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► To cite this version:

Yael Fleischmann, Tobias Mai, Rolf Biehler, Alexander Gold. Digital learning materials in traditional lectures and their evaluation at the example of a voluntary pre-university bridging course. Eleventh Congress of the European Society for Research in Mathematics Education, Utrecht University, Feb 2019, Utrecht, Netherlands. hal-02422613

HAL Id: hal-02422613

<https://hal.science/hal-02422613>

Submitted on 22 Dec 2019

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Digital learning materials in traditional lectures and their evaluation at the example of a voluntary pre-university bridging course

Yael Fleischmann, Tobias Mai, Rolf Biehler and Alexander Gold

University of Paderborn, Germany;

yael.fleischmann@math.upb.de, tmai@math.upb.de, biehler@math.upb.de,
alexander.gold@math.upb.de

Keywords: transition, bridging course, evaluation design.

Description of the research topic

This contribution documents an excerpt from a conducted research study concerning the integration of digital learning materials into a voluntary, attendance-based bridging course for freshmen majoring in different engineering subjects at the University of Paderborn, Germany. The focus of the study was to evaluate the acceptance of digital learning materials by the students during the lectures and self-regulated learning days of the four-week course. Based on the use of an audience response system (ARS), we developed an instrument to collect feedback from the students immediately after elements of blended learning – such as students' usage of interactive applets and digital, self-evaluating tasks with solutions and different elements using the ARS – were implemented during the lectures of this course to obtain students' reactions as instantaneous as possible.

The digital material was provided in form of the studiVEMINT-online course, which can be found on the website www.studiport.de as free-access material (only available in German yet). This learning material was designed and implemented by our research team during the years 2014 to 2016 and was created as an independent online course in mathematics that can be used for free by any person who wishes to prepare her- or himself for university mathematics (e.g., Biehler, Fleischmann, Gold, & Mai, 2017; Colberg, Mai, Wilms, & Biehler, 2014; studiVEMINT homepage: go.upb.de/studivemint).

Additionally, we prepared work assignments for this digital course that the students were asked to work on during the self-regulated learning days with the intention to support them in repetition and deepening their knowledge.

The study was conducted to answer (among others) the following research questions:

1. Do students appreciate the integration of digital learning materials in the lecture, i.e. do they experience it as a support for their learning process and do they find pleasure in using the materials?
2. How much time do the students invest to work with the provided learning materials on the self-regulated learning days?

Theoretical background and method

ARs can support feedback from learners and provide a means to collect data for research purposes. Ebner, Haintz, Pichler, and Schön (2014) suggest a distinction between front-channel (direct

feedback during lectures) and back-channel (asynchronous feedback during and out of the lecture) of those systems. They further distinguish these into qualitative and quantitative forms of feedback. The focus of the study is the evaluation of the presented teaching scenario in mathematics with its elements of blended learning (e.g., Bernard, Borokhovski, Abrami, Schmid & Tamim, 2014) via the ARS.

We used the ARS functionality regarding quantitative front channel feedback (Ebner et al., 2014) during the lectures to collect reactions to the use of the digital elements as instantaneous as possible. Furthermore, we asked the students how much time they spent working (as they were requested to do) with the digital learning material on the self-regulated learning days in each subsequent lecture. Supplementary data was collected by a pen and paper questionnaire issued at the first and the last day of the course.

Results and discussion

The feedback concerning the integration of the digital learning materials into the lectures was largely positive. However, while looking at the results more closely, we found that more students appreciated the support of the digital materials for their learning processes than reported having pleasure while working with those materials. Another result was that the time students spent on their self-regulated learning days decreased dramatically during the four weeks of the course, even though students reported that the work on the tasks for these days was helpful for their individual learning and understanding. Further and more detailed results from the study have been presented at the conference.

Literature

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