

Isolation or Interaction? – Challenges in Studying Online Teacher Training Students and their Experiences with Online Teaching

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Abstract

The Corona pandemic has banished students and lecturers alike behind the PC at home. An academic exchange, courses and learning have largely taken place in private. Formal as well as informal exchange is only possible in a modified form. This poses new, previously unknown challenges for everyone involved. Universities have reacted quickly and created a formal framework by providing the necessary infrastructure, such as conference tools or examination platforms. But for students, the overall study situation tends to be difficult. Students have less contact with their fellow students, difficulties structuring their day and coping with the learning material. In this paper, the question of how students deal with the challenges of online study after nearly three semesters of online teaching is explored. For this purpose, results of a study conducted with teacher training students at a German university are presented and put up for discussion. The focus was on the aspects of technical equipment as a prerequisite for being able to participate adequately in online teaching, the interaction with each other and with the lecturers, the design of the online teaching and experiences with online exams. In addition, it will be discussed whether asynchronous courses and online exams are still desirable study formats even after the pandemic and whether the students see added value for their own professional future through participation in digital formats. From this, recommendations can be derived on how students can be supported and benefit from participating in digital study formats during and after the pandemic.

Keywords

Online study, initial teacher education, university teaching, online teaching, further development of university teaching

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1 Introduction

Online seminars, asynchronous lectures or digital open-book exams – these teaching and examination formats already existed before the outbreak of the Corona pandemic. But since March 2020, they have suddenly become the talk of the university sector and have gone from being the exception to the rule within a very short time. What was initially conceived as a transitional solution to keep teaching going has now been in place for three semesters. The so-called „digital semester“ has become normal everyday life for students and lecturers. Instead of sitting in packed lecture halls, students sit alone at home at their laptops, meet online with their fellow students and lecturers to work together on content from courses or prepare for exams. But how do students fare in this home-study situation? While general and vocational education institutions are now rarely affected by complete closures, students still have limited access to the university and related infrastructure. Although many universities are planning to return to more face-to-face teaching in the coming semesters, a pandemic-related continuation or even a complete return to digital offerings is conceivable at any time. A discussion of problem areas, but also of the advantages of digital studies, is central to the further development of teaching. A good university education also includes responding to the needs of students. In this chapter, the following questions will be answered: How well does digital teaching work, what challenges does it bring with it and how do students deal with it? Which aspects have proven to be positive and should be further considered for further development of teaching in a post-pandemic period? All this will be discussed using the results of a survey with students at the university location Chemnitz (Saxony/Germany) as an example. Since the participants are students from the primary school teaching programme, it will also be discussed how the pandemic has influenced their practical experiences in connection with school placements and which insights from online teaching they find helpful for their own later professional practice.

2 Study Conditions in Germany in Times of the Corona Pandemic

Numerous studies were conducted in the summer semester 2020 in Germany at various university locations and also nationwide, looking at the study situation during the first semester in the Corona pandemic. They show that in many places the transition from face-to-face to digital teaching initially went well (Berghoff et al., 2020; Karapanos et al., 2021; Kreidl & Dittler, 2021). However, students do not always find it easy to keep in touch with their fellow students or to organize their day with more personal responsibility (Marczuk et al., 2021; Traus et al., 2020). As a result, many feel more burdened in the digital semester (Adam-Gutsch et al., 2021; Hahn et al., 2021; Kreidl & Dittler, 2021; Traus et al., 2020). The reasons for this are manifold. For example, this can be associated with more required independence and a simultaneously increased workload, for

