

Learning Analytics for Learning Communities in MOOCS Workshop

LDE CEL annual meeting

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07/12/2022

WORKSHOP

Learning Analytics for Learning Communities in MOOCs

- Research possibilities within Extension School courses or with its data
- Methods to study learning communities in MOOCs. A case study
- Discussion & Concluding remarks



Research possibilities within Extension School courses or with its data

07 December 2022, Selma van Esveld

Extension School

Offer technical and engineering online courses and short programs

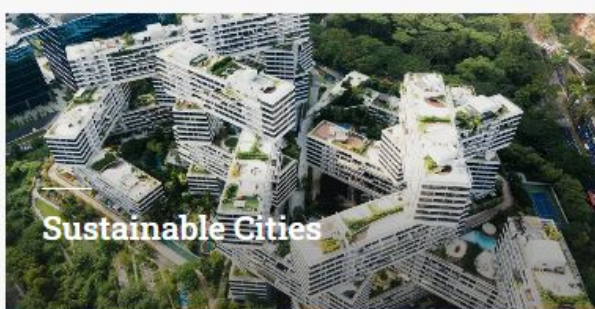
Equip people with skills needed to find solutions for today's global challenges.

View at <https://tu-delft.foleon.com/tu-delft/extension-school-annual-report-2021/impact>





