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

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The Changing Landscape of Higher Education & Professional Development

The Changing Landscape of Higher Education

Higher Education Institutions around the world are challenged with *incremental* or *disruptive* ***transformations*** to the way that individuals, groups and organizations "***learn***" and the way to "***assess"*** learning in 21st Century

Objectives: From acquiring new "*knowledge*" to develop new and relevant "*competences*" and build individual "*identities*"

Methods: From "*classroom*" based teaching to "*context-aware*" personalized learning

Assessment: From "*life-long*" degrees and certifications to "*on-demand*" and "*in-context*" accreditation of qualifications

The Role of Digital Technologies

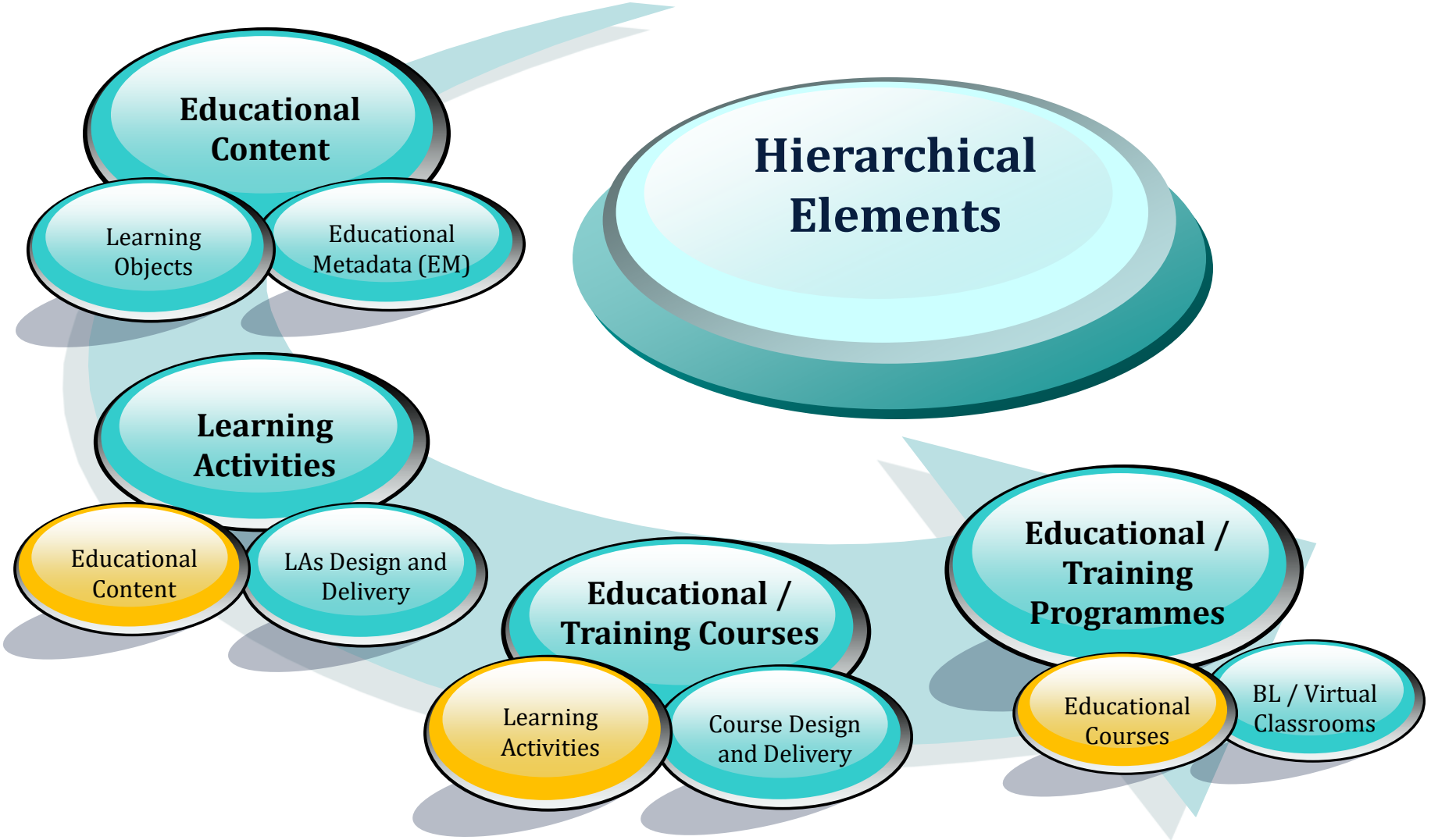
The Role of Digital Technologies

- **enabler** for incremental or disruptive **transformations**
- **supports** higher education institutions complexity **leadership**
- **allows** for **innovative** experiences, processes, products, services, that would not be possible without the use of digital technologies

through exploiting data-driven approaches based on evidence and data collected from the otherwise "black boxes"