example due to a more time-consuming processing of the accruing learning material (Adam-Gutsch et al., 2021; Feucht et al., 2020; Kreidl & Dittler, 2021). Students also state that they are more often distracted from their studies at home, that they have difficulty concentrating and that they are less able to organise themselves (Karapanos et al., 2021; Kreidl & Dittler, 2021; Marczuk et al., 2021; Traus et al., 2020). Looking at student satisfaction with digital learning opportunities, a very heterogeneous picture emerges. The quality of teaching is perceived as lower than in-person (Kreidl & Dittler, 2021). Especially the didactic design and the motivation by the lecturers seem to be difficult (Berghoff et al., 2020). Individual courses have been replaced by providing material, actual teaching does not take place (Feucht et al., 2020). Communication with lecturers is assessed very differently and ranges from predominantly good (Berghoff et al., 2020; Karapanos et al., 2021; Kreidl & Dittler, 2021) to difficult (Marczuk et al., 2021). Especially the contact with fellow students seems challenging for many students (Berghoff et al., 2020; Feucht et al., 2020; Marczuk et al., 2021), and the active participation in events turns out to be low (Kreidl & Dittler, 2021). The technical requirements of the students are very diverse, but they seem to have the essential equipment (Adam-Gutsch et al., 2021; Feucht et al., 2020; Karapanos et al., 2021). However, due to the occasional instability of internet connections, it seems that the students find it easier to attend asynchronous events than to participate in synchronous events (Feucht et al., 2020). Little evidence is found on the handling of the changed examination situation. This could be due to the fact that many universities try to continue to conduct examinations in-person (Berghoff et al., 2020), as the legal basis needed for online examinations is also missing in the German university landscape so far. In general, however, online examination formats seem to be reasonable alternatives from the students' point of view (Widmann et al., 2021). Besides avoiding the Corona-related hygiene constraints (mouth-nose protection must be worn during the exam, etc.), students see an advantage in the relaxed exam environment (Diel et al., 2021). Last but not least, a worsened financial situation was also evident among some students in spring 2020. The Corona pandemic led to lower employment and reduced income for them (Becker & Lörz, 2020; Widmann et al., 2021). Loss of job or loss of parental support are only some of the reasons. Others have a fairly stable income, either because they are still living with their parents, for example, or are living with them again, or because they are spending less money overall due to pandemic-related restrictions (Traus et al., 2020). A positive aspect is that the intention to drop out has not increased due to the pandemic (Marczuk et al., 2021).

Surveys that look at developments over several semesters are few and far between. A study shows that the perception of stress increases somewhat from spring 2020 to spring 2021 (Besa et al., 2021). Students do see being flexible in their work arrangements as an advantage, but the already very low agreement that more independent learning brings advantages in the digital semester has declined even further. Contact with lecturers and fellow students is also still missed (Besa et al., 2021). Students feel increasingly alone as the pan-

demographic progresses (Kindler et al., 2021). Students seem to find it difficult to get used to the changed study routine and to structure their day. The motivation to study decreases (Kindler et al., 2021).

The survey presented here was conducted three semesters after the outbreak of the Corona pandemic with student teachers at the Chemnitz University of Technology in Germany. In this course of study, teaching is still predominantly digital and only in exceptional cases, in compliance with the usual hygiene and distance learning rules, in presence. In addition to a learning platform and a central cloud storage, students and lecturers have access to data protection-compliant web conferencing systems as well as online examination platforms, which are designed to maintain teaching operations in the best possible way. The design of teaching is left to the instructors and ranges from the provision of asynchronous teaching materials to synchronous, cooperative online events.

In July 2021, all students of primary education were contacted and asked to participate in an online survey about their experiences of teaching during the pandemic. After completion of the survey, a dataset of 139 completed questionnaires was available, representing a response rate of 29.5%. The questionnaire survey looks at the study situation during the Corona pandemic from a variety of perspectives and with a view to the current situation of the students. The question is investigated which hurdles still exist and how they can be overcome. In addition, possible positive aspects will also be brought out, which could and should retain their place in studying and teaching even after the pandemic.

3 The Investigation Planning

3.1 The Questionnaire

The questionnaire consists of a total of 43 items focusing on the following areas:

- Social statistics (e. g. age, gender, study term)
- Technical equipment for students (e. g. possession of computer, printer, tablet, wi-fi connection)
- Interaction and design of online teaching (e. g. contact with lecturers, type of courses attended)
- Experience with online exams (e. g. exam preparation, participation in online exams, type of online exams)
- Ideas for the further development of university teaching in a post-pandemic period (e. g. advantages of digital teaching, what should be adopted)

The technical equipment is a central factor here, because only if an appropriate end device is available for unrestricted use can the online teaching be followed both asynchronously and synchronously. This also includes the possession of a functioning camera as well as a headset. On the infrastructure side, a stable internet connection is also required.