Energy Transition



Sustainable Cities



Future of Transportation



Quantum Technology



AI, Data & Digitalization



Medical Technology

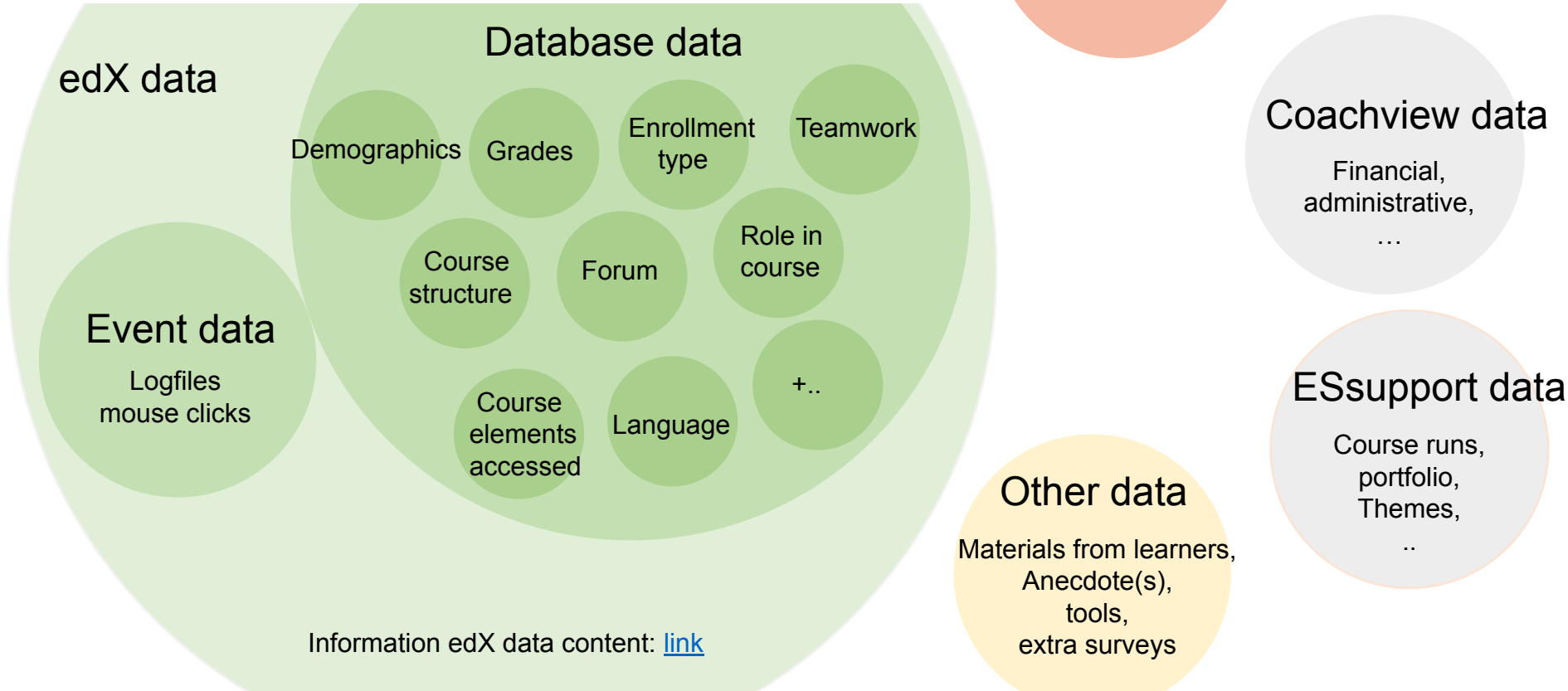


Skills for Engineers

Strategic Themes

<https://www.tudelft.nl/extensionschool/portfolio>

Data Types overview



Research collaborations

In principle there are two types of research projects:

1. Projects in which the Extension School shares data after course run ends
2. Intervention projects:
 1. Researchers have an additional element for the course (e.g. a tool or survey). The Extension School incorporates this extra element in the course environment
 2. After the course run ends, Extension School shares data to analyse the effect of the extra element

Examples of previous research collaborations

1. Do learners follow designed paths, or take their own path through the MOOCs?

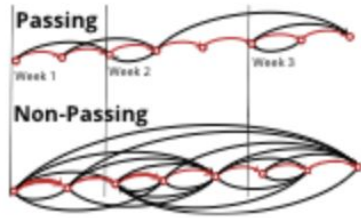
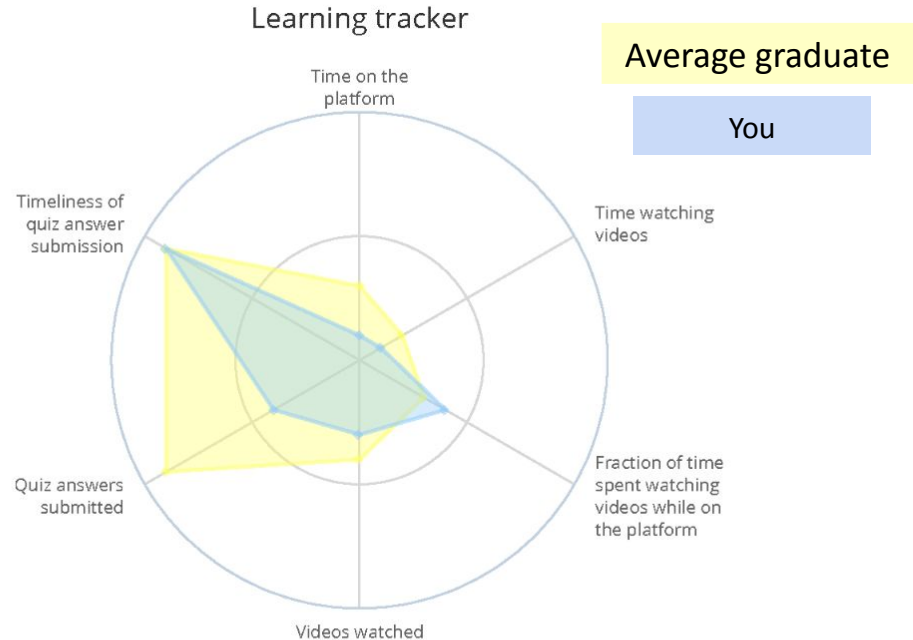


Figure 3: Functional Programming video interactions.

Dan, Davis., Guanliang, Chen., Claudia, Hauff., Geert-Jan, Houben. "Gauging MOOC Learners' Adherence to the Designed Learning Path.." null (2016):54-61.

- 2.