Methods and Tools
for
Open Access
to
Educational Resources and Practices

A Hierarchical Framework for Open Access to Learning and Education



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?

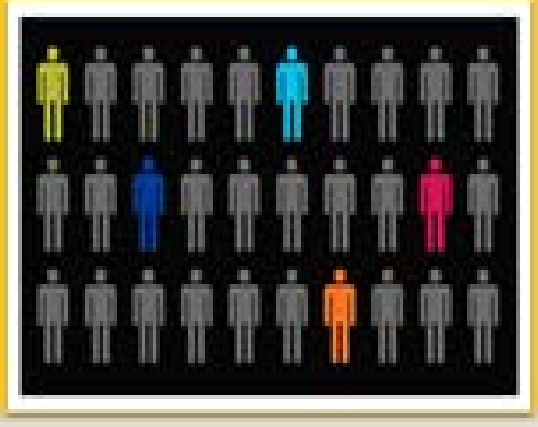
Can

Digital Technologies

help?


EDUCATION
DATA


CONTINUOUS
IMPROVEMENT



Data-driven Decision Making

the systematic collection, analysis, examination, and interpretation of data

to report, evaluate and improve the *processes* and *outcomes* at various level of education, teaching & learning, assessment to inform practice and policy in educational settings

Educational Data

Collected and organised to represent all aspects of teaching and learning, including

