Exploring the relation between teacher practices, technology infrastructure and national curriculum

The case of the Goal Arrow

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"I THINK WE NEED SOME TOOLS !"

TEACHER STORIES 7 YEARS AGO

Developing a framework for learning analytics in school municipalities

The Unbearable Lightness of Consent: An Eye on Learning Analytics and MOOCs

PEDAGOGICAL VISUALIZATIONS OF LONGER WRITTEN ASSIGNMENTS: EPISTEMIC NETWORK ANALYSIS AS A FORMATIVE EVALUATION TOOL?

Simon Skov Fougt, University College Copenhagen, Denmark; Amanda Siebert-Evenstone, Sara Tabatabai and Brendan Eagan, University of Wisconsin-Madison, USA

RESEARCH QUESTION

Can epistemic network analysis (ENA) be used as a tool for the professor to support the understanding of subject learning and assessment when network visuals are compared to given grades (low (F), middle (C-D), high (A-B))?

THEORY: EPISTEMIC FRAMES

Several learning theories describe complex thinking as understanding connections among domain elements (Chi, Feltovich & Glaser, 1981; Bransford, Brown & Cocking, 1999). Shaffer (2017) builds on these ideas characterizing learning as developing an epistemic frame, which is made up of the "collections of skills, knowledge, identities, values, and epistemology that professionals use to think" (Shaffer, 2006, p.12).

EMPIRICAL DATA: WRITTEN ASSIGNMENTS

16 Danish L1 student teachers wrote a five-page literary analysis of a short story to pass the fictional-text module of the L1 specialization (one semester), see fig. 1.

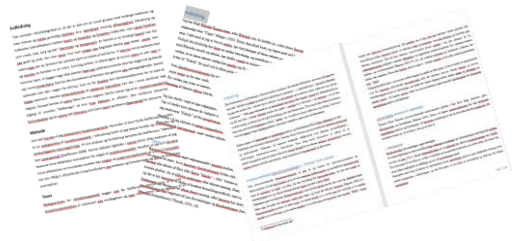

Figure 1. Examples of the written assignments

METHOD: ENA

Epistemic Network Analysis (ENA) is a tool for measuring and visualizing relationships between concepts in students' discourse (Shaffer, 2017). ENA analyzes the structure of connections by looking at the co-occurrence of concepts (codes) (see fig. 2) within a defined stanza (see fig. 3) and creates a discourse network model hereof (see fig. 4-5) (Shaffer, 2017).

stativet. Ifoelge receptionsaestetikken bestaar alle tekster af flere eller faerre "blanks" – eller "tomme pladser". Laeseren udfylder de tomme pladser, for at tilfoere saetningen eller teksten mening. Denne "udfyldning" kaldes inferens, og det er her laeseren vil skabe et konkret forestillingsindhold, samt mere abstrakte fortolkning. Saetningen og teksten giver altsaa foerst mening, efter laeseren har skabt en meningsfuld sammenhaeng, paa baggrund af sine forventninger og

Figure 2. Co-occurrence of concepts within a defined stanza

ENA enables the comparison of networks in terms of (a) complexity, or the number of types of connections, as well as strengths of the individual connections; and (b) statistics summarizing the weighted structure of network

Figure 3. Stanzas

The 16 assignments were initially traditionally assessed by their lecturer by giving them a grade A-F.

Subsequently, these assignments were analyzed with ENA, using two sets of eight deductive codes to investigate whether ENA could indicate the quality of the assignment based on visuals of the network and as compared to grades.

RESULTS: AN INDICATION

ENA can visualize and confirm the quality of the assignments compared to given grades (see fig. 4-5). The high performing students (grades A-B) make more connections between subject terms (thickness of the line) as well as an increased number of types of connections (more codes), as compared to middle (C-D) and low (F) performers. The density of the structure of connections between codes matches with the grades given by the instructor

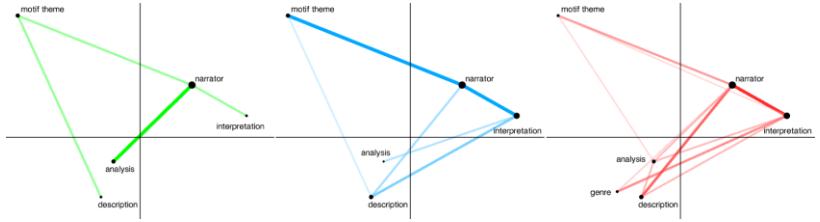

Figure 4. The epistemic networks of one low performing student (green, ID:16), one middle (blue, ID:4) and one high (red, ID:2), using 8 general literary analysis terms

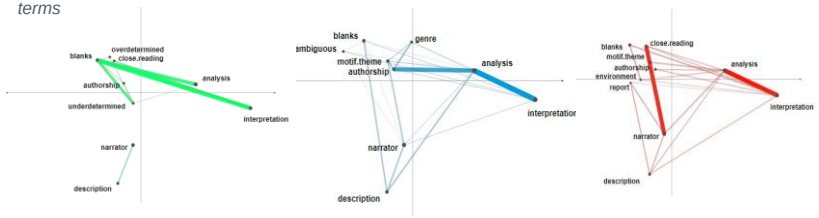

Figure 5. The epistemic networks of one low performing student (green, ID: 6), one middle (blue, ID:10) and one high (red, ID:8), using 8 general literary analysis terms and 8 specific literary terms

PERSPERCTIVES AND DISCUSSIONS

1. Using ENA as a tool to support formative evaluation - a tool for whom?
2. Using ENA as a tool to support understanding of subject learning ('proofing' the complex thinking approach) - a tool for whom?
3. Choosing the right keywords?
4. Choosing the right number of keywords?

