages) learning objects are supported 17 existing graphics. We would suggest adding some originally developed graphics to meet this requirement. Adding some more videos of an expert view would be also useful. Finally, issues related with the clearance with copyrights of the existing graphics needs to be clarified.
Does the module include adequate number of learning activities to stimulate the engagement of the participants and support their practice (when relevant)? <i>[relevant to PI3.3 Number of MOOC learning activities developed]</i>	The module includes an adequate number of learning activities to stimulate the engagement of the participants and support their practice. Especially the “workshops” are really useful. More specifically, the module includes 3 learning activities: polls to stimulate the engagement of the participants, as well as 6 activities: polls/discussions/reflections and 3 activities: workshops, to support learners’ practice. We would suggest adding an initial activity poll at the beginning of each subtopic to self-assess participants existing knowledge and/or experience and/or initial views on the topic of the module, as mentioned in APPENDIX IV.a L2A MOOC Version 1 Module 2-4 Educational Design Template (L2A MOOC Handbook).
Does the module include adequate number of assessment activities to assess the expected learning outcomes? <i>[relevant to PI3.4 Number of MOOC assessment activities developed]</i>	The module includes an adequate number of assessment activities to assess the expected learning outcomes. More specifically, the module includes 20 Multiple Choice Questions.

Are the assessment activities well aligned to the learning objectives of the module?	The assessment activities are well aligned to the learning objectives of the module.
Additional detailed comments were offered on the text (total 34)	

Internal Peer Review	Module 4 (UMA)
Internal Peer Reviewers	Chara Papamitsiou (NTNU)
Date	12.5.2019

Internal Review Form	
Is the definition of the learning objective consistent to the L2A EDL-CP Dimensions & Statements?	The definition of the learning objective is consistent to the L2A EDL-CP Dimensions & Statements.
Do the topics, subtopics and their content cover well the targeted learning objectives <i>[relevant to PI3.1 Completeness of accommodation for proposed professional competence profiles from the educational objectives of the MOOC modules]</i>	<p>The module consists of 3 Topics and 8 sub-topics, with 99 Learning Objects.</p> <p>The topics, sub-topics and their content cover the learning objectives. Most of the sub-topics are addressing the targeted learning objectives sufficiently. However, there is significant overlap with the topics covered in Module 3 (which is dedicated to Learning Analytics).</p> <p>Some additional examples (use cases) would better communicate and clarify the content and facilitate the learning objectives.</p>
Is the content of the subtopics accurate and well presented	<p>The content of the sub-topics is accurate and well presented. However, some of them are written in a highly “academic” style, and the audience might not feel comfortable with that.</p> <p>Furthermore, some of the used material require some effort to understand (e.g., Figure 4.2.3.3), or better fit the content of another module (e.g., Figure 4.1.2.1 presents a framework for learning analytics that is covered by Module 3).</p>
<p>Does the module include adequate number of learning materials (original and existing)</p> <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video <p>to cover the topics and subtopics <i>[relevant to PI3.2 Number of MOOC learning materials developed in different types (e.g. educational videos, presentation slides, further readings, case studies etc)]</i></p>	<p>The module includes 42 html pages (with 17 graphics – all existing), as well as 8 existing videos and 9 activities, in total. Especially the “workshops” activities is a very nice and welcomed idea.</p> <p>The number of learning materials is sufficient to cover the topics and sub-topics for 6 hours (one week) anticipated study time.</p>
<p>Does the module include a good balance between originally developed and pre-existing</p> <ul style="list-style-type: none"> • text (html pages), 	The module lacks original graphics, and the ones that are included might be limited by copyrights (most of them are published in papers). Some originally developed graphics would be nice to be included.

<ul style="list-style-type: none"> graphics and/or video to support the topics and subtopics	One of the videos is very long (>1hour), and one presentation is also very long (106 slides), both in "Learning Object #4.1.3.6 VIDEO".
Does the module include adequate number of learning activities to stimulate the engagement of the participants and support their practice (when relevant)? <i>[relevant to PI3.3 Number of MOOC learning activities developed]</i>	Yes. The activities are relevant. It would be nice, though, to add some introductory polls at the beginning of the sub-topics.
Does the module include adequate number of assessment activities to assess the expected learning outcomes? <i>[relevant to PI3.4 Number of MOOC assessment activities developed]</i>	Yes
Are the assessment activities well aligned to the learning objectives of the module?	Yes