Profiling and **Interaction** Data

Students, Teachers, Learning Environment

derived from

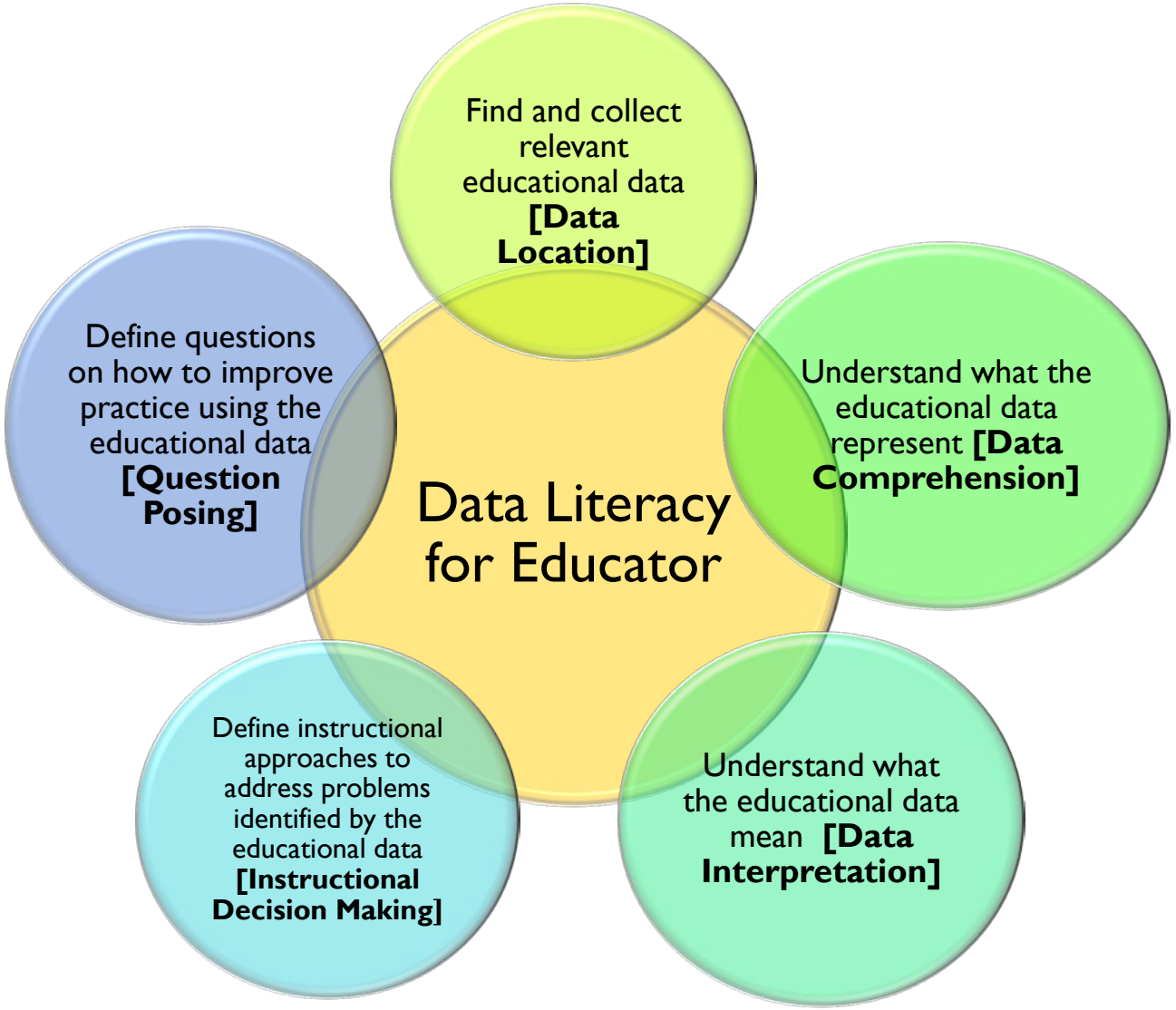
qualitative and quantitative methods

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 (2/2)



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

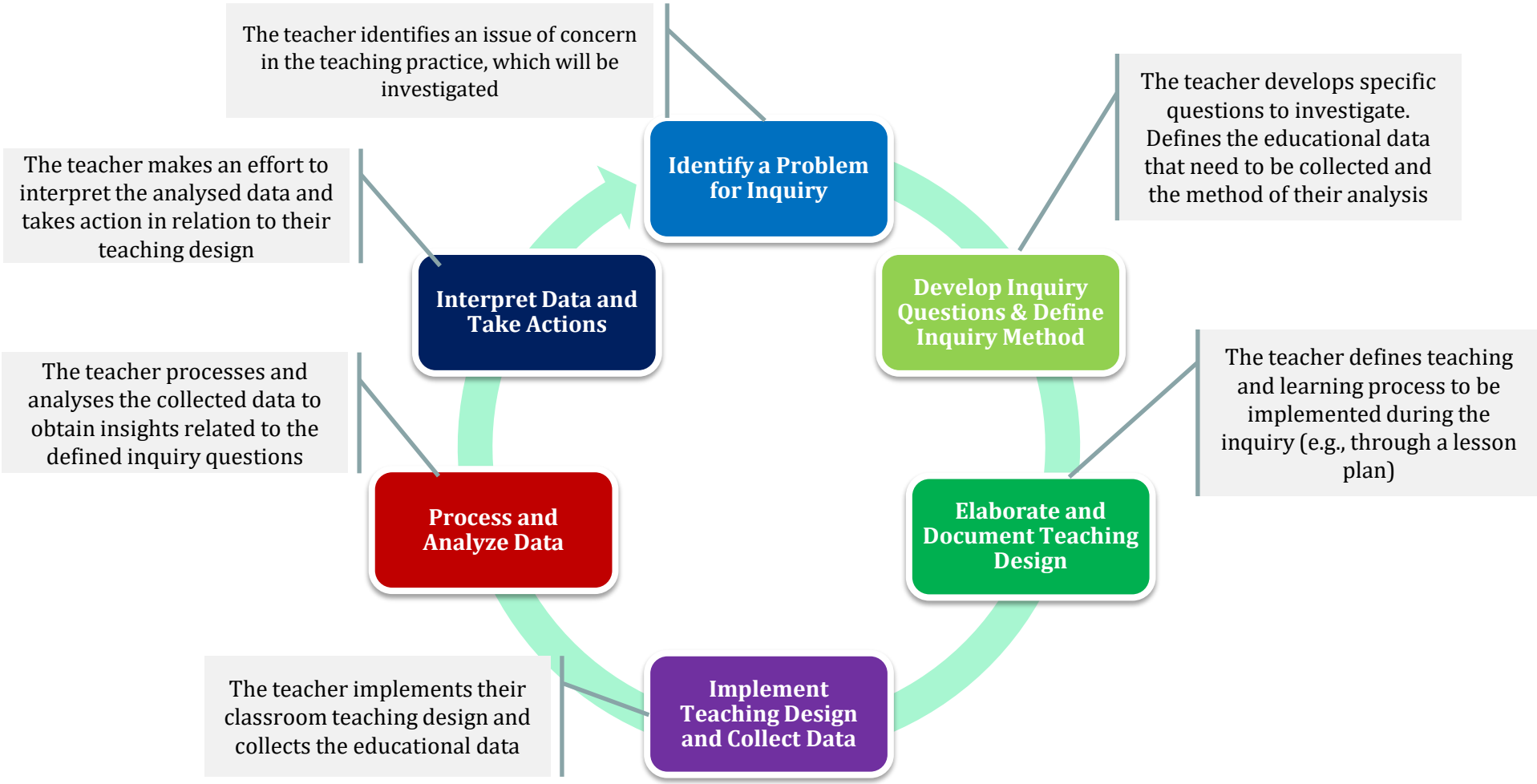
Teaching and Learning Analytics mainly support Reflection