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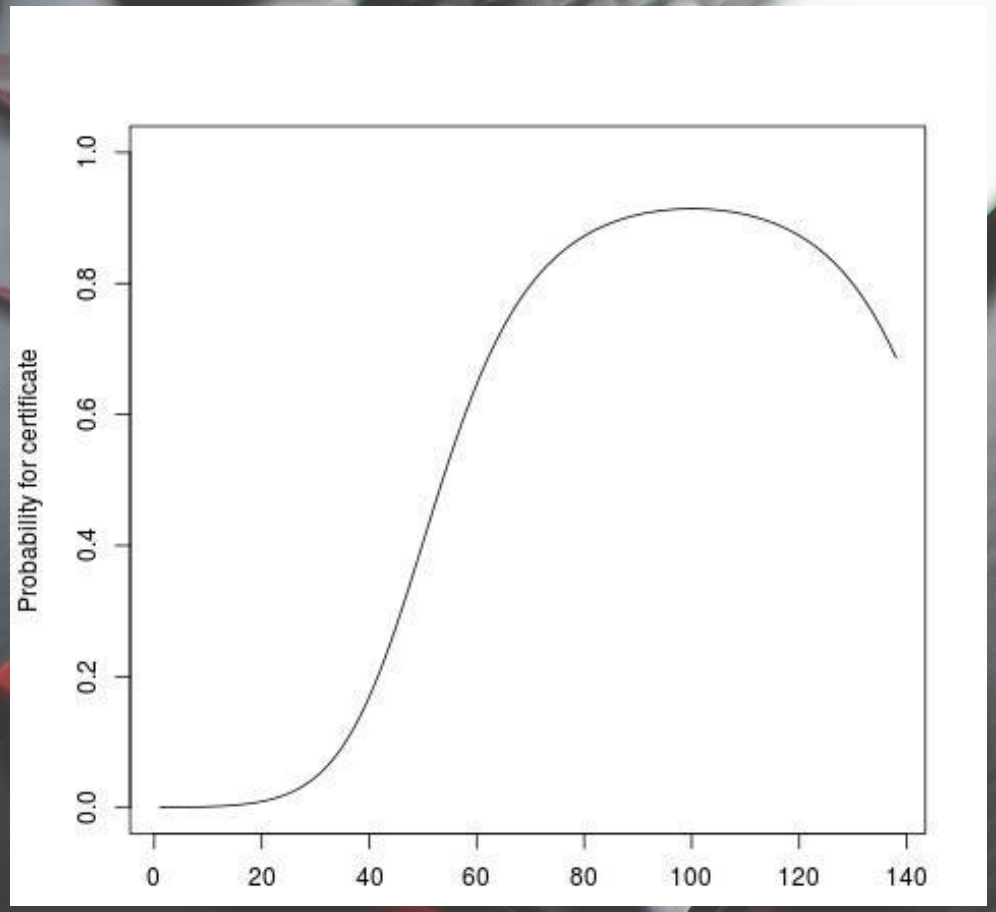
COLLECT DATA THAT REALLY MATTERS