Module 5 Internal Peer Review Report

Internal Peer Review	Module 5 (eN)
Internal Peer Reviewers	Dimitra Vinatsella & Sofia Mougiakou (UPRC)
Date	10.5.2019

Internal Peer Review Form	
Is the definition of the learning objective consistent to the L2A EDL-CP Dimensions & Statements?	The definition of the learning objective is consistent to the L2A EDL-CP Dimensions & Statements. Nevertheless, the syllabus needs to be updated accordingly (as per suggested track changes).
Do the topics, subtopics and their content cover well the targeted learning objectives <i>[relevant to PI3.1 Completeness of accommodation for proposed professional competence profiles from the educational objectives of the MOOC modules]</i>	The topics, subtopics and their content cover well the targeted learning objectives. The module consists of 6 Topics and 10 Subtopics, with 97 Learning Objects.
Is the content of the subtopics accurate and well presented	<p>Yes, the content of the subtopics is accurate and well presented, using useful examples and LMS screenshots.</p> <p>With regards to the content, our detailed comments are included, as per track changes, in the accompanying document.</p> <p>Issues to take under consideration:</p> <ul style="list-style-type: none"> We would suggest specifying explicitly how the several reports can be accessed /generated by a user. The links of internal videos were not included, thus not reviewed. In LO #5.1.4.2, the provided video is quite long [42:10]. We would suggest avoiding repeating the same texting. Thus, suggest

	<p>removing either LO #5.2.0 or #5.2.2.1.</p> <ul style="list-style-type: none"> ● In LO # 5.6.2, the use case to be included refers to “Use-case example for school teacher in K-12 education context”. ● References and Reading need be included.
<p>Does the module include adequate number of learning materials (original and existing)</p> <ul style="list-style-type: none"> ● text (html pages), ● graphics and/or ● video <p>to cover the topics and subtopics</p> <p><i>[relevant to PI3.2 Number of MOOC learning materials developed in different types (e.g. educational videos, presentation slides, further readings, case studies etc)]</i></p>	<p>The module includes adequate number of learning materials to cover the topics and subtopics.</p> <p>More specifically, it includes 66 text (html) pages, with 96 graphics, as well as 17 videos’ pages.</p>
<p>Does the module include a good balance between originally developed and pre-existing</p> <ul style="list-style-type: none"> ● text (html pages), ● graphics and/or ● video <p>to support the topics and subtopics</p>	<p>The module includes a good balance between originally developed and pre-existing learning materials to support the topics and subtopics.</p> <p>All 66 text (html pages) are originally developed, including 66 original and 30 existing graphics, as well as 6 original and 11 existing videos.</p>
<p>Does the module include adequate number of learning activities to stimulate the engagement of the participants and support their practice (when relevant)?</p> <p><i>[relevant to PI3.3 Number of MOOC learning activities developed]</i></p>	<p>Yes, the module includes adequate number of learning activities. More specifically, the module includes 5 learning activities: 1 Pre-module Survey and 4 Pre-topic Surveys to stimulate the engagement of the participants, as well as 4 activities: Post-topic Surveys, to support learners’ practice.</p>
<p>Does the module include adequate number of assessment activities to assess the expected learning outcomes?</p> <p><i>[relevant to PI3.4 Number of MOOC assessment activities developed]</i></p>	<p>Yes the module includes adequate number of assessment activities to assess the expected learning outcomes. More specifically, the module includes 4 assessment activities/quizzes, one for each topic, as well as one module quiz assessment consisting of 55 questions, in total.</p> <p>Nevertheless, since the module quiz assessment consists of questions included randomly in the respective quiz for each topic, we would suggest keeping either the topic quizzes or the total module quiz assessment, or split the questions among the quizzes, so as to avoid repeating the same question.</p> <p>Module also includes one feedback activity for evaluation purposes.</p>
<p>Are the assessment activities well aligned to the</p>	<p>Definitely the assessment activities are well</p>

learning objectives of the module ?	<p>aligned to the learning objectives of the module.</p> <p>Some clarifications to be reviewed as per track changes, e.g. for question 4 in Learning Object #5.1.5 activity (Site Level Reporting Quiz), for question 12 in Learning Object #5.2.4 activity (Course Level Reporting Quiz) and for questions 1 & 4 in Learning Object #5.3.3 activity (User Level Reporting Quiz).</p> <p>Moreover, we would suggest adding the “Module Summary and Conclusion” before the Assessment Quiz, including Next Up and Reminder sections. Assessment Quiz recommended to be placed at the end of the module.</p>
Additional detailed comments were offered on the text (total 61)	