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)



Educational Data Analytics Technologies

Teaching Analytics	methods and digital tools to visualize, analyze, and/or assess **teaching practice**
Learning Analytics	methods and digital tools to collect, analyze and report student-related educational data towards monitoring the **learning process**
Teaching & Learning Analytics	to support the process of **reflective practice**: facilitating teachers to reflect on their teaching design using evidence from the actual delivery to their students

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***
- *Validates whether a lesson plan has potential **inconsistencies** in its design*

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 and annotations*

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

Descriptive Analytics	***"what has already happened"***: they are related to existing *data summarization*, namely the visualization of ***past data***
Predictive Analytics	***"what will happen"***: they are related to processing existing data for *pattern elicitation*, so as to make estimations of ***future trends***
Prescriptive Analytics	***"what should we do"***: they are related to generating decision-support ***recommendations for actions*** to be taken, based on the analysis of existing data

Teaching and Learning Analytics

<table>
<tr><th>Teacher Inquiry Cycle Steps</th><th>How TLA can contribute</th></tr>
<tr><td>Identify a Problem to Inquiry</td><td rowspan="3">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.</td></tr>
<tr><td>Develop Inquiry Questions and Define Inquiry Method</td></tr>
<tr><td>Elaborate and Document Teaching Design</td></tr>
<tr><td>Implement Teaching Design and Collect Data</td><td rowspan="2">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.</td></tr>
<tr><td>Process and Analyse Data</td></tr>
<tr><td>Interpret Data and Take Actions</td><td>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.</td></tr>
</table>