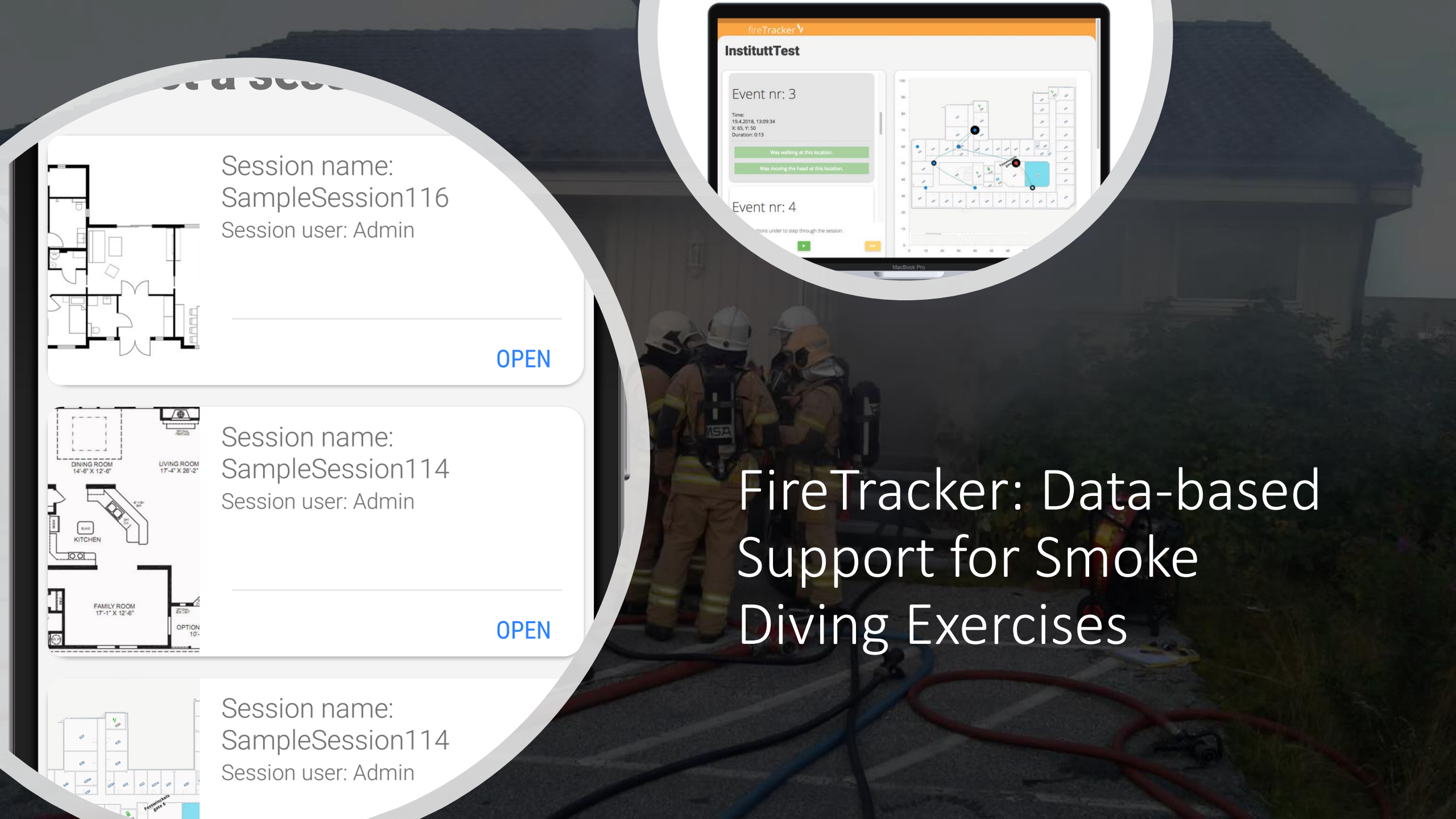
Some data are more important than others

Jeanette Samuelsen & Mohammad Khalil, SLATE (UiB)

More effort does not necessarily lead to greater success!



Study effort and study success: A MOOC case study



FireTracker: Data-based Support for Smoke Diving Exercises

ALIGNING LEARNING ANALYTICS & LEARNING DESIGN

UiO : University of Oslo

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ABSTRACT

Learning design (LD) in virtual and blended learning environments can be supported by learning analytics (LA) through providing explicit feedback to teachers about learning and teaching processes. However, to-date, this area has received little attention. This doctoral project intends to explore the potential for leveraging LA in support of and for evaluation of LDs, by exploring how different LD choices made by teachers impact students' learning experiences and performance.

BACKGROUND/PROBLEM

- LD can be supported by LA through providing explicit feedback to teachers [2]
- Thus, there is an increasing interest to explore the dynamics of LA & LD [2,3,4]
- However, empirical studies on the subject is limited
- Issues of how different LD decisions/patterns affect students' learning experiences & performance have received little attention
- The combination of LA outcomes & students' voice to redesign courses is also missing [4]

PURPOSE & QUESTIONS

The aim of the study is to **explore how different learning design choices/patterns made by teachers impact** students' learning experiences and performance, using LA and disposition data obtained by self-reports as points of reference.

Questions

RQ1: To what extent are the teachers' learning design decisions associated with students' learning experiences and performance?

RQ2: How do LA outcomes contribute to improvements in learning design experiences?

RQ3: How does the involvement of students' voice impact teachers' learning design decisions?

METHODS & MATERIALS

- Design: Educational design research
- Approach: Explanatory sequential mixed methods
- Data sources: Web-analytics (i.e. system logs from the Learning Management System (LMS) 'Canvas'), self-reported surveys, in-class observations and interviews
- Data types: Students' performance/participation data, access to course material, online engagement (e.g. online discussions), average time on task, and student feedback
- Empirical Context: Three blended undergraduate courses @ University of Oslo
- Sample: Teachers (6) 2 from @ course scenario, and students (300) Approx. 100 from @ course
- Sampling procedure: Theoretical/purposive sampling
- Analysis techniques: Descriptive & inferential statistics, social network analysis, interaction analysis & thematic analysis

LD & LA FRAMEWORK

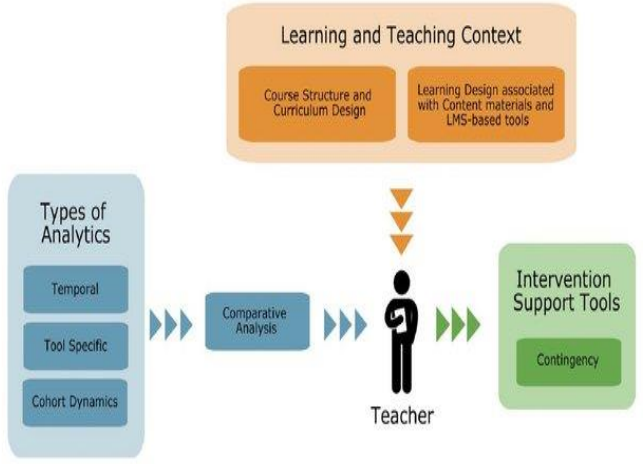

Figure 1. Conceptual framework linking LD with LA [1]

