The usage of digital resources during the Corona semester at a German university

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ABSTRACT

Due to the pandemic, the summer semester 2020 was largely offered digitally at all German universities. The following article deals with the effects of the online semester at a German university BTU due to the pandemic-related closings. For this purpose, student data in the BTU's online platform was compared with data from previous years and during the pandemic semester. Within this article are discussed on the one hand, the existing digital learning materials, and on the other hand, the live video platform BigBlueButton, which the students used to communicate with the teachers. In addition to the experience from the Corona semester, the article also deals with evidence-based empirical results that were collected in the summer semester 2020.

Keywords: e-assessment, learning analytics, digital math education, online course, pandemic, German university, live video, BigBlueButton

1. INTRODUCTION

The engineering students (electrical engineering, mechanical engineering and industrial engineering) at the Brandenburg Technical University Cottbus-Senftenberg (BTU) have been offered study-related, electronic tests in mathematics (in the first and second semester with 6 SWS each) since 2014. Since 2016, the successful (successful = at least 50 percent of each test solved correctly) processing these weekly tests has been part of the compulsory examination admission in mathematics [1]. The tests are designed in such a way that, due to the randomization of the task variables, they can lead to increased learning success even if they are processed several times [2]. The tests and other activities (e.g. learning videos, simulations and interactive materials such as memories) in the digital course room have also been accompanied and additionally evaluated with the help of tools for collecting learner data (learning analytics) since 2016 [3]. As part of this contribution, the student activities (which is understood as digital engagement in this context) due to the pandemic-related online summer semester 2020 are to be compared with those from previous years (summer semester 2014 to 2019). These student cohorts are largely comparable in terms of the total number of students who took part in the course, as well as their previous knowledge of mathematics and the final examination (exam grades).

2. USE OF EXISTING DIGITAL LEARNING MATERIALS

Basically, it can be said that there was no significant increase in the general use of existing digital learning activities (as they were also offered in previous years). This may be due to the fact that the BTU encouraged its students to use corresponding digital materials even before the pandemic. Since the students were offered live video (with the system BigbBueButton) as a substitute for the face-to-face lectures, in which the content of the lecture was processed in digital form, this activity was used significantly more. The number of participants in these video conferences was almost identically high throughout the semester (an average of 75 percent of the entire cohort). This means that some of the video conferences were perceived better than the actual face-to-face courses from previous years. Due to the special study situation in the online semester, it may be obvious that the students have also increasingly dealt with digital learning materials outside of the BTU's digital course room. However, this is not the case. The use of (BTU)-external learning materials has also been recorded since 2014. There is no significant quantitative increase in student responses compared to previous years. It can also be stated that there was a shift in online activities in the area of mandatory tests from the last possible submission date [3] to the day on which the video connections were offered (see Figure 1). Furthermore, the electronic test materials were rated significantly better by the students in the evaluations during the entire online semester than in previous years (see Figure 2). [4]