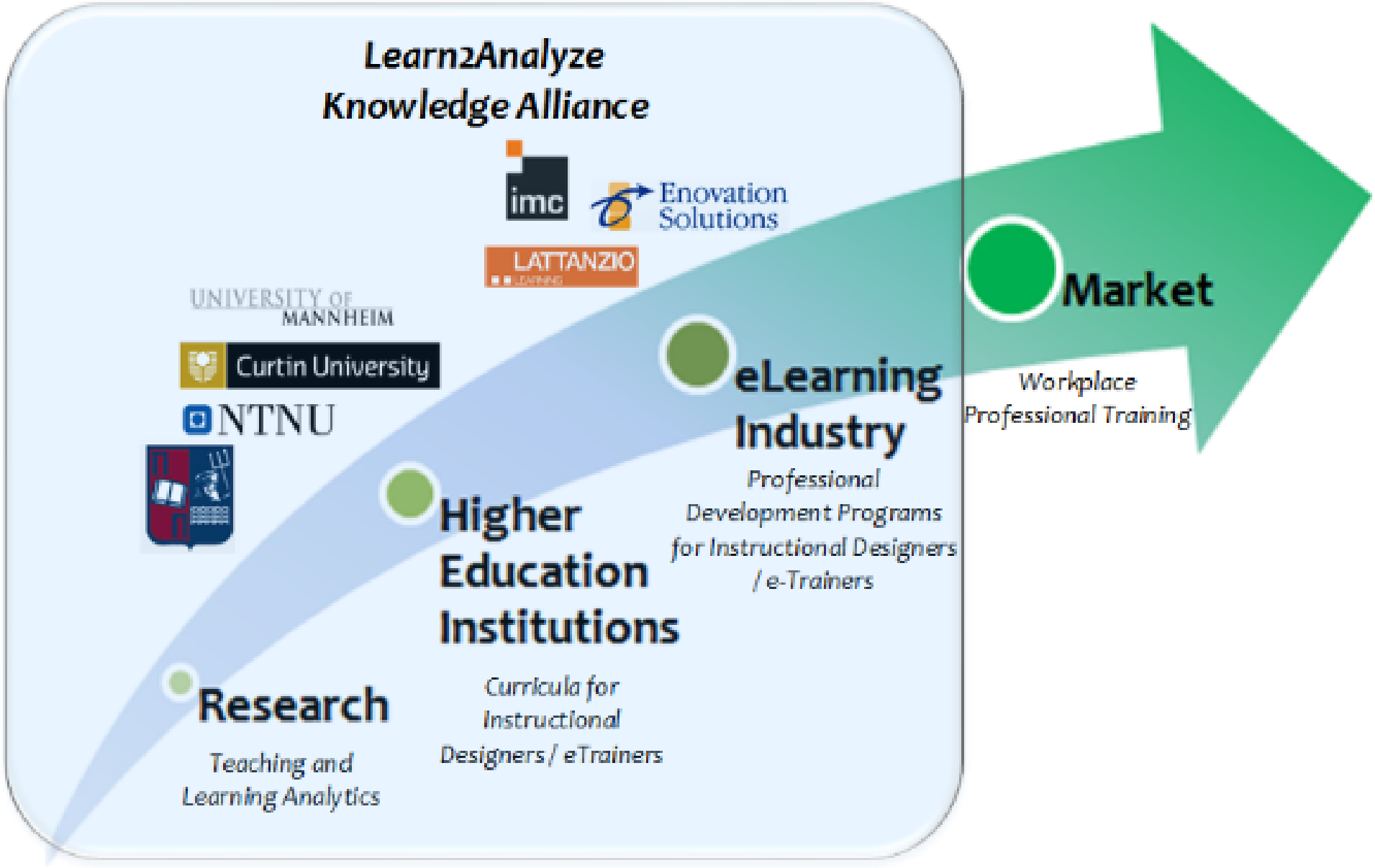
Learn2Analyze:
An Academia-Industry Knowledge Alliance for enhancing Online Training Professionals' (Instructional Designers and e-Trainers) Competences in Educational Data Analytics

European Commission

ERASMUS+ Key Action 2

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

Academia – Industry
End User Communities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Workplace
Professional Training
eLearning Industry
Professional Development Programs for Instructional Designers / e-Trainers
Higher Education Institutions
Curricula for Instructional Designers / eTrainers
Research
Teaching and Learning Analytics

Learn2Analyze: The Business Case

Existing

- **professional competence frameworks**
- **professional development** programs

For

- **instructional designers**, who design and develop online courses
- **e-trainers** , who support the delivery of these online courses.

Almost ignore

- the dimension of **Educational Data Literacy**

Missing out

- the potential of using emerging **Educational Data Analytics** methods and tools in effective online **professional training**

Learn2Analyze: Project Outcomes

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

- **Develop** and **evaluate** a series of professional development **Massive Open Online Courses (MOOCs)** for cultivating these competences with emphasis to combining theory and practice in the form of authentic work-oriented tasks.