EXPECTED CONTRIBUTION

- Empirical discussion for the potential of LA towards LD
- Exploring the impact of students' involvement in LD decisions
- Formal validation/revision of LA tools and frameworks (i.e. the conceptual framework linking LD with LA) in natural learning environments

CHALLENGES/ADVICE SOUGHT

- Finding appropriate external analytics tools to plug-into the LMS (Canvas)
- Harvesting & Analysis of data from the LMS (Canvas)
- Developing appropriate measures of LA & LD data
- Gaining informed consent from students/access to relevant data from the University LMS

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PBL3.0: Integrating Learning Analytics and Semantics in Problem-Based Learning

By EVANGELIA TRIANTAFYLLOU[1]: EMMANOUIL XYLAKIS[1]: OLGA TIMCENKO[1]: MARIA ZOTOU[2]: EFTHIMIOS TAMBOURIS[2]: KONSTANTINOS TARABANIS[2]

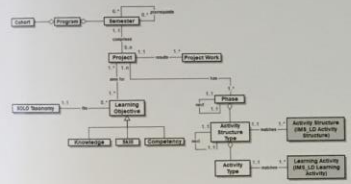
[1]Aalborg University, Copenhagen, Denmark

[2]University of Macedonia, Thessaloniki, Greece

The project

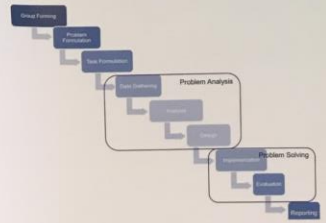
A new educational approach that combines PBL with LA respecting legal and ethical considerations (termed PBL_LA).

- design a semantic model for PBL_LA for the annotation of learning resources

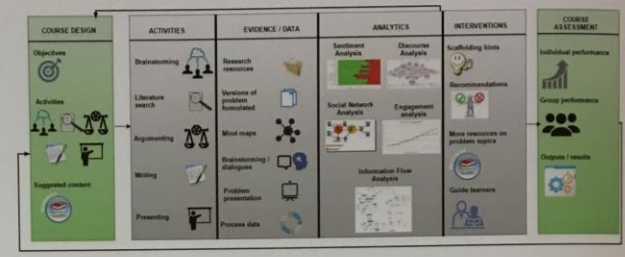


- create relevant, semantically annotated educational materials and perform trials to draw evidence-based conclusions
- produce relevant policy recommendations that can raise the quality in education and training
- create an organic ecosystem of organizations, researchers, learners, etc with an interest in PBL_LA.

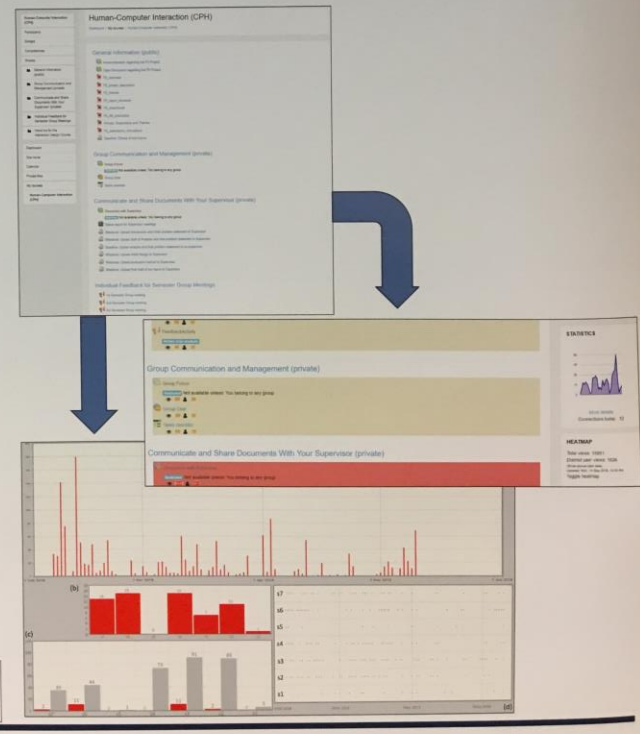
PBL project work activities



PBL_LA instance for problem formulation



PBL_LA applied in a pilot in Moodle



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NORDIC LASI 2018: 29-30 August 2018, Aalborg University Copenhagen, Denmark

Learning Analytics in Digital Mathematics Textbooks

Marie Utterberg
Department of Applied IT, University of Gothenburg

UNIVERSITY OF GOTHENBURG

Introduction and purpose

As students increasingly use digital technologies, new kinds of software are developed using students as sources for data tracing of their activities on digital platforms. Furthermore, teachers in mathematics are beginning to use digital textbooks, which often have embedded functionalities allowing for continuous real-time measurement of students' activities including the use of learning analytics dashboards.