Although learning itself is an individual process, it is important for the acquisition of knowledge to be able to exchange information with lecturers and fellow students. Only in this way can theories be thought through, analyzed and reflected upon (Siebert, 2008). For this reason, it is important to record students' experiences of online teaching and also of online examinations and to think further about the insights gained in order to be able to use the opportunities that the forced conversion of face-to-face teaching to the digital space has brought with it for the further development of university teaching.

Thus, this paper will present data and findings that address the design of teaching, experiences with online examination formats, and positive aspects that should be retained for the post-pandemic period.

The questionnaire contains closed questions, which are Likert-scaled in four levels (1=strongly agree, 4=strongly disagree), as well as open-ended questions. The closed questions were analyzed descriptively; in addition, correlations with significances between individual questions were calculated. The statistical software IBM SPSS Statistics Version 27 was used as an aid. The open-ended questions were analyzed with the aid of MAXQDA Analytics Pro 2018 software using content-structuring qualitative content analysis according to Kuckartz (2018). In doing so, the main categories were first deductively derived from the research question. The response texts available in the data matrix were assigned to these main categories in a second step. Subsequently, the individual subcategories were formed inductively on the data material (Kuckartz, 2018).

The questionnaire was designed so that the study participants could answer it in 15 minutes.

3.2 Statistics

3.2.1 Item Analysis

In a first step, item difficulty was calculated at the single item level. „In order for a test to differentiate examinees with different abilities approximately equally well, care must be taken that the items have as wide a spread of difficulty as possible“ (Bortz & Döring, 2002, p. 218). Because the item difficulty of all items ranged from .2 to .8, all items were retained for analysis of the data.

3.2.2 Factor Analysis

Where it made sense in terms of content, the individual items were included in a principal component analysis. The Varimax method was used as the rotation method. The Kaiser-Guttman criterion or scree plot was used as criteria for the formation of the factors, depending on how the factors were to be interpreted in a way that also made sense in terms of content. With regard to the factor loading criteria, it was determined that items with a factor loading less than .5 were excluded, as were items that loaded on multiple factors and the loading difference was less than .2. Based on the factor analytically determined item groups, the discriminatory power of the individual items was calculated in a next step. A minimum of .3 was set as an exclusion criterion (Bortz & Döring, 2002). In a final step, the internal consistency of the factors determined on the basis of the principal component analysis was calculated. Cronbach's alpha coefficient was used for this purpose (Bortz & Döring, 2002).

Overall, two groups of scales were formed from the Likert-scaled items, one concerning the stress situation and the social environment (Table 1) and one concerning the process of online teaching (Table 2).

Table 1: Statistical parameters of the factors concerning the stress situation and the social environment

	Stress situation and social environment	
	Burden due to lack of contacts in presence (Factor I)	Keeping in touch with fellow students (Factor II)
Explained variance in %	52.21	26.10
Mean \pm standard deviation	1.98 \pm .77	2.47 \pm .90
Cronbach's α	.795	---
Intercorrelation Burden due to lack of contacts in presence	---	-.35**

Items that load on the first factor are, for example, the question about the stress caused by the lack of personal contact with lecturers, while the second factor is the question about whether it is possible to maintain contact with fellow students in the digital world.

Table 2: Statistical parameters of the factors concerning the online teaching process

	Procedure of the online teaching		
	Work-live-balance (Factor III)	Satisfaction with online teaching (Factor IV)	Focus on the study (Factor V)
Explained variance in %	26.55	26.24	24.35
Mean \pm standard deviation	2.90 \pm .75	2.62 \pm .59	2.17 \pm .95
Cronbach's α	.681	.576	.756
Intercorrelation			
Work-live-balance	---	.24**	-.21*
Satisfaction with online teaching			-.36**

Items loading on the first factor, for example, address the amount of work during online teaching. Items that load on the second factor include e. g. whether instructors are doing a good job of implementing course content in online teaching. Items that load on the third factor include asking about distraction and maintaining fun and motivation while studying online.