Internal Peer Review	Module 5 (eN)
Internal Peer Reviewers	Elisabetta Parodi (LL)
Date	10.5.2019

Internal Peer Review Report	
Is the definition of the learning objective consistent to the L2A EDL-CP Dimensions & Statements?	Yes it is: 8 learning outcomes are listed and they are consistent with the ones in L2A EDL-CP
Do the topics, subtopics and their content cover well the targeted learning objectives <i>[relevant to PI3.1 Completeness of accommodation for proposed professional competence profiles from the educational objectives of the MOOC modules]</i>	Yes they do
Is the content of the subtopics accurate and well presented	<p>Overall yes.</p> <p>Punctual comments are reported into the .docx revised Module. In general:</p> <ul style="list-style-type: none"> - there are a few videos which appear too long - some perplexities about the use cases which should be more Moodle-centered, while they appear a bit generic so far
<p>Does the module include adequate number of learning materials (original and existing)</p> <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video <p>to cover the topics and subtopics <i>[relevant to PI3.2 Number of MOOC learning materials developed in different types (e.g. educational videos, presentation slides, further readings, case studies etc)]</i></p>	<p>Yes it does:</p> <p>Overall 98 html pages for 6 topics with 10 subtopics, roughly there are 7-8 pages per subtopic plus “helper pages” for introductions and surveys.</p>

<p>Does the module include a good balance between originally developed and pre-existing</p> <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video <p>to support the topics and subtopics</p>	<p>Graphics: original 66 Graphics: existing 30 Videos: original 6 Videos: existing 11 Around 1/3 of graphics are existing, 2/3 are new; Around 1/3 of videos are new, 2/3 are existing. As there is a plethora of pre-existing Moodle tutorials and documentation, these numbers are reasonable. Across the module this distinction is not clear, videos merge smoothly in the logic and the graphics are always appropriate.</p>
<p>Does the module include adequate number of learning activities to stimulate the engagement of the participants and support their practice (when relevant)?</p> <p><i>[relevant to PI3.3 Number of MOOC learning activities developed]</i></p>	<p>Activities encompass Surveys, quizzes and feedback.</p>
<p>Does the module include adequate number of assessment activities to assess the expected learning outcomes?</p> <p><i>[relevant to PI3.4 Number of MOOC assessment activities developed]</i></p>	<p>Not possible to say as:</p> <ul style="list-style-type: none"> - questions are meant to be presented randomly - questions are not explicitly linked to learning outcomes
<p>Are the assessment activities well aligned to the learning objectives of the module ?</p>	<p>Hard to say as the final assessment so far envisages 20 questions presented randomly out of all 55 questions</p>
<p>Additional Comments</p>	<ul style="list-style-type: none"> - discuss with IMC how to better display large images (the screenshots with a lot of data) which result hardly readable. Would it be possible i.e. to click on image in course and open up the image in larger size? - quizzes 5.2.4, 5.3.3 and 5.4.5 appear a bit difficult if you are not already familiar with Moodle as you have to remember some details that you could have just read for the 1st time. If there is no possibility to repeat the test, the quiz could be hard to pass the 1st time. We would suggest some easier questions, i.e. less questions which requires to remember a specific setting/filed and more general questions about purpose of the plugin/functions - add references section to group all main references - use cases in 5.6.2 to be reviewed in accordance with Moodle tools and plugins <p>OR</p>

	you could also do not closely align to learning outcomes and simply "tell a story" about Laura & Moodle
Additional detailed comments were offered on the text (total 73)	

Module 6 Internal Peer Review Report

Internal Peer Review	Module 6 (LL)
Internal Peer Reviewers	Dirk Ifenthaler (UMA)
Date	12.5.2019