However, mathematics teachers that could follow students' progress on a dashboard, asses students and assign tasks and activities, did not use the feedback extensively (Faber, Luyten and Visscher, 2017). Data visualisations are not actionable if they do not disclose necessary information for teachers, and it seems to be a limited joint agreement on what information that is relevant for dashboard users in a learning context (Verbert et al., 2014). Furthermore, there is a lack of research examining how exactly teachers respond to and make use of learning analytics (van Leeuwen et al., 2017) and of the relationship between the information visualised on a dashboard related to users' reactions (Park & Jo, 2015).

Dashboards, three examples

One DT has tasks that are self-adapted to each student's level of progression. Dashboard shows if the student has an increased (green-bar) or a decreased (red-bar) knowledge progression in various topics.

A dashboard showing a student's points and levels (gamification), correct tasks and self assessment of how well instructional video clips are understood (dumb up/down).

A dashboard in which information about each student's assigned tasks are aggregated and visualised.
One student has solved 171 tasks of the 237 that was assigned. 90 % of the maximum score is achieved. The circle shows that the student has 21 incorrect answer, has called for right answers 4 times, has not called for a clue and has seen instructional video clips 4 times.

Methods

Three designer/developer, one from each DT, have been individually interviewed to give an understanding of ideas behind the DTs, their functionalities generally and of learning analytics dashboards specifically.
We have conducted interviews with nine teachers that are users of one of the DTs.
We have log data from teachers in Sweden using one of the DTs. This raw data, not yet analysed, includes students' interactions with different kinds of mathematics activities and tasks, assigned by their teachers.

Preliminary results

"All information given by the dashboard is incrementally developed from teachers' requests. Hence, I have no general picture of how they could make use of it." Designer

"Sometimes I show the dashboard on the projector for the students. - Look what I can see, here you can not avoid working." Teacher

"Because all the answers will be entered, the system can compile and give statistics to the teacher in real time. I knew that we must make use of that, to give the teacher better control." Designer

"According to the constantly ongoing technical development, digital textbooks will adapt and change with new functions. Hence, the teacher must continually take time to learn." Designer

Teachers used real-time data in the classroom to ensure that no students will be left behind. Previously, with printed textbooks, students could pretend working or correct tasks by just re-write with help of the answer key. However, digital dashboards allow teachers to take notice of students' performance during lessons. Teachers said that their control of students' work effort increases.

Students' data aimed for teachers to understand individual knowledge or to address misconceptions in learning, does not appear to be of main interest. Rather, teachers wanted to use their own assessment competency.

Additionally, teachers expressed that it would be a challenge if students' comprehensive mathematics understanding is supposed to be digitally assessed.

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MINING FOR EUROPEAN PEDAGOGY; LOOKING INTO THE DIVERSITY OF EDUCATIONAL DESIGNS USING QUALITATIVE DATA

By Soegaard, Mette, Cphbusiness, Copenhagen, Denmark

Introduction and problem

Using software for word processing affords i.e. writing. Using that tool does not require the same amount of manual dexterity nor the same eye-hand coordination as writing with a pen on paper. What else changes, when using digital tools for learning?
If the digital tools in and off themselves offer affordances for some learning activities and not requiring other activities one must assume the chosen pedagogy is mirrored in the students' use of digital tools and consequently the learning outcome.
Educational design needs to take both the formal and the informal teaching/learning provided by the tools into account.
This poster suggests one way of mining for questions to be examined further in regard to the European Commission's "Key Competences for Lifelong Learning"

Methodology and Empirical Basis

A survey (N=375) was made in regard to the use of software for study purposes among students and teachers at two universities in Denmark. The different types of software were analysed in regard to Learning Affordances supporting the Key Competences for Lifelong Learning.

Theory

I used the European Commission's "Key Competences for Lifelong Learning" (EUR-Lex, 2006) dissolved into required learning affordances (Bower, 2008) to triangulate the qualitative data (Jansen, 2010) with Bower's affordance analysis e-learning design methodology (Bower, 2008), looking for outliers.

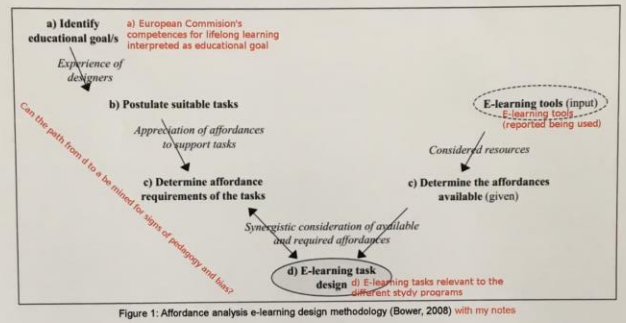

Figure 1: Affordance analysis e-learning design methodology (Bower, 2008) with my notes

Results

Here I (Soegaard, 2016) report two correlations between study program and use of digital tools with significant effect size:
- Video conference is being used more by one study program (47.4% against 27.6% on average). The study program is an online program, using video conferences as one primary way of communication between students and staff and students in study groups.
- The affordance "search-ability" did not show significance in itself, but the tools used for searching did: The use of Wikipedia was on average 25.4%, but students from one study program did not mention using it. The use of library databases was on average 10.2% and one study program reported using it significantly more with 27.8%

Analysis and Discussion

The reporting of one tool over another does not imply how the tool is being used.
The use of video conference in an online masters program is an unsurprising pedagogical choice and might be indicated in the numbers.
If use of search engines is tied to critical thinking, it might be worth examining the pedagogy of the study programmes further and find out if the numbers show choice or hidden bias.