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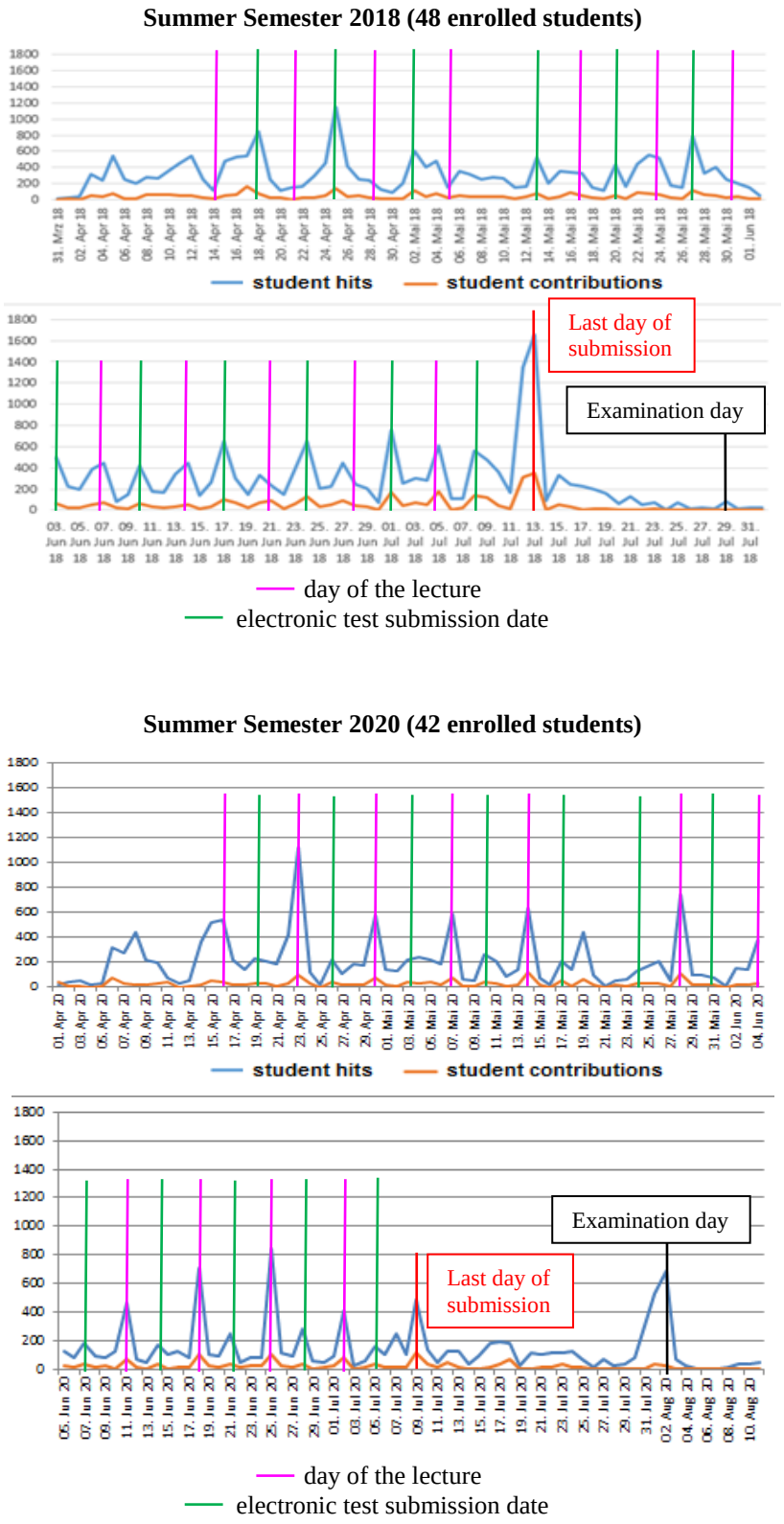

Figure 1 Comparison of daily student activities in the classroom semester (2018) and online semester (2020) via learning analytics

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I like working with the electronic tests:

(1 = strongly agree; 2 = agree; 3 = neither; 4 disagree; strongly disagree)

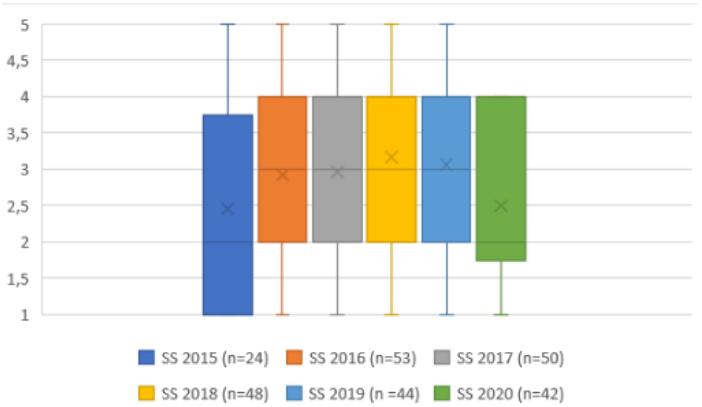

Figure 2 Rating of the electronic tests (student perspective) from summer semester 2015 to summer semester 2020

3. LIVE STREAMING SYSTEM "BIGBLUEBUTTON"

In teaching at BTU, there has been a steady increase in the use of educational videos and video conferencing systems in recent years. [5][6] Since 2015, the video conferencing system Adobe Connect is directly connected from the courses on the learning platform via Moodle plugin. [7] Adobe connect has been used for live streaming lessons and instructors received regular training and work well until beginning 2020. Before the Corona crisis, our university relied on Adobe Connect, but from mid-March 2020 (Lock Down in Germany) it became apparent that this system could not meet the demands placed on it with the resources made available to the university. The main problems at this time are: no connection or long connection establishment, cancellation of meetings during the meeting, very low number of participants possible, while at the same time rapidly increasing usage on the learning platform and especially in video conferences. Quick action was required and alternatives were researched immediately.