The fact that the individual factors in both constructs are only moderately weakly correlated with each other is another criterion for the clean mapping of different factors.

3.2.3 *Qualitative Content Analysis*

The answers to the open-ended questions were also analyzed descriptively. Here, the codes assigned in each case in the main categories (derived from the question) form the population of the sample. For the most frequently occurring statements in the subcategories, an initial count was made on the basis of the number of codes assigned in each case. The results are summarized by indicating the relative frequencies of the assigned subcodes.

4 Results

4.1 Description of the Sample

In the summer semester of 2021, a total of 139 students of primary school teaching at the Chemnitz University of Technology, completed a survey. The age range of the students stretched from 18 to 48 years. The mean was 24 years with a standard deviation of 6.6 years. In accordance with the gender distribution in the primary school teaching profession, most of the study participants in the study reported here were also female (92.1%). At the Chemnitz University of Technology, students can only begin their studies in the winter semester; accordingly, the participants were distributed among the second (40.3%), fourth (23.7%), sixth (15.8%), and eighth (15.1%) semesters of study. The outgoing summer semester was the third semester in which online teaching has taken place. 56.8% of the students have taken part in online teaching for three semesters, 42.4% for two semesters.

4.2 Technical Equipment for Students

After 3 semesters of online teaching, three quarters of the students had technical equipment so that they could participate in teaching without any problems. The main problems were still considered to be a partly unstable internet connection, which was mentioned as a problem by almost all students, as well as a lack of peripheral devices such as printers, scanners or copiers. Normally this was compensated by using the university's multifunctional devices for a fee, but this was not possible during the pandemic with the university's closure. However there were also few students who purchased devices such as a laptop or tablet or accessories such as a headset and camera in the spring of 2020:

“I necessarily had to purchase a new laptop with a microphone and camera because I didn't want to borrow equipment or at the beginning that option didn't exist.”

4.3 Interaction and Design of Online Teaching

The pandemic contributed to a social burden on the part of the students (Factor I, $M=1.98$, $SD=.77$). Students miss both the social interaction with their fellow students and the personal contact with them. At the same time, the students succeeded quite differently in staying in contact with their fellow students (Factor II, $M=2.47$, $SD=.90$; see Figure 1). Nevertheless, 70.5% of the students who began their studies in a Corona semester succeeded in making new contacts. However, there was a very large correlation between the problem of maintaining personal contact with fellow students and the start of studies in a Corona semester ($r>.99^{**}$).

Students felt that studying during a pandemic is more time-consuming than studying in person (see Figure 2). The students stated that they need more time to cope with the volume of tasks and work. This also resulted in fewer recovery periods during the day (Factor II, $M=2.90$, $SD=.75$). When asked about self-organization and structuring of everyday learning, 68.2% of students stated that they are very successful in organizing themselves ($M=2.12$; $SD=.83$). At the same time, 86.1% of respondents said that the pandemic and digital teaching have made a big difference in their daily lives ($M=1.70$, $SD=.86$). In an open-ended question, nearly half (49%) of these students indicated that they perceive these changes as mostly negative:

“I hardly ever get out of the house on a normal school day except to go to my own backyard or take a walk. Breaks during the day are neglected or not used. You never really get to rest, you’re almost always busy with college because you could be doing something at any time.”