Conclusion

This poster does not claim to report any results of validity!
If triangulating European pedagogical goals with learning affordances at the used tools reported in the survey and qualitative statistical analysis results in a glimpse of the pedagogy and biases, the procedure could be suggestion for a stepping stone to further qualitative inquiries prior to isolating variables to be quantitatively verified.

Acknowledgement

Thank you Pantelis Papadopoulos for encouraging me to mine the data set as well as supervising me as I wrote my master thesis.

Literature

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Exploring Physics Education in the Classroom and the Laboratory with Multimodal Learning Analytics

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Introduction

There is a good amount of evidence set out in recent reports that show the rising importance of working with other agents, both people and machines, to solve complex problems across subjects.

In the case of physics education with the focus on neutron sciences in preparation for the European Spallation Source (ESS), many teaching/learning initiatives have been launched that allow for collaborative problem-solving in authentic contexts, the laboratories.

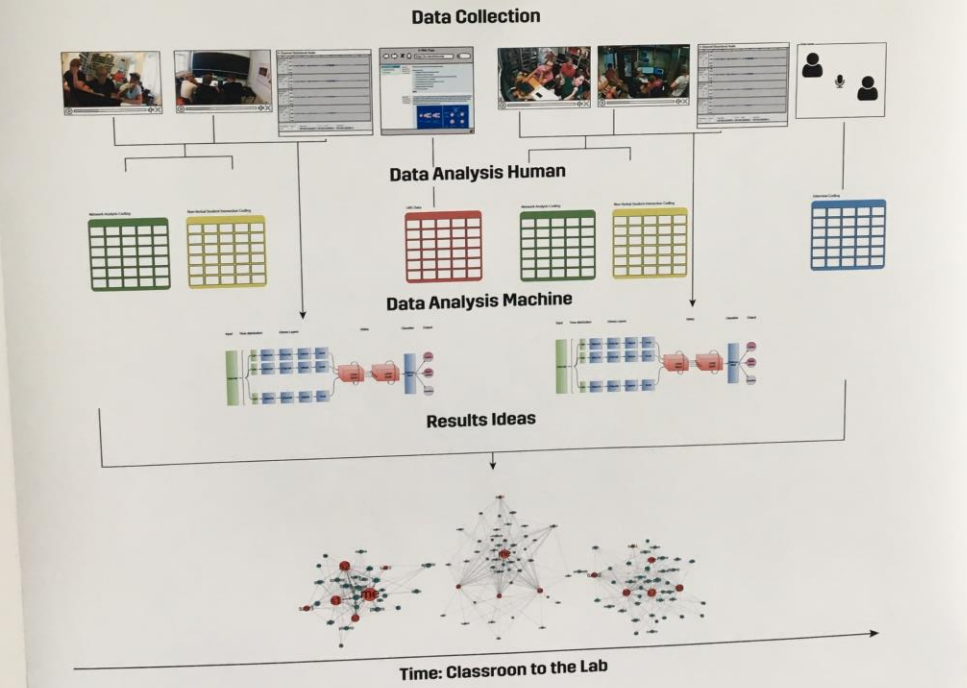
Our research aim is to examine how the students' actions change from the classroom to the laboratory to understand how the coursework can further support the laboratory work in real scientific experiments.

Approach

We are investigating student behaviour in a neutron scattering science course using a combination of server logs, MMLA and observations of learners in the classroom and authentic experimental environments.

We expect some students to display behaviour which can be identified as in-depth learning strategies, while other students display behaviours more associated with surface learning. However, a given student may display in-depth learning strategies at one point in time, and surface learning strategies at other points in time.

Concurrent with logging and analysing online behaviour, we will use video and audio recording student interactions with online course material during class and during group work that will be analysed by human and machine with ongoing MMLA work that explores group collaboration



UNIVERSITY OF COPENHAGEN

MALMÖ UNIVERSITY

Learning Analytics from a Student Perspective

Student preferences regarding use of data to support academic goals and ambitions

A survey conducted among first year Danish high school students (n=339) asked students about different data preferences, to understand what kind of data that supports students at their individual levels in terms of academic ambitions. This rich dataset tells us that students want informative data, that helps them filling out their knowledge gaps and perform better. They are less interested in comparative data, like clickstream data and time spent in digital systems, which is what is often being used in student dashboards as an indicator of engagement.

