Learn2Analyse: an Industry and Academia Knowledge Alliance on Educational Data Analytics

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Introduction
As teachers, how much do we know about our students?

• do they understand?
  • are they bored?
  • are they distracted?
we know quite a lot when we interact with them daily in the classroom or in the lab.
And yet: we would like to be able to **discover more** and **personalise** our teaching for **each** one of our students
But then what happens when **Teaching and Learning** moves

- From the **Physical Classroom** to the **Online Virtual Space** (the Web)
- From the **Small Groups** of Students to the **Massive Audiences** of a MOOC
How much do we know about our Online Students in a Massive Online Open Course?
Educational Organisations and Teachers are challenged to
Personalise Teaching and Learning:
• Learning Experiences
• Guidance & Feedback
• Recognition of Achievements for each Individual Student.
This is already **hard to achieve** in Physical Classrooms with a limited number of Students, in an **effective way** ("differentiate instruction")
It seems impossible to do Online and At Large Scale
Or Is It Not?
Can Digital Technologies help?
**Data-driven Decision Making**

The systematic collection, analysis, examination, and interpretation of data to report, evaluate and improve the *processes* and *outcomes* at various levels of education, teaching & learning, assessment to inform *practice* and *policy* in educational settings.

- The aim of data-driven decision making is to report, evaluate and improve the processes and outcomes at various levels of education, teaching & learning, assessment.
Educational Data

Collected and organised to represent all aspects of teaching and learning, including **Profiling and Interaction Data**

**Students, Teachers, Learning Environment**

derived from

qualitative and quantitative methods
Data Literacy for Educators

(1/2)

▪ the ability to understand and use data effectively to inform decisions

▪ a competence set to locate, collect, analyze/understand, interpret, and act upon Educational Data from different sources so as to support improvement of the teaching, learning and assessment process
Data Literacy for Educators

Find and collect relevant educational data **[Data Location]**

Understand what the educational data represent **[Data Comprehension]**

Define questions on how to improve practice using the educational data **[Question Posing]**

Understand what the educational data mean **[Data Interpretation]**

Define instructional approaches to address problems identified by the educational data **[Instructional Decision Making]**
Reflective Practice

“[A process that] involves thinking about and critically analyzing one's actions with the goal of improving one's professional practice”
Types of Reflective practice

**Reflection-In-Action**
Takes place while the practice is executed and the practitioner reacts **on-the-fly**

**Reflection-On-Action**
Takes a more **systematic** approach in which practitioners intentionally **review, analyse** and **evaluate** their practice after it has been performed, documenting the process and results.

**Teaching and Learning Analytics** mainly support Reflection
Teacher Inquiry (1/2)

• “[a process] that is conducted by teachers, individually or collaboratively, with the primary aim of understanding teaching and learning in context”

• The main goal of teacher inquiry is to improve the learning conditions for students
Teacher Inquiry (2/2)

The teacher identifies an issue of concern in the teaching practice, which will be investigated.

The teacher makes an effort to interpret the analysed data and takes action in relation to their teaching design.

The teacher processes and analyses the collected data to obtain insights related to the defined inquiry questions.

The teacher implements their classroom teaching design and collects the educational data.

The teacher defines teaching and learning process to be implemented during the inquiry (e.g., through a lesson plan).

The teacher develops specific questions to investigate. Defines the educational data that need to be collected and the method of their analysis.

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<table>
<thead>
<tr>
<th>Educational Data Analytics Technologies</th>
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<tbody>
<tr>
<td><strong>Teaching Analytics</strong></td>
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<tr>
<td>methods and digital tools to visualize, analyze, and/or assess teaching practice</td>
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<tr>
<td><strong>Learning Analytics</strong></td>
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<td>methods and digital tools to collect, analyze and report student-related educational data towards monitoring the learning process</td>
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<td><strong>Teaching &amp; Learning Analytics</strong></td>
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<td>to support the process of reflective practice: facilitating teachers to reflect on their teaching design using evidence from the actual delivery to their students</td>
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Teaching Analytics: Analyse Teaching Design

for self-reflection and improvement

- Visualize the **elements** of a lesson plan
- Visualize the alignment of a lesson plan to **educational objectives / standards**

through sharing with peers or mentors to receive feedback

- Support the process of **sharing** a lesson plan with **peers or mentors**, allowing them to provide **feedback** through comments

through co-designing and co-reflecting with peers

- Allow **peers** to **jointly analyze and annotate** a common teaching design in order to allow for co-reflection
Learning Analytics

- Collection of learner data during the delivery of a teaching design (e.g., a lesson plan) to **build/update individual student profiles**.

- **Types of learner data** typically are “*Dynamic Student Data*”:
  - **Engagement in learning activities.** For example, the progress each learner is making in completing certain learning activities.
  - **Performance in assessment activities.** For example, formative or summative assessment scores.
  - **Interaction with Digital Educational Resources and Tools,** for example which educational resources each learner is viewing/using.
  - **Emotional data,** for example stress, boredom, anxiety.
## Educational Data Analytics

<table>
<thead>
<tr>
<th>Analytics Type</th>
<th>Description</th>
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<tr>
<td><strong>Descriptive Analytics</strong></td>
<td>“what has already happened”: they are related to existing data summarization, namely the visualization of past data</td>
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<tr>
<td><strong>Predictive Analytics</strong></td>
<td>“what will happen”: they are related to processing existing data for pattern elicitation, so as to make estimations of future trends</td>
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<tr>
<td><strong>Prescriptive Analytics</strong></td>
<td>“what should we do”: they are related to generating decision-support recommendations for actions</td>
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# Teaching and Learning Analytics

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<tr>
<th>Teacher Inquiry Cycle Steps</th>
<th>How TLA can contribute</th>
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| Identify a Problem to Inquiry | **Teaching Analytics** can be used to capture and analyse the teaching design and help the teacher to:  
  - pinpoint the specific elements of their teaching design that relate to the problem they have identified;  
  - elaborate on their inquiry question by defining explicitly the teaching design elements they will monitor and investigate in their inquiry. |
| Develop Inquiry Questions and Define Inquiry Method | Learning Analytics can be used to:  
  - collect the learner data that the teacher has defined to answer their question.  
  - analyse and report on the collected data in order to facilitate interpretation. |
| Elaborate and Document Teaching Design |  
| Implement Teaching Design and Collect Data |  
| Process and Analyse Data |  
| Interpret Data and Take Actions | The combined use of **Teaching and Learning Analytics** can be used to map the analysed data to the initial teaching design, answer the inquiry question and generate insights for teaching design revisions. |
Learn2Analyze: An Academia-Industry Knowledge Alliance for enhancing Online Training Professionals’ (Instructional Designers and e-Trainees) Competences in Educational Data Analytics
European Commission

**ERASMUS+** Key Action 2

“*Cooperation for innovation and the exchange of good practices - Knowledge Alliances*”

Academia – Industry
End User Communities
A Knowledge Alliance to **Learn2Analyze**

- Improve existing competence frameworks for *instructional designers* and *e-trainers* of online courses with new *Data Literacy* competences for using emerging *Educational Data Analytics* methods and tools.

- Develop and evaluate a professional development **Massive Open Online Course** for cultivating these competences with emphasis to authentic experiences to individual learners, integrated into real work-oriented tasks.
EDU1x: Analytics for the Classroom Teacher

edX MOOC, Curtin University

EDU1x Analytics for the Classroom Teacher

8000 enrollments from 145 countries since October 2016