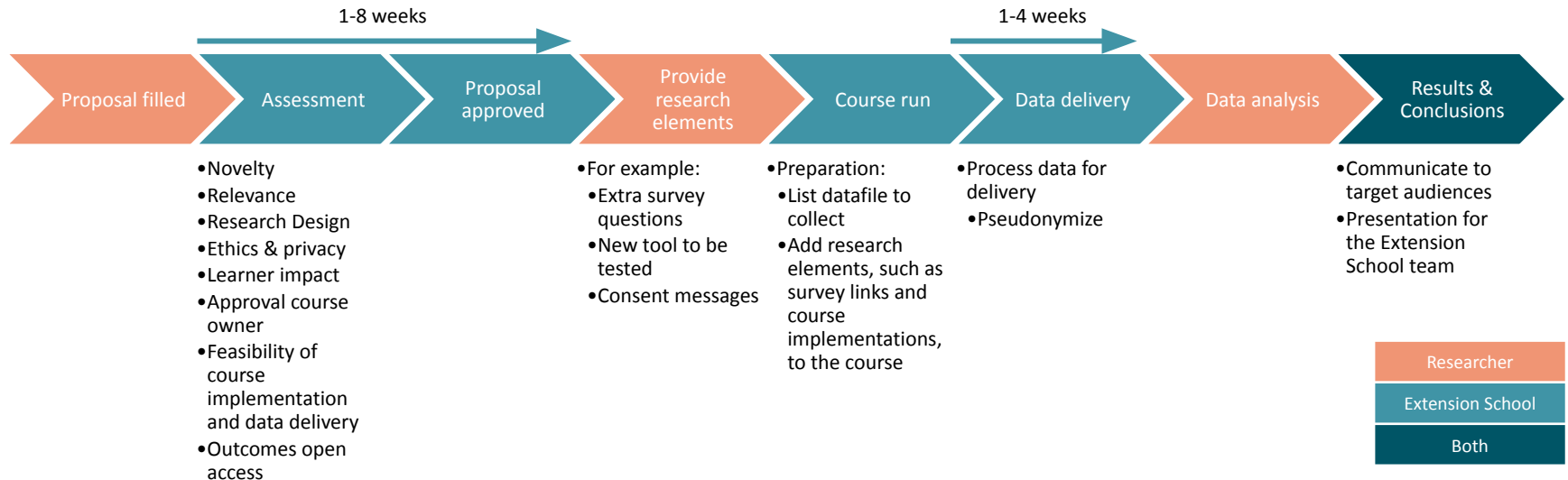


Jivet, Ioana. "The Learning Tracker: A Learner Dashboard that Encourages Self-regulation in MOOC Learners." (2016).

learners exposed to the Learning Tracker are more likely to complete the course due to changes in their behaviour.

Starting a Research Collaboration

Contact research-es@tudelft.nl with your idea and receive a proposal form.



Why are we interested in research collaborations?

They are a valuable two-way exchange:

- Data is shared to support the execution of research projects
- The outcome and insights from research can be used to improve teaching and learning practices.

The increased access to both data and results further supports a common vision for open education.

Research interests for coming years

- Learning Networks
- Credentials
- Digital Assessment
- Open Education
- Learners needs
- Impact on society

Feel free to contact us with novel ideas also when you are uncertain if they fall within one of the above categories.





Do not hesitate to contact me (research-es@tudelft.nl) with any novel idea.

We are open for collaborations!

Methods to study learning communities in MOOCs. A case study

Plan for today;

1. Background
2. My PhD project
3. Overview of using Social Network Analysis(SNA) to study networked learning in MOOCs
4. Case study
5. Discussion



Universiteit
Leiden



Erasmus
University
Rotterdam



1. Background

I am a **psychologist** who loves data, AI, and new technologies (And of course **COFFEE**).

I have a long list of **UNSUCCESSFUL** startups in my CV.



2. My PhD project

Professional Learning Networks and Lifelong Learning in the Era of Transition

'...there is a knowledge gap between the people who know how to design and maintain the systems, and those who know how to make the best use of the data. Learning networks can help in **closing this gap**, by allowing professionals to share knowledge, to learn together, to innovate together.'