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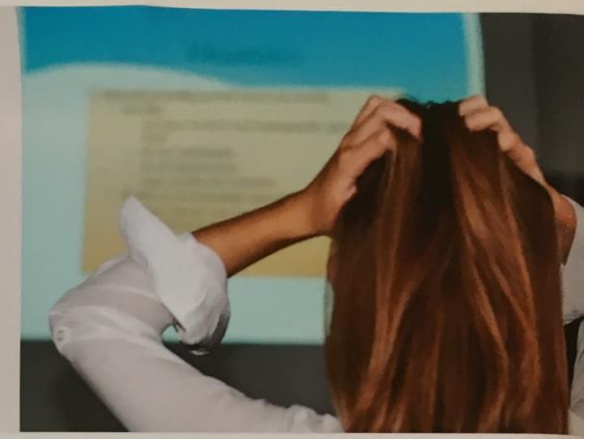
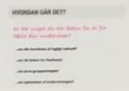


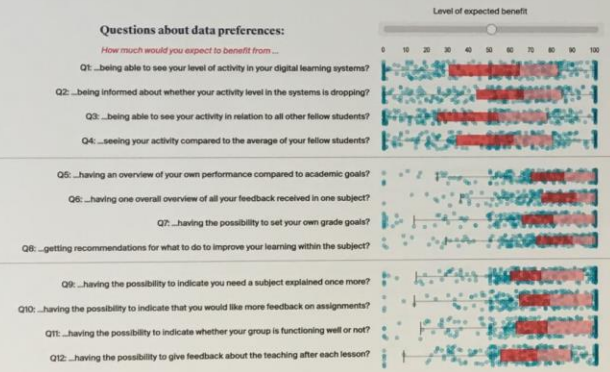
Survey about data preferences

Data from digital learning systems

Data on academic goals and feedback

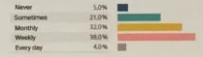
Student self-reported data





About students willingness to provide data about their learning process to the teacher.

Q14: How often do you think you would benefit from giving data back to your teacher about your learning process, through a simple digital interface?



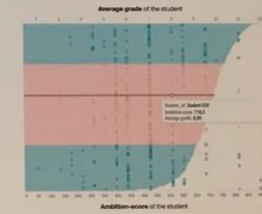
Measuring academic ambition

The survey contained 2 set of questions (same set of questions for a subject that the student found hard and easy) about use of:

- **goal-setting**
- **grade-level**
- **use of feedback**
- **help-seeking behaviour**
- **level of satisfaction with knowledge**

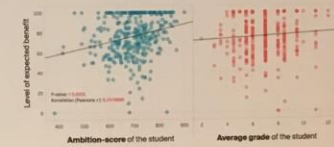
A quantitative method to calculate a score defining the level of academic ambition based on these questions was developed. This ambition-score can ultimately be used to ensure development of data interfaces that support different student profiles in terms of their academic ambitions.

There is no correlation between average grade and the ambition-score



Q10 *How much do you think you would benefit from being able to...*
indicate that you would like more detailed feedback on your assignments?

The ambition-score is a better indicator than grade-average, when predicting which students would benefit from a specific data preference.



Students want to submit data about their knowledge gaps

This survey tells that many students do not feel comfortable about asking questions to the teacher in class, when they do not fully understand the subject taught.

These students keep on struggling to understand. If they get their assignment back from the teacher with insufficient feedback or no formative feedback at all, their knowledge gap will increase furthermore.

The students asked for a simple interface, that let them communicate in an easy way. With a few clicks they can ask for extra feedback or indicate that they are struggling with specific curriculum content.

The teacher can easily see which students need the subject explained once more, and who needs more feedback on the assessment. The teacher dashboard informs the teacher continously about every students needs.

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This poster describes the research from my Master thesis specializing in Learning Analytics. Aalborg University, spring 2018.

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Qualitative Learner Analytics: Screen Recordings and Learning Feedback

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Introduction & Problem

This poster calls for an increased student and learning transfer-oriented approach in learning analytics.

The technology perspective prevails, and the focus in learning analytics has so far been primarily on *"what"*, i.e. quantitative measurements of the performance of students.

This poster suggests an alternative and more learning transfer-centered approach, which focuses on *"how"*, i.e. qualitative recordings of the actions of the student.

The objective of this poster is to discuss a student and learning transfer-oriented model on qualitative learner analytics and to discuss the advantages and disadvantages of using screen recordings, feedback rubrics, self-evaluations and feedback sessions.

Methodology and Empirical Basis

A total of 75 students from different classes studying different programmes at Copenhagen Business School and SmartLearning participated in five controlled studies.

The test persons followed this process:

- Received the test case
- Made the test according to written instructions
- Uploaded case texts
- Switched on their integrated screen recorder
- Uploaded screen recording
- 75 case texts
- Self-assessed their performance
- 75 feedback sheets

The five controlled studies resulted in a total of

- 75 screen recordings (approx. 6 hours each)
- 75 self-assessments

which is the empirical basis of this poster.

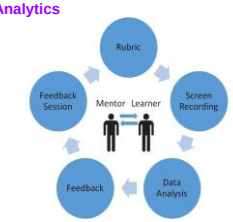
Theory

Learning analytics is usually defined as *"the measurement, collection, analysis and reporting data about learners and their contexts, for purposes of understanding and optimizing learning and environments in which it occurs"*, cf. (Siemens 2011). But that is conventional learning analytics, uses a different approach, cf. (Duval 2012), who defines learning analytics as *"about collecting traces that learners leave behind and using those traces to improve learning"*.

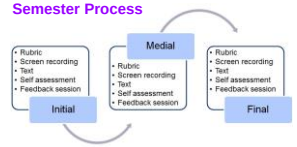
And this is in fact what this poster is based on. To use "traces that learners leave behind" to improve learning. Learning and learning transfer are what this poster focuses on.