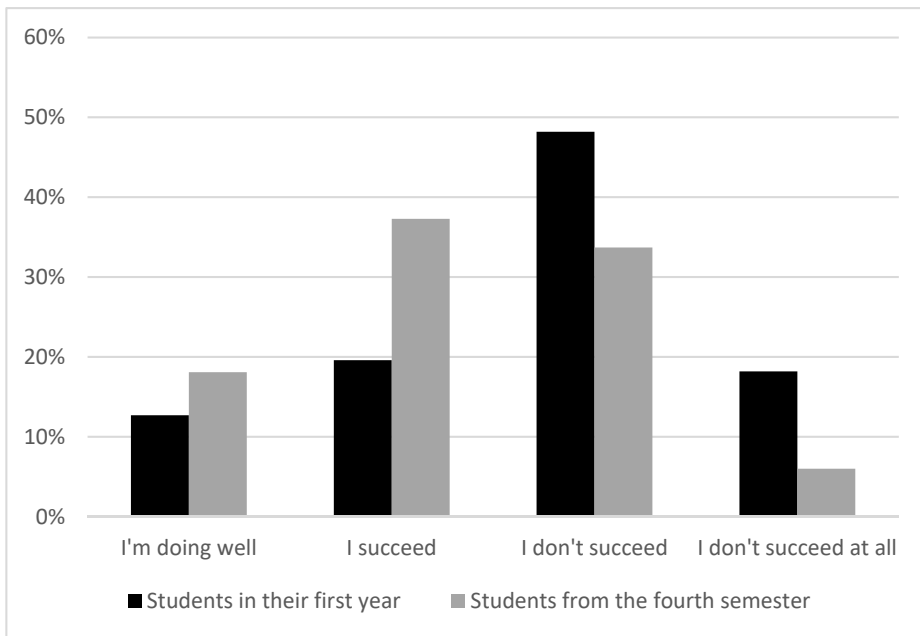


Figure 1: Contact situation with fellow students

However, some students (12.7%) indicated that they would benefit from being more independent in their learning and see the changes as positive:

“I have learned to organize myself completely and find my own way to deal with the learning content.”

There was a rather heterogeneous picture about the quality of online teaching. Basically, the students were satisfied on average with how the lecturers managed to implement the topics in the online courses. When asked about the preferred form of teaching on the part of the students, then 24.1% of the students preferred only asynchronous learning material and 51.1% only synchronous online courses. A return to face-to-face study as quickly as possible was advocated by 68.4%. As a concept for the future, however, a combination of online and face-to-face parts, hybrid teaching, was also being discussed (see section 4.5 below).

Another important factor influencing student-lecturer interaction is the flow of information. Here, the students saw need for improvement. Overall, the interaction between students and lecturers was rated satisfactory (Factor IV, $M=2.62$, $SD=.59$).

The third factor concerned the affective aspects in studying. Here, the students stated that they were distracted from their studies by the home learning situation and that it was a challenge to maintain motivation and enjoyment working in the given conditions (Factor V, $M=2.17$, $SD=.95$). If asked more specifically what the challenges were, students stated that they lacked social contact and personal interaction with other students and with the lecturers. In particular, students who started their studies in the pandemic found it difficult to get to know other students and to exchange ideas.

Of the 76 more detailed statements made in this regard, just under half (48.7%) of all respondents made comments such as:

“I only know one other fellow student. The idea of creating study groups via an Opal forum or WhatsApp is unrealistic.”

or:

“There is simply a lack of social exchange with other fellow students. Since you hardly get to know anyone in person, I find it difficult to exchange ideas about topics and discuss difficulties. Especially in exam preparation, this kind of thing is noticeable.”

These statements made it clear above all that the study programme was now much more characterized by the students' own responsibility and that an exchange was particularly difficult for those who had only got to know their fellow students in online courses. 38.2% of the respondents stated that they did not find it easy to work at home because of the lack of spatial and temporal separation between studies and private life, for example:

“It's stressful to spend all day in your own home, separating work and free time/children there. I feel like I have to work all the time, but then I can't concentrate partly because there's too much to distract me.”

The constant work on the PC or laptop was perceived as tiring and monotonous (15.8%). Just as often, students felt left alone with their worries and fears, for example:

“As there is no end in sight and you feel like you are alone with your problems because of few social contacts.”

Every fourth student (25%) was of the opinion that online studies entailed an additional workload because a lot of independent text work and self-study was required, too little was explained and there was too little feedback, for example:

“You work through big mountains of tasks all the time on your own, but you often don’t get feedback for solving them.”

Thus, students tended to find online teaching overwhelming and demotivating, as the following statements show:

“It takes me 5 hours to process some lectures. After that, you’re just frustrated.”

or:

“It’s difficult to motivate yourself to watch videos for several hours when they are asynchronous and all relevant information is uploaded on the slides. Further to that, reading texts, which takes another 2 hours.”