EDU1x: Analytics for the Classroom Teacher

edX MOOC, Curtin University

EDU1x Analytics for the Classroom Teacher

10000 enrollments from 150 countries since October 2016


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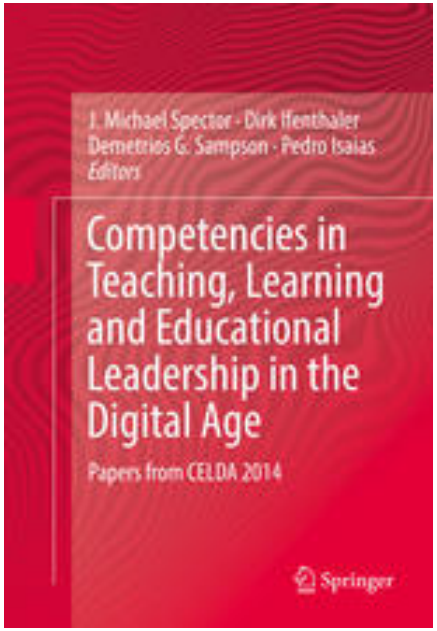
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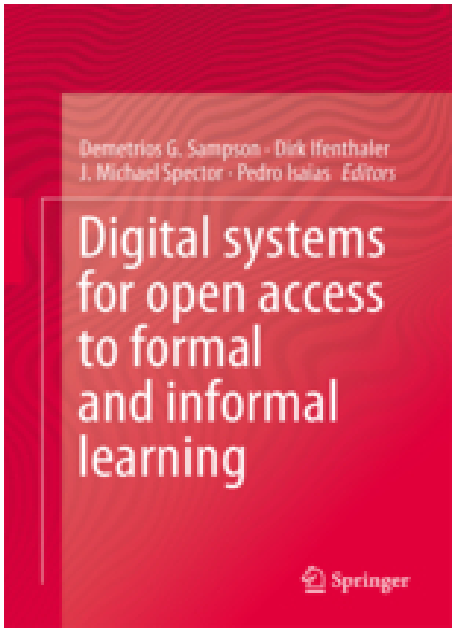
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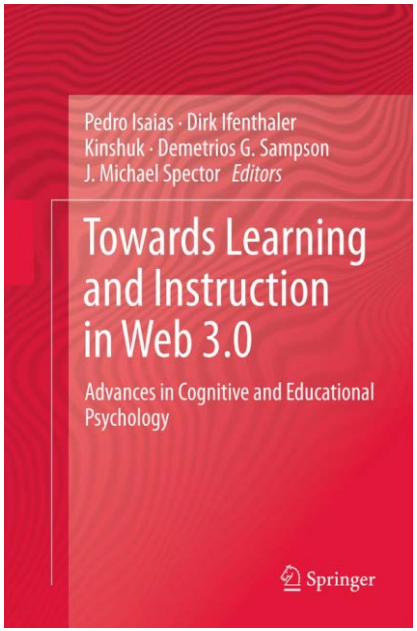
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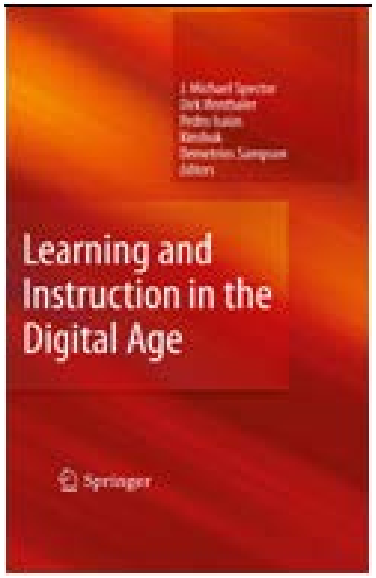
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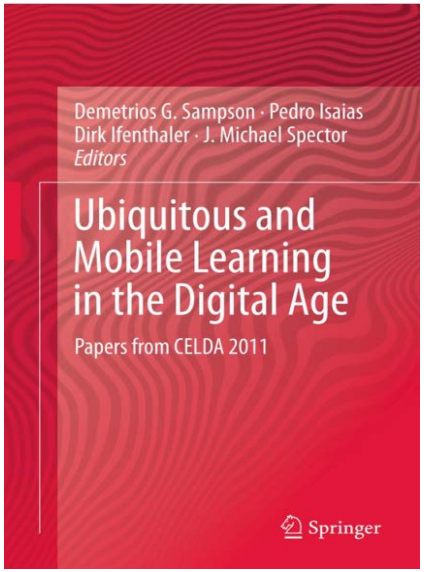
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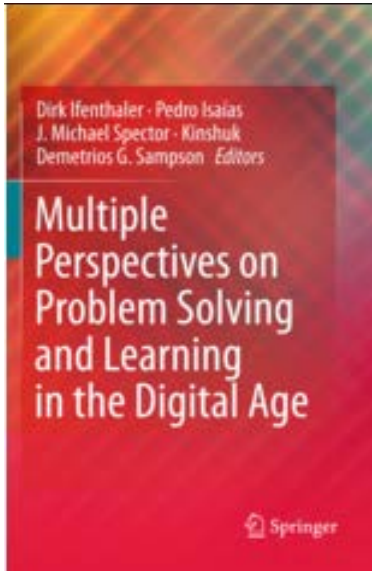
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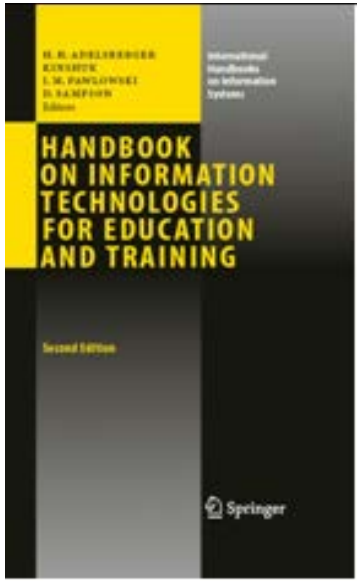
HANDBOOK ON INFORMATION TECHNOLOGIES FOR EDUCATION AND TRAINING
Springer