The following main requirements had to be met for the evaluation of a new system:

- Security and privacy (Hosted in Europe, if possible in own computer administration center, compliance with data protection regulations)
- Maximum active participants (at least 50 active users)
- Integrate via plugin into Moodle (learning platform)
- Conference scenarios (for confidential conferences, internal consultations, examinations, defenses, collaborative seminars)
- Additional functions for teaching (shared whiteboard, shared notes, participant status, surveys)

The decision was made for BigBlueButton (BBB), it’s an open source web conferencing system for online learning. The goal of the BBB project is to enable remote students to have a high-quality online learning experience. BBB enables real-time sharing of audio, video, and screen. [8]

Several BBB instances were set up in BTU's data administration center and connected to the learning platform and other platforms via Moodle plugin. [9] BBB is also successfully used for projects such as "Profilgebundene Wissenschecks 2.0" and “College” for project meetings, for preliminary and accompanying courses. (see Figure 3).

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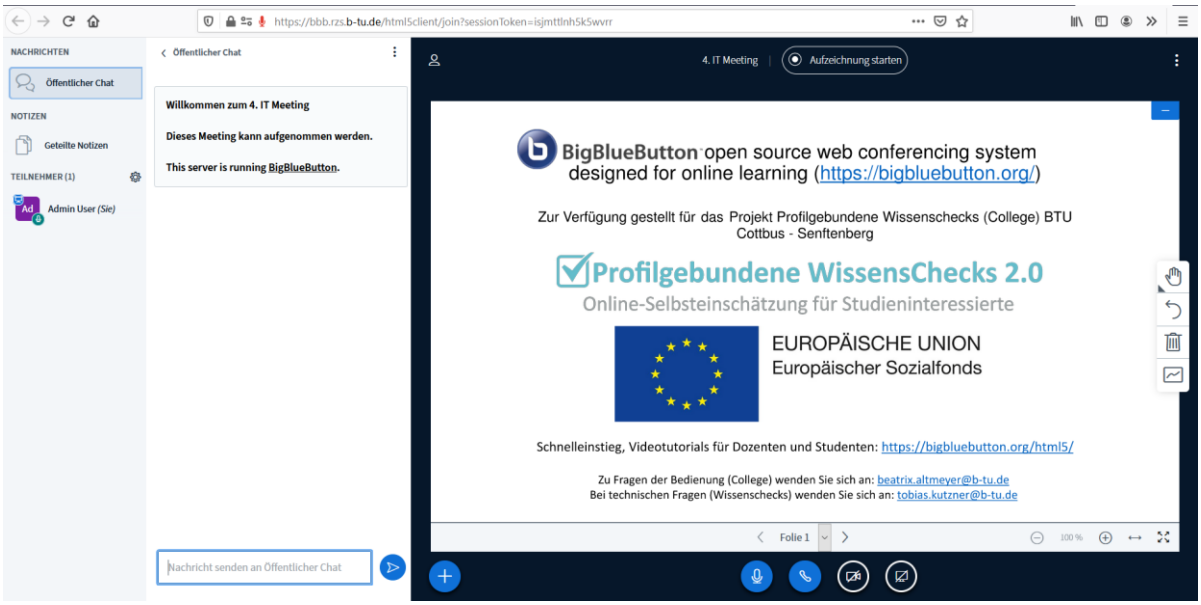

Figure 3 BigBlueButton client

The use of BBB increased by the end of the summer semester up to 272 activities with up to 60 possible users (respective integration in courses) in the learning platform and for Adobe Connect, which continues to be used in parallel, up to 305 activities in the learning platform with up to 200 possible users per activity, but due to the high capacity utilization currently limited. In addition, BBB is still used as a single instance for learning platform independent video meetings and for various projects at BTU.

4. CONCLUSION AND OUTLOOK

In summary, it can be said that in the field of engineering mathematics at the BTU, due to the long-term use of digital materials in the classroom, no significant increase in the use of these materials can be observed even in the pandemic compared to previous years. However, due to the shift of all lectures and exercises from classroom to online courses with live video lessons, a strong increase in the use of these systems can be observed. This can be seen in the sharp increase in the number of activities on the learning platform. Due to the fact that almost everyone was forced to work from home during the LockDown phase and that meetings at other universities throughout Germany were not possible, tele- and conferencing remained the only possibility for face to face communication. This has led to a much greater use of these systems not only in teaching but also in projects at the BTU.

It has been shown that digitization in recent years has enabled the infrastructure and knowledge of those responsible to continue teaching and university operations with restrictions, particularly in the area of university digital learning. In the meantime, many restrictions have been lifted again. Lectures and exercises, for example, are once again being held locally for some of the students, but the crisis has not yet been overcome, so that the use of online teaching will continue at least at the same high level in the coming winter semester.

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