Almost one third (30.2%) of the students surveyed would like the university to offer them advice on the organization of their studies and teaching. This applied equally to first-year students and to students in higher semesters. If one asked about the wishes of the students, they were very diverse. They ranged from the desire for a regular offer of open online consultation hours by the lecturers, for example, to clarify content-related questions about teaching, to specially established call centers of the university for organizational questions. From the students’ point of view, important information should be bundled centrally and advised on how to deal with digital teaching or courses on self-management and motivation should be available. The students also considered a workshop on the use of digital media to be helpful.

In addition to the organizational aspects of the events, the closure of the university library also meant that important study-relevant infrastructure could not be used. Thus, either online literature had to be used for writing assignments or students had to invest a lot of money and purchased the required literature themselves. But also, the university library as a valued working space, where a quiet and concentrated work is possible and the access to relevant literature is given at any time, was lost due to the pandemic, for example:

“The university library was a place of learning and writing for me before the pandemic. Here I prepared and followed up on lessons, wrote my papers, because I had access to the literature right here.”

At the same time, there were also students who considered the changes in everyday study life to be positive. Just under half of the students (45.3%) stated that they benefit from more flexibility because, for example, they could better coordinate university and private commitments such as childcare, a part-time job or household chores, for example:

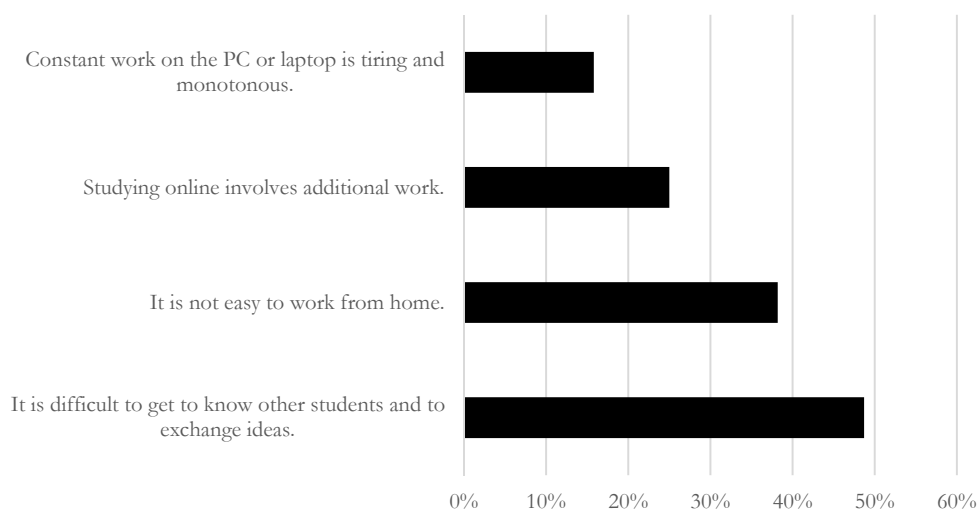


Figure 2: Challenges in online studies

In addition, the pandemic had an impact on practical experience, which is a central component of teacher training. 87.0% of the students succeeded in taking part in an internship. However, the quality of the internships was considered to be very poor. Here it was a matter of supervising children in emergency care or planning lessons theoretically as a substitute for the internship. The practical insight, which was otherwise very much appreciated by students, the opportunity to try things out and to plan and carry out lessons themselves, to reflect on them with mentors afterwards and to optimize them, unfortunately had to be dropped. Here the students feared that they were missing important learning opportunities for the second phase.

However, there were also students who rescheduled their internships to find a time during the summer months when schools had face-to-face classes. This often happened in such a way that the internships, which regularly take place after summer vacation, were extended. This allowed practical experience to be gained, but the extension brought other disadvantages:

“There was no recovery time at all. You started from the semester into studying, into writing exams, into the [extended] internship and into the new semester. This put a lot of psychological strain on me and many of my fellow students. There are no recovery phases or phases of relaxation at all. As a result, the following semester also suffered.”

However, semesters abroad could also not take place in 83.3% of all cases. This applied above all to students who have chosen English as their subject. Here, the students criti-

cized the lack of ideas on how to deal with the lack of stays abroad and how to ensure that the transition from studies to the traineeship is possible without problems.