Relevant Publications

- S. Sergis, D. Sampson, and M. Giannakos, "Supporting school leadership decision making with holistic school analytics: Bridging the qualitative-quantitative divide using fuzzy-set qualitative comparative analysis", *Computers in Human Behavior*, Elsevier, June 2018
- S. Sergis and D. Sampson, "Teaching and Learning Analytics to support Teacher Inquiry: a Systematic Literature Review", in A. Peña-Ayala (Eds.), *Learning analytics: Fundaments, applications, and trends*, Chapter 2, pp 25-63, Springer, ISBN 978-3-319-52976-9, 2017
- S. Sergis, D. Sampson and L. Pelliccione, "Educational Design for MOOCs: Design Considerations for Technology-Supported Learning at Large Scale", in M. Jemni, K. Khribi and Kinshuk (Eds.), *Open Education: from OERs to MOOCs*, Chapter 3, pp 39-71, Springer, ISBN 978-3-662-52923-2, 2017
- S. Sergis, E. Papageorgiou, P. Zervas, D. Sampson and L. Pelliccione, "Evaluation of Lesson Plan Authoring Tools based on an Educational Design Representation Model for Lesson Plans", in Ann Marcus-Quinn and Triona Hourigan (Eds.), *Handbook for Digital Learning in K-12 Schools,* Chapter 11, pp 173-189 ISBN 978-3-319-33808-8, 2017
- S. Sergis and D. Sampson, "School Analytics: A Framework for Supporting Systemic School Complexity Leadership", in J. M. Spector, D. Ifenthaler, D. Sampson and P. Isaias (Eds.), *Competencies, Challenges and Changes in Teaching, Learning and Educational Leadership in the Digital Age*, Chapter 6, pp 79-122, ISBN 978-3-319-30293-5, 2016
- S. Sergis and D. Sampson, "Data Driven Decision Making For School Leadership: A Critical Analysis Of Supporting Systems", in R. Huang, Kinshuk, and J.K. Price (Eds.), *ICT in education in global context: comparative reports of K-12 schools innovation,* Chapter 8, pp 145-171, Springer, ISBN 978-3-662-47955-1, 2016
- S. Sergis and D. Sampson, "From Teachers' to Schools' ICT Competence Profiles", in D. Sampson, D. Ifenthaler, J. M. Spector and P. Isaias, (Eds.), Digital Systems for Open Access to Formal and Informal Learning, Chapter 19, pp 307-327, Springer, ISBN 978-3-319-02263-5, 2014
- P. Zervas, C. Chatzistavrianos and D. Sampson, "Towards Modelling ICT Teachers' Competences Profiles in Europe", in R. Huang, Kinshuk and J.K. Price (Eds.), ICT in Education in Global Context: Emerging Trends 2013-2014, Chapter10, pp 163-181, Springer, ISBN 978-3-662-43926-5, 2014
- D. Sampson and P. Zervas, "A Hierarchical Framework for Open Access to Learning and Education", *International Journal of Web-based Communities*, Volume 10, Issue 1, pp. 25-51, January 2014
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