KROPMAN
INSTALLATIETECHNIEK

ISSO

HALMOS
ADVISEURS

CALEFFI
Hydronic Solutions

avans+

TVVL

Wij Techniek
samen werken aan jouw ontwikkeling

THE HAGUE
UNIVERSITY OF
APPLIED SCIENCES

NWO
TU Delft

TU/e EINDHOVEN
UNIVERSITY OF
TECHNOLOGY

3. Overview of using Social Network Analysis to study networked learning in MOOCs

- Growth in online education
- Online discussion forums play an important role in collaborative networked learning

Benefits of Collaborative Networked Learning

Students/ Experts

Allow them to connect, build and refine ideas

Stimulate deeper reflection

perform intellectually at a much higher level of thinking

Teachers/ Researchers

Providing information about the quality of learning and teaching

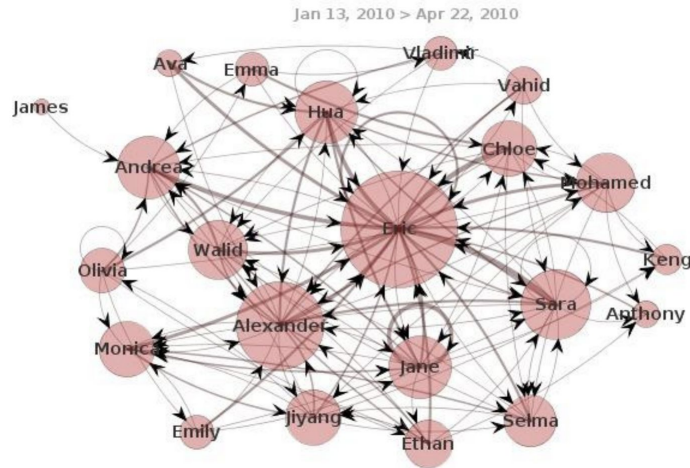
What has been learned and investigate the challenges

Building a diagnostic assessment model to improve education

What is Social Networks?

Social Networks are formally defined as a set of **actors** which are tied by one or more types of **relations**.

These relations are represented by the edges in the network connecting the actors and may have a direction indicating the flow from one actor to the other.



Why SNA?



1. Because MOOCs data is too large and cannot be assessed manually by teachers and researchers.
2. Most of online learning providers do not provide information about the participation of students and structure of interactions in discussion threads.

SNA is a Method for obtaining information about relations, fundamental structural and collaborative patterns.

Social network analysts argue that causation is not located in the individuals, but in the social structure.

Social Network Analysis

- Student interaction network
- Dynamic analysis
- Term Co-occurrence Network

Centrality measures; to find actors with the most prestige, influence, prominence or to detect the outlier actors.

The general statistics such as, **the density** i.e. proportion of possible ties that actually exist in the network, or the clustering coefficient, i.e., how many actors tend to group together.

Jan 13, 2010 > Apr 22, 2010

Students Interaction Network



It summarizes all the interactions that occurred during the course.

The instructor can **monitor the structure** of these interactions, examine which students are the leaders, and who are the peripheral students.

Consequently, students could be **ranked explicitly in a concentric centrality graph** in which the more central/powerful the node is, the closer it is to the center.

Dynamic analysis

Students' interaction network can be performed in consecutive timestamps.

It shows how the interactions, the students' roles and the collaboration groups are **changing over time**. Particularly, the dynamic analysis of the ranking of students illustrates changes in the roles and the activeness of students during the course.



Case Study

Using Social Network Analysis to explore learning networks in MOOCs discussion forums.