Further effects of the pandemic on studies were evident with regard to graduation. Thus, 26.1% of the students were concerned about their graduation; 40.0% of the respondents planned to take advantage of an extension of the study period.

Because the participants were student teachers, they were also asked whether they saw added value in their personal experiences with online formats for their future professional activities. A large proportion of the respondents (51.4%) saw an increase in their own digital skills, especially in knowing and using various video conferencing tools, learning platforms, or apps.

“I have been able to get to know many digital offerings (apps and the like), which I could use well and usefully in everyday school life.”

Some stated that they were better prepared for digitalization in the classroom (33.3%) or for future distance learning (10.5%), for example:

“For primary school teachers, the use of digital media will also become a central teaching content in the coming years due to digitalization. So, it is necessary that the prospective teachers themselves can also work with such formats.”

Students also saw wide-ranging applications for their newly acquired skills:

“Yes, better use of technology can also be used when kids are sick and need to catch up or for a new pandemic.”

4.4 Experience with Online Exams

The majority of the students surveyed (84.9%) participated in online examinations in the last semester. In response to the open-ended question of how students felt about participating in online examinations, 101 of the survey participants answered. A heterogeneous picture emerged here (see Figure 3): just under half (47.5%) of the students stated that they found participation to be predominantly positive. In addition, online exams were rated positively because they were perceived as less stressful and open-book exams focused on the application rather than the memorization of knowledge, for example:

“Plus, the open-book exams allow you to counteract the old-fashioned ‘bulimic learning’ and actually learn more.”

One third (32.7%) of the respondents expressed negative opinions about online examinations. The statements mainly concerned technical aspects (68.3%), for example:

“Much more stress and excitement, not because of the exam itself, but because of the fear of technical problems and an accompanying disqualification from the exam.”

or time management (32.7%). Uncertainties about content were also mentioned by 10.9% of the students, for example:

“Open-book exams are unusual. I don’t really know what I have to know by heart or what I have to be able to do. And when I have my materials attached for reference, it does get quite confusing in bulk and I get time problems when I want to look up something specific.”

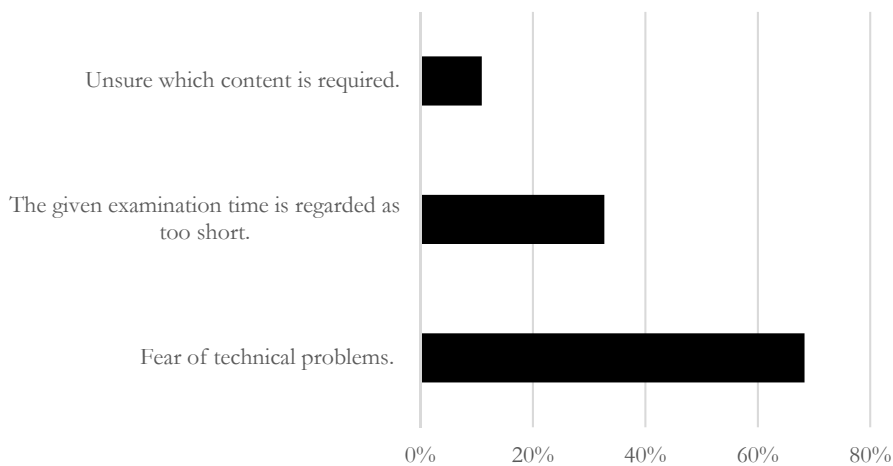


Figure 3: Challenges in online exams

The most common type of online exam was the open-book exam. 99.2% of the respondents stated that they took part in this type of examination, followed by take-home examinations (63.4%). Online oral exams (28.2%) and closed-book exams (25.2%), occurred less frequently. 37.8% of students had the experience of being proctored during the exam. This was perceived as disruptive and unpleasant by slightly more than half (53.8%) of the students, for example:

“I felt very watched and uncomfortable.”

4.5 University Teaching – Quo Vadis?

Finally, the students were asked the open-ended question of which elements could or should be continued or further developed in post-pandemic university teaching. When asked which event formats should be retained in the future, 112 of the respondents answered. Here, the participants were primarily in favor of retaining digital examination formats (35.7%). Likewise, for 33.9% of the students, events, especially lectures, should continue to be offered asynchronously:

“Asynchronous lecture videos were very good in my opinion because it was free to schedule and always work as it suited your pace. Difficult topics you could watch several times to understand it.”

