Learning Analytics and Assessment in Higher Education

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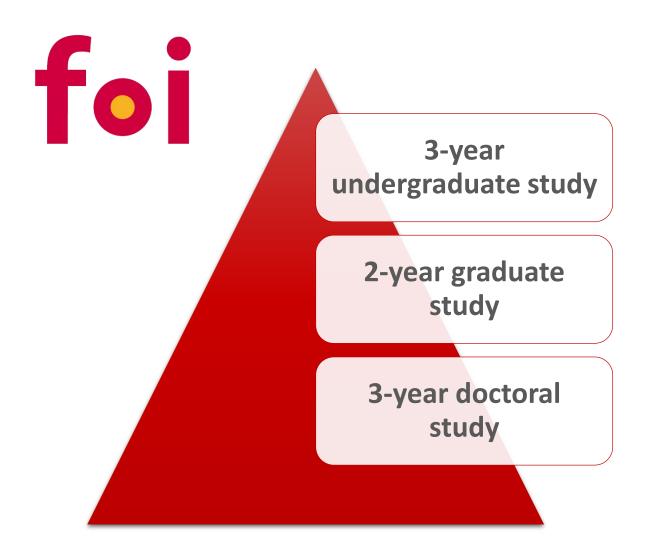
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THE STUDY STRUCTURE – Three-level model

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- 3-year undergraduate study
- 2-year graduate study
- 3-year doctoral study

Learning and
Academic Analytics Lab

- **Established in 2017**

- **Projects:**

  - **E-Schools Establishing a System for Developing Digitally Mature Schools (pilot project) March 2015-August 2018 (EU ERDF & ESF)**

  - **Agency for Science and Higher Education**

    - **Data Analysis of National Survey of Student Experience**

    - **Design and Analysis of National Survey of Student Employability**

  - **University of Zagreb Research Support**

    - **Learning Analytics and Mathematical Modelling (2017)**

    - **Learning and Academic Analytics (2018)**

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Overview

- What is Learning Analytics (LA)?

- Learning Analytics (LA) vs. Academic Analytics (AA) vs. Educational Data Mining (EDM)

- Learning Analytics and Assessment

- Learning Analytics and Open Educational Resources

- European projects in Learning Analytics

- Conclusions

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Digitalization is transforming education

- Technology enhanced learning (TEL) is becoming ubiquitous (blended or hybrid learning, MOOCs, web-based teaching and learning, mobile devices …)

- By products of integration of information and communication technology in teaching and learning are rich data on students' learning behavior and achievements in digital form

- Information systems that support administrative procedures in higher education also produce high volumes of data on students and teachers, as well as on study programs

- Can we use this abundance of digital data to help improve quality of higher education?

What is Learning Analytics?

Learning analytics …

- is 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.
(Long and Siemens, 2011)

- is a means to help educators examine, understand, and support students' study behaviours and change their learning environments.
(Drachsler and Kalz, 2012; Rubel and Jones, 2016)

- uses concepts and techniques from computer science, learning science, network science, information science, data mining, sociology, and psychology.
(Romero and Ventura, 2013)

Learning Analytics – a very young research field

2011 – the 1st Learning Analytics and Knowledge Conference (LAK 2011)

2013 – Society for Learning Analytics Research (SoLAR) established (www.solarresearch.com)

2014 – the 1st issue of Journal of Learning Analytics published

⋮

2019 – LAK19 theme "Ways in which learning analytics can be used to promote inclusion and success"

AA vs. LA & EDM

- Academic Analytics (AA): goal is to support decision-making process in educational institutions (institutional, operational, financial etc.)