Internal Peer Review Report	
Is the definition of the learning objective consistent to the L2A EDL-CP Dimensions & Statements?	<p>Five of the six learning objectives are direct operationalizations of L2A EDF-CP statements.</p> <p>For LO3 "Understand how to communicate your interpretation of the educational data in an intuitive accessible way within the eXact Suite" there is no visible direct connection, but the LO seems consistent to the framework.</p> <p>All LO blend in product-related knowledge (on the eXact Suite and its components).</p>
<p>Do the topics, subtopics and their content cover well the targeted learning objectives</p> <p><i>[relevant to PI3.1 Completeness of accommodation for proposed professional competence profiles from the educational objectives of the MOOC modules]</i></p>	<p>Some subtopics seem to go beyond the targeted learning objectives.</p> <p>The overview on LO interoperability standards (SCORM and others) is quite extensive.</p> <p>Some of the content is very technical. It should be checked whether this is suitable for the target audience.</p> <p>Product-related knowledge should only be covered in a depth that is necessary to understand the analytics and reporting functionalities.</p>
Is the content of the subtopics accurate and well presented	<p>Generally yes.</p> <p>Some LOs need to be reworked, especially after a language check.</p>
<p>Does the module include adequate number of learning materials (original and existing)</p> <ul style="list-style-type: none"> • text (html pages), 	Generally yes.

<ul style="list-style-type: none"> • graphics and/or • video <p>to cover the topics and subtopics</p> <p><i>[relevant to PI3.2 Number of MOOC learning materials developed in different types (e.g. educational videos, presentation slides, further readings, case studies etc)]</i></p>	
<p>Does the module include a good balance between originally developed and pre-existing</p> <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video <p>to support the topics and subtopics</p>	<p>There is a balance between the different LOs used.</p> <p>It is not self-evident which ones have been originally developed and which ones have been pre-existing.</p>
<p>Does the module include adequate number of learning activities to stimulate the engagement of the participants and support their practice (when relevant)?</p> <p><i>[relevant to PI3.3 Number of MOOC learning activities developed]</i></p>	<p>There is an adequate number of activities for stimulating learner engagement.</p> <p>However, the aims and the cognitive level of some of those activities can be questioned.</p> <p>The purpose of the frequently used polls is not always evident. Furthermore, the results should be communicated to the learners.</p> <p>Some of the quiz-like activities only demand for lower cognitive abilities (e.g., drag & drop) which is not in line with higher-order learning outcomes.</p> <p>Feedback on the learners' solutions is crucial and should be implemented as extensive as possible.</p>
<p>Does the module include adequate number of assessment activities to assess the expected learning outcomes?</p> <p><i>[relevant to PI3.4 Number of MOOC assessment activities developed]</i></p>	<p>The overall assessment is carried out with a 10-question MC module quiz at the end. As the questions are rather specific, this does not seem to cover the expected learning outcome in total.</p>
<p>Are the assessment activities well aligned to the learning objectives of the module ?</p>	<p>The alignment of assessment activities and learning objectives could be improved, if the assessment included some higher-order tasks in the context of data analysis instead of simple MC questions. For example, learners could be asked to extract data / information from an eXact instance and prepare an own report. If this was embedded in a case-study assessment, learners could elicit implications and sketch pedagogical interventions according to the given context, which is in line with the L2A EDL CP framework.</p>
<p>Additional detailed comments were offered on the text (total 66)</p>	

Module 7 Internal Peer Review Report

Internal Peer Review	Module 7 (IMC)
Internal Peer Reviewers	Chara Papamitsiou (NTNU)
Date	

Indicative Content Review Criteria	
Is the definition of the learning objective consistent to the L2A EDL-CP Dimensions & Statements?	The definition of the learning objective is consistent to the L2A EDL-CP Dimensions & Statements.
Do the topics, subtopics and their content cover well the targeted learning objectives <i>[relevant to PI3.1 Completeness of accommodation for proposed professional competence profiles from the educational objectives of the MOOC modules]</i>	<p>The module consists of 3 Topics and 11 sub-topics, with 62 Learning Objects.</p> <p>The topics, sub-topics and their content cover the learning objectives.</p> <p>However, some of the sub-topics make extended reference to another MOOC developed by IMC and some sub-topics are not correctly positioned in the module, i.e., parts of them are presented in the first topic and then described in more detail in the third topic.</p>
Is the content of the subtopics accurate and well presented	<p>The content of the sub-topics needs additional clarification in many cases. For instance, many definitions are missing; some abbreviated terms are used without explanation; it is not clear what data are collected and how the reports are generated; some of the quizzes and exercises are advanced or have high requirement or are not relevant to the topic; some of the figures are difficult to understand. It is also not clear how feedback is generated (see comments in text). The connection between the lesson plan and teaching and learning analytics is not clear. The term “correlation” is misused throughout the text. Overall, considerable – if not extended – revision are required.</p>
Does the module include adequate number of learning materials (original and existing)	The module includes 33 html pages (with 31 graphics – 29 original, 2 existing), as well as 8