In lectures, there was often a lack of interaction opportunities for students. Therefore, one wish was that they will also be conducted asynchronously and digitally in the future:

“Lectures in particular are just as easy to follow in the digital setting as they are in the present, since there’s usually little sharing in lectures anyway.”

Seminars and similar forms of learning, which thrive on interaction and exchange among students and between students and lecturers, should be held in person again as soon as possible. Only a few students (11.6%) considered exclusively online courses to be a sensible study format for the future.

5 Summary and Outlook

Summarizing the results, it becomes clear that in the digital everyday study life, the exchange between students, as well as between students and lecturers, often comes up short. Although students manage to keep in touch with fellow students digitally despite pandemic restrictions, this is not easy and does not replace direct personal contact and working and learning together in the seminar room. Here, in addition to the students themselves, the lecturers are also obliged to maintain or establish contact with the students and not just hope for asynchronous learning success. Above all, students who began their studies during the pandemic should receive support and suggestions from the universities or individual lecturers in order to meet other students and to exchange ideas. This is particularly evident from the evaluation of the open-ended questions, in which students repeatedly expressed a desire for exchange opportunities. However, support for teachers and the university should also focus on how to deal with digital teaching in general. In addition to the technical requirements, the acquisition of individual competencies is crucial in order to successfully participate in synchronous online teaching. Furthermore, students wished for more help in organizing their daily study routine. Here, it is necessary to consider what these offers could look like and also be adapted to the current study situation (e. g., self-management, time planning).

Furthermore, students perceive the preparation of asynchronous teaching material as very time-consuming, especially if lectures are replaced by editing extensive text documents. Whether asynchronous learning is actually more time-consuming than attending classes in person must be interpreted cautiously here, since a large proportion of the students surveyed had not been able to attend any or only a few classes in person. In addition, some respondents felt that the lack of variety due to the monotonous daily study routine at home generally curbed their motivation to study. Here, too, it is important to regularly involve students in synchronous events and to enable exchange in digital learning groups or individual consultation hours. On the other hand, the (additional) offer of asynchronous lectures can support the individual learning speed and a more intensive examination of the content. The offer of synchronous (online) lectures should be maintained after the pandemic. It gives students the opportunity to better structure their everyday student life and it offers an important platform for formal and informal exchange. However, if content is outsourced asynchronously, seminar time can be used primarily for more extensive discussions, individual contributions, joint elaborations, etc. In order to make better use of the travel time that is no longer needed and to make everyday study more flexible and individual, hybrid event formats could also enrich studies after the pandemic.

Experience with online examination formats shows that open-book examinations in particular tend to be rated positively by students. On the one hand, because performance pressure and exam anxiety are reduced and, on the other hand, because knowledge must not only be reproduced but also applied in context. Whether this is actually perceived by learners as more profitable and sustainable than classic closed-book examinations should be discussed further. At the same time, there must also be alternatives for students with limited technical access or the possibility of conducting examinations in presence if desired. Study documents should be adapted to this end, as many lack legally binding flexibility as to the conditions under which an examination can or must be taken.

However, online teaching has also led to students becoming more involved with digital tools and ways of using apps, for example. These experiences are certainly an important contribution to advancing the digitization of elementary schools as well, because many digital tools can also be used in face-to-face teaching. However, the newly acquired knowledge of the students cannot be equated to a basic qualification; continuous further development of the competencies through advanced training is required.

Overall, research about living and studying in the pandemic and about the home office have produced contradictory results (see section 2 in this chapter). Therefore, it is important to conduct further and more differentiated research and to consider different living conditions of students (e. g. studying with children), so that the findings can contribute to the further development of university teaching in a time after the COVID-19 pandemic in an addressee- and demand-oriented way. It would be unfortunate to return unreflectively to the „status quo“, in which further development opportunities for university

teaching are omitted, simply because digital teaching was not introduced out of conviction in spring 2020, but was owed to external circumstances.

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