- Learning Analytics (LA) and Educational Data Mining (EDM): goal is to understand how students learn and improve quality of learning and teaching

LA vs. EDM

Learning Analytics	Educational Data Mining
Automatic discovery serves to support human judgement	Automatic discovery is the goal
Aim to understand complex systems	Identifying components and analyzing their relationships
Based on semantic web, intelligent curriculum, outcome prediction, systemic intervention	Educational software and student modelling, predicting course outcomes
Focus on empowering instructors and learners	Focus on automatic adaptation
Techniques: SNA, sentiment analysis, discourse analysis, prediction of learners success, concept analysis, sense making models	Techniques: classification, clustering, Bayesian modelling, relationship mining, discovery with models, visualization

Source: Siemens and Baker, 2012

(Expected) Benefits of Learning Analytics

- Teaching and learning
  - Tracking students' progress, detecting at risk students, predicting academic performance
  - Recognizing determinants of students' academic achievement
  - Predicting individual learning needs
  - Ensuring academic integrity and accountability through authorship assurance
  - Overcoming measurement challenges in educational assessment
  - Supporting development and evaluation of curricula
  - Demonstrating effects of pedagogical interventions

- Education management
  - Increasing students' enrollment
  - Improving processes
  - Introducing new services

(El Alfy, Gómez, Dani, 2019)

Learning Analytics and Assessment

- Analytics driven assessments may include (Ifenthaler et al, 2018)
  - Self-assessments linked to learning outcomes using various assessment formats, and personalized real-time feedback
  - Peer assessments
  - Defining individual goals and desired achievements and tracking progress toward them
  - Semantic-rich feedback for written assignments in real time using natural language processing (e.g. Shermis and Burstein, 2013: automatics assessment of essays)
  - Progress reports toward required competences or learning outcomes
  - Reminders of reoccurring errors, misconceptions etc.

- This area of LA is still developing and only a few advanced algorithms have been implemented

- Large scale computer based assessments carried on in MOOCs, but also in other contexts (e.g. Pisa testing by OECD) provide an untapped potential for better understanding of learning process.

LA meets Open Education

- UNESCO champions the idea of open educational resources (OER) as "a concept with great potential to support educational transformation."

- Open learning / education – a wider concept, key principles:
    - "Learning opportunity should be lifelong and should encompass both education and training;
    - The learning process should center on the learners, build on their experience and encourage independent and critical thinking;
    - Learning provision should be flexible so that learners can increasingly choose, where, when, what and how they learn, as well as the pace at which they will learn;
    - **Prior learning, prior experience and demonstrated competencies should be recognized so that learners are not unnecessarily barred from educational opportunities by lack of appropriate qualifications**;
    - Learners should be able to accumulate credits from different learning contexts;
    - Providers should create the conditions for a fair chance of learner success." (UNESCO)

Open Assessment Resources

- Gibson et al (2016) propose "a creation of a global Open Assessment Resources (OAR) item bank with integrated automated feedback and scoring tools for Open Educational Resources (OER)…"

- Enhancing such OARs with an open knowledge graph providing semantic linkage to competences, concepts, and learning outcomes associated with OAR, as well as relevant OERs would enable fast and easy search for both OERs and OARs

- http://assessmentcommons.org/

- Use of OAR items linked to learning outcomes and competences would enable Learning Analytics and Educational Data Mining on linked, anonymized student behavior and performance data.

Some EU projects on Learning Analytics   1

- TeSLA – An Adaptive Trust-based e-assesment System for Learning (H2020, 2016-2019) provides to educational institutions, an adaptive trust e-assessment system for assuring e-assessment processes in online and blended environments. (http://tesla-project.eu/)

- AFEL – Analytics for Everyday Learning (H2020, 2015-2018) goal to tackle the main challenges of **informal** learning analytics through

  1. developing the tools and techniques necessary to **capture information about learning activities from (not necessarily educational) online social environments**;

  2. **creating methods for the analysis of such informal learning data**, based on combining visual analytics with cognitive models of learning and collaboration; and

  3. **demonstrating the potential of the approach** in improving the understanding of informal learning, and the way it is better supported;

  4. evaluate all the former items in real world large scale applications and platforms.

  (http://afel-project.eu/)

Some EU projects on Learning Analytics 2

- SlideWiki – Large-scale pilots for collaborative OpenCourseWare authoring, multiplatform delivery and Learning Analytics (H2020, 2016-2018) – further development and testing of SlideWiki, integration with MOOC platform and perform four large-scale trials. (https://slidewiki.eu/)

- LACE – Learning Analytics Community Exchange (FP7, 2014-2016) – activities designed to actively and passively integrate communities that are conducting LA/EDM research, early practitioner adopters, and those who are building first-generation commercial or open-source software. (http://www.laceproject.eu/)

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