<ul style="list-style-type: none"> • text (html pages), • graphics and/or • video <p>to cover the topics and subtopics</p> <p><i>[relevant to PI3.2 Number of MOOC learning materials developed in different types (e.g. educational videos, presentation slides, further readings, case studies etc)]</i></p>	<p>videos (5 original, 3 existing) and 14 activities, in total.</p> <p>The number of learning materials is – in most cases – higher than could be efficiently studied within the 6 hours anticipated learner time (one week). Furthermore, some of the materials (e.g., graphics) need further explanation (see comments in text), whereas some of the activities are very advanced and some html pages are out-of-the-scope of the sub-topic (e.g., make extended reference to the details of another project).</p>
<p>Does the module include a good balance between originally developed and pre-existing</p> <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video <p>to support the topics and subtopics</p>	<p>The balance between originally developed and pre-existing materials is well maintained in the module.</p>
<p>Does the module include adequate number of learning activities to stimulate the engagement of the participants and support their practice (when relevant)?</p> <p><i>[relevant to PI3.3 Number of MOOC learning activities developed]</i></p>	<p>Yes. The activities are relevant (need to be revised, though, to align with the suggested revisions of the content, and some of them need to be simplified). A comment is that many activities are based on the IBIS case study and might lack generalizability.</p>
<p>Does the module include adequate number of assessment activities to assess the expected learning outcomes?</p> <p><i>[relevant to PI3.4 Number of MOOC assessment activities developed]</i></p>	<p>A final assessment quiz is missing.</p>
<p>Are the assessment activities well aligned to the learning objectives of the module ?</p>	<p>A final assessment quiz is missing.</p>

Internal Peer Review	Module 7 (IMC)
Internal Peer Reviewers	Elisabetta Parodi (LL)
Date	

Indicative Content Review Criteria	
Is the definition of the learning objective consistent to the L2A EDL-CP Dimensions & Statements?	Yes, it is
Do the topics, subtopics and their content cover well the targeted learning objectives <i>[relevant to PI3.1 Completeness of accommodation for proposed professional competence profiles from the educational objectives of the MOOC modules]</i>	Yes, they do.
Is the content of the subtopics accurate and well presented	The structure of the information is questionable.

	<p>Instead of presenting different kinds of tracked/trackable data one by one, the impression is that the whole set of available data is presented.</p> <p>For example:</p> <p>In 7.1.1.4 and 7.1.1.5 all categories of available data are presented.</p> <p>7.1.2.2 again discusses all available data</p> <p>Dynamic data at p.41-42 are presented a bit too quickly, all together.</p> <p>7.3.2.1 again reports all available data all together</p> <p>Not clear how the lesson plan relates to Teaching & Learning Analytics.</p>
<p>Does the module include adequate number of learning materials (original and existing)</p> <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video <p>to cover the topics and subtopics</p> <p><i>[relevant to PI3.2 Number of MOOC learning materials developed in different types (e.g. educational videos, presentation slides, further readings, case studies etc)]</i></p>	<p>Yes, the mixture of original and pre-existing learning materials appears appropriate</p>
<p>Does the module include a good balance between originally developed and pre-existing</p> <ul style="list-style-type: none"> • text (html pages), • graphics and/or • video <p>to support the topics and subtopics</p>	<p>More original than existing graphics and videos are present. This does not seem a problem: if existing materials were not enough to cover the Module, the partner developed new ones.</p>
<p>Does the module include adequate number of learning activities to stimulate the engagement of the participants and support their practice (when relevant)?</p> <p><i>[relevant to PI3.3 Number of MOOC learning activities developed]</i></p>	<p>Yes, the module includes appropriate learning activities which allow the learner to, among other, download data sheets and reason and work upon them. This appears a very nice choice.</p>
<p>Does the module include adequate number of assessment activities to assess the expected learning outcomes?</p> <p><i>[relevant to PI3.4 Number of MOOC assessment activities developed]</i></p>	<p>The module includes a number of exercises. Thus having chosen a very specific use case (IBIS) the exercises are tailored upon that and in some cases they seem to lack “general” validity.</p> <p>Missing a final assessment activity.</p>
<p>Are the assessment activities well aligned to the learning objectives of the module ?</p>	<p>Missing a final assessment activity.</p>