As will appear, this poster is based on a thick

Model on Qualitative Learner Analytics



Semester Process

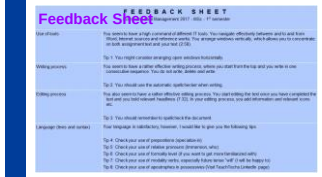


The teacher uses three case-based assignments. One assignment at the start of the semester, one mid-semester assignment and one end of semester assignment based. The process is based on the same rubric, self-assessment and feedback rubric, which enables the teacher to follow learning performance and progress.

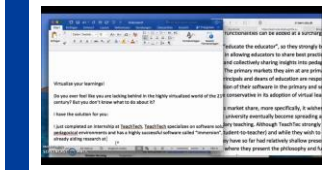
Rubric

Rubric Feedback

Feedback Sheet



Screen Recording



Analysis and Discussion

Learning analytics as a field has to some extent been hijacked by technologists, cf. also (Bernhardt & Simonsen 2017), who refer to this questions as the *"Good Cop versus Bad Cop perspective"* The approach presented in this poster attempts to get the discussion on the right track again, because our efforts must focus on the student and the learning process. The model on qualitative learner analytics and the semester process outlined above, offer an alternative approach and is called learner analytics.

The use of rubrics, self-assessments and screen recordings are particularly powerful, because they enable the teacher and the student to focus on the "how" and the "why". It is also argued that the model and process suggested also enable the teacher to design for learning, cf. also (Nortvig 2016). Finally, it is argued that learning also takes place as a social process between peers and between the student and the teacher, and it is argued that rubrics, screen recordings and feedback sheets support that social learning process.

Conclusion

The objectives of this poster was to discuss a student and learning transfer-oriented model on qualitative learner analytics and to discuss the advantages and disadvantages of this method. On the basis of data from five controlled experiments with different classes at CBS a model on qualitative learner analytics was developed. It was found that the model in fact works in practice and that the students seem to like the personal feedback sessions based on screen recordings and feedback rubrics. Admittedly, the process is quite time-consuming, because the teacher needs to process a lot of data and spend time on personal F2F feedback sessions with the student.

Literature

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Towards Detecting and Understanding Changes in Behaviour by Smart L earning Environment

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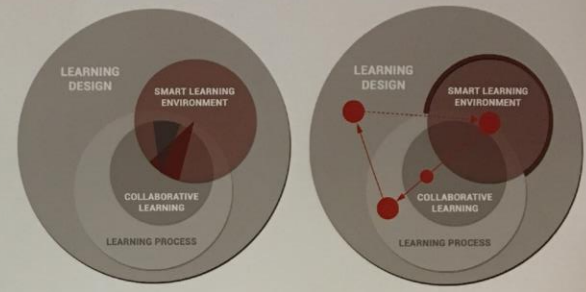
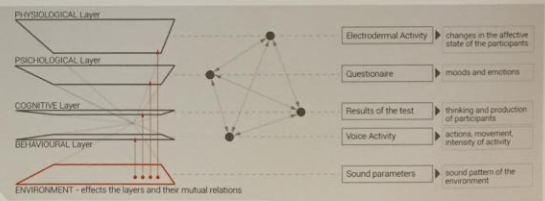
Certain areas of Smart Learning Environment (SLE) are insufficiently explored. Sound, as an element of the environment, provides great opportunities for influencing content that takes place within the space. In addition, in the context of learning, we recognize transitional periods as a place where intervention is possible. Transition periods would represent a novelty in the learning design as part of a teaching that has not been sufficiently treated so far. Other areas such as sports and business use transitional periods to improve performance and we are interested in how the environment (sound) can affect those transitional periods, so that we do not jeopardize the content of learning, and at the same time improve the performance. Research of how the environment creates a sound which creates transitional periods as a generator of working/learning mindset is the area that we want to analyze and discuss in more detail. Automation and visualization of this process is a specific topic of our interest.

Keywords: Smart Learning Environment, Learning Design, Sound, Transitional Activities, Layers of Behaviour.

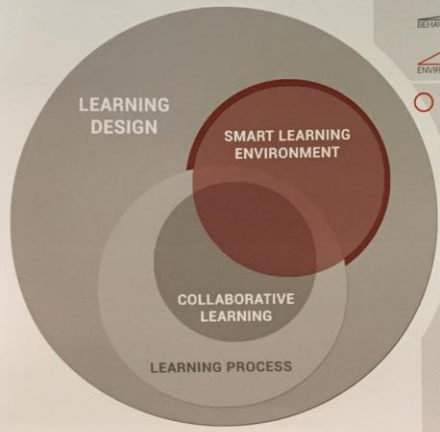
Research Question & Contributions



Framework



Research Context



Visual Representation

The goal of this paper is to articulate an approach that can frame understanding and operationalization of the relation of the sound footprint of a learning space with the behaviour of participants and its impact on learning. We examine the effect of the environment through multiple layers. Each of the layers has indicators and they are interconnected through interdependencies of changes in layers. We propose a framework that shows the dependence of parameters at the layers as a tool for insight into the changes that occur at each of the layers.

"la Caixa" Foundation

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