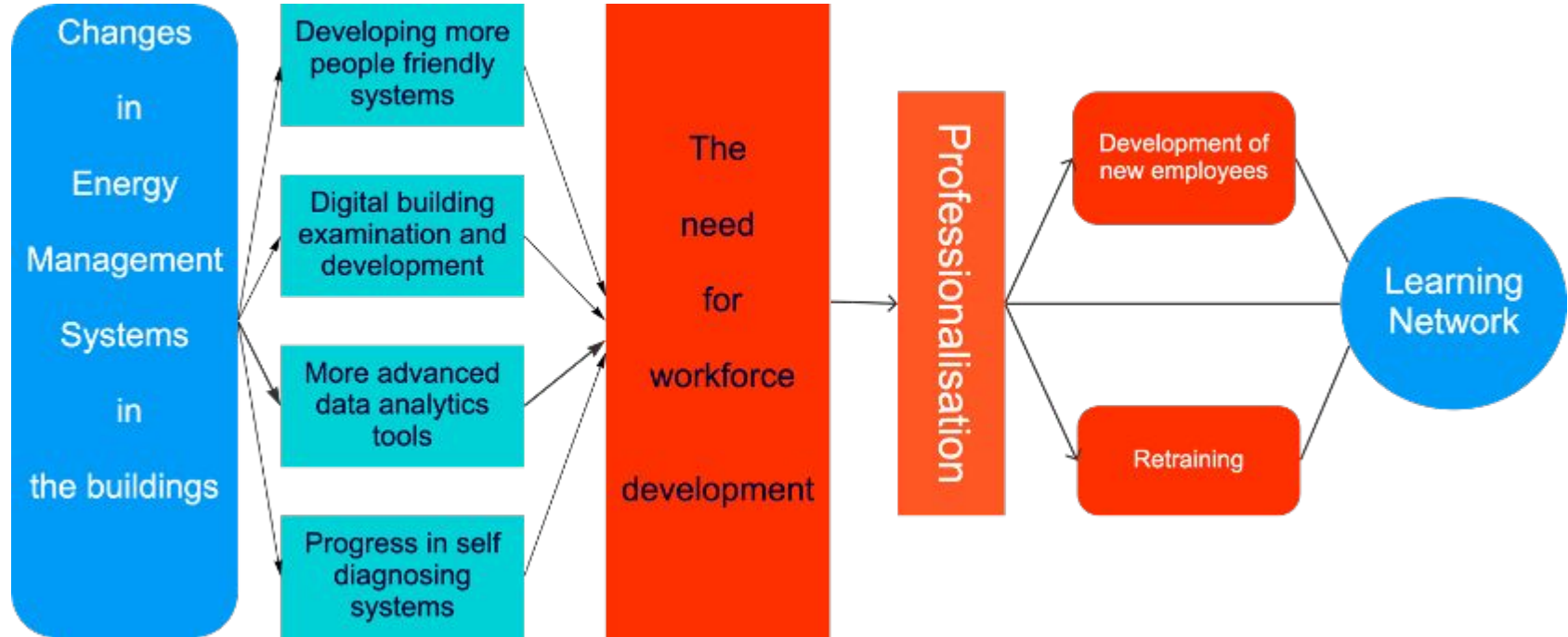
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Case study



Methods

- Three discussion forums from three MOOCs.
- Part of the “Buildings as Sustainable Energy Systems professional certificate program” on the EdX platform provided by researchers at TU Delft, the Netherlands.
- Participants: Course 1 had over 6500 participants and courses 2 and 3 were smaller by around 5000 participants.



methods

- Two type of participants: Audit and Paid (7-10 %).
- Participants from high school students who are interested in indoor energy systems to senior HVAC- designers who want to update or upscale their knowledge.
- A Python script was used to extract three variables, discussion id, discussion creator, and discussion poster.
- Using NodeXL software to run our SNA





Results

1. Network measures of all participants

	Network Metrics	MOOC 3	MOOC 2	MOOC 1
Number of replies to peer posting	Vertices	100	98	278
Number of participants in the forum	Total edges	273	284	777
number of replies that someone receives for the post	Indegree range	0-14	0-12	0-89
number of replies that someone gives to someone else post	Outdegree range	0-30	0-30	0-57
The percentage of replies to peer posting that has a reciprocal relationship (mutual interchange)	Reciprocated edge ratio	0.04	0.06	0.09

Results

2. Network measures of Audit and Paid participants

Network Metrics	MOOC 3		MOOC 2		MOOC 1	
	Not certified	Certified	Not certified	Certified	Not certified	Certified
Vertices	9	52	24	55	35	140
Total edges	10	91	41	133	102	402

Number of replies to peer posting



Number of participants in the forum



Discussion

Our design elements suggestions for future MOOCs in the technical field like energy management systems in the buildings:

1. Simple contribution request
2. Mediators
3. Peers who have more similar professional roles, work contexts, or experience



Discussion

Focus on not only the quantity of interactions but also the quality of exchanges.

- High quality and meaningful interaction can be considered as an exchange that stimulates the **intellectual curiosity** of learners.
- Exchanging the information which is **directly relevant** to the learners' real-life situation and applied to similar culture or applied setting.
- Providing **clear guidelines for discussions and interactions**
- and **setting or defining the expectations of learners**, both in formal and informal learning context.



Thank you for your
attention

Are you active in any
form of educational
forums?
why?