Sociological Teaching

Digital Teaching in Times of Covid-19: Risks and Opportunities

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Abstract

COVID-19: It started in one place in January 2020 and has since reached the whole world. The global pandemic has been spreading and changing our lives since. The COVID-19 crisis has also changed many things within the world of higher education. In-person teaching was no longer possible; instead, almost all courses were offered in digital formats. This sudden change poses enormous challenges for universities, students, and teachers. This paper discusses the advantages, disadvantages, and opportunities offered by digital teaching. Based on central assumptions of the 'second digital divide,' it examines whether certain groups of higher education students are more affected by the switch to digital teaching than others. Findings from national and international studies were used, as well as a survey from the University of Marburg (Germany). They show that there is a relationship between various socio-demographic factors and the evaluation of digital teaching. For example, university students with highly educated parents more often rate digital courses as a good substitute for face-to-face teaching than students with less educated parents. A brief overview highlights the problems faced by teachers in the transition to digital teaching. This paper ends with a discussion of the opportunities that arise from the digitalization of teaching and the wishes of students and teachers with regard to future teaching.

Keywords: Digitalization of teaching, COVID-19, digital teaching, second digital divide, social inequality, higher education, non-traditional students

Introduction

The digitalization of teaching at universities began several decades ago. Although numerous virtual universities are already offering online-only courses, most bricks-and-mortar universities are still providing primarily face-to-face courses. That has now all changed due to the COVID-19 crisis. Students and teachers have suddenly been confronted with digital teaching formats, whether they wanted them or not.

With the almost complete conversion to digital teaching, major challenges for universities, teachers and students have arisen, as well as opportunities for future teaching. This paper deals with the advantages and disadvantages of digital teaching. The focus is on students' perspective, while the teachers' view is only touched upon in passing. In this context, the question arises as to whether certain groups of higher education students are more affected by the switch to digital teaching than others. According to the assumptions of the 'second digital divide', both the social background and socio-economic context of the students should play a role. It can also be assumed that the heterogeneity of the students will influence how they use digital media. Students with children, commuters, etc., have different needs concerning digital teaching and, would therefore evaluate it differently.

In this paper, central aspects that influence digital learning are addressed. Theoretically, these can be assigned to the area of social inequality. The time before the COVID-19 crisis and the time afterwards are a sub-issue in each case. Aspects such as the prerequisites for using digital media will be explained, and then digital teaching since the COVID-19 crisis will be evaluated – focusing not only on disadvantages and problems, but also advantages. How teachers have dealt with digital teaching since the crisis started is then briefly presented. The results of international and national studies serve as a basis for the investigation. In addition, the findings of a survey on digital teaching are presented. This work concludes with a reflection on the opportunities for digital learning that have resulted from COVID-19.

1 Theoretical background

The COVID-19 crisis affected universities in all 191 countries around the world to which COVID-19 has spread. Since the lockdown, schools and teachers are using

almost digital tools to ensure the continuation of teaching and learning. However, not all countries and students have been affected equally. Here, central aspects from a sociological point of view that have an impact on digital learning are presented. These include various forms of the digital divide and other factors, such as the heterogeneity of students. From a theoretical point of view, these aspects belong to the field of social inequality, but, to date, they have rarely been related to this field in the academic literature (van Dijk, 2006).

The unequal access of different population groups to information and communication technologies, i.e. the digital divide or digital inequality, is a fundamental problem for digital teaching. This access is, in turn, influenced by other aspects, such as socio-economic factors. When research into the digital divide started, the focus was on access to the internet or digital media. This approach was complemented by the research of DiMaggio and Hargittai (2001). Hargittai (2002) described "*five dimensions along which divides may exist:*

1. *technical means (software, hardware, connectivity quality);*
2. *autonomy of use (location of access, freedom to use the medium for one's preferred activities);*
3. *use patterns (types of uses of the Internet);*
4. *social support networks (availability of others one can turn to for assistance with use, size of networks to encourage use); and,*
5. *skill (one's ability to use the medium effectively)"*

Internet skills are classified as a 'second digital' divide by Hargittai (2002).

In the following section of the paper, the technical equipment of the population will be discussed, exemplarily internet access. The implications of the second digital divide are then discussed, in terms of students.

Technological digital divide

According to Unesco (2020), 86% of the population in developed countries had access to the internet before the COVID-19 crisis compared to only 47% in developing countries. In India, the proportion was around 35% in 2016, although this country has an impressive digital infrastructure for a developing country. In the African

continent, broadband hardly exists beyond urban hotspots (Hill & Lawton, 2018). However, even in developed countries such as Italy, a gap is visible. According to the Unesco chair on Population, Migration and Development, about 25% of families in Italy do not have broadband internet connection, including 20.6% in Trentino (northern Italy) and 35.7% in Calabria (southern Italy) (Unesco, 2020).

Access to the internet, especially broadband internet, depends, among other factors, on economic resources. For this research, the USA will represent North America, and Germany will represent Europe. According to the Digital Economy and Society Index (DESI) (European Commission, 2020), Germany is in the middle of Europe in terms of digital technologies. In 2019, 88% of low-income internet users in Germany had broadband internet access, compared to 98% for high income users (DeStatis Statistisches Bundesamt, 2018, p. 10). In the USA, the number in 2016 was 58.2% for low-income compared with 96.5% for high-income (United States Census Bureau, 2018, p. 7). However, it is not only economic resources that play a role, but also factors such as education. In Germany, the share of pure internet use was 80% for people with lower level of education and 96% for those with high level of education (DeStatis Statistisches Bundesamt, 2018, p. 14). In 2016 in the USA, 55.7% of users with lower level of education had a broadband connection compared with 93.1% of users with high level of education (United States Census Bureau, 2018, p. 8). With regards to access to digital media, it can generally be said that there are still major inequalities worldwide.

The findings can be applicable to students: the digital divide is influenced by factors such as the socio-economic situation or socio-cultural background of students. Pupils and students with fewer socio-economic resources can only participate to a limited extent in digital learning. Good technical equipment and fast internet access depend on economic resources, but not exclusively. Empirical studies have shown, for example, that educational background and gender have an influence on equipment (computers, internet), but also on the use of digital media. The higher the income and level of education of parents, the more likely it is that young people have access to these types of media (Pietrass, 2007, p.1). The effects of gender and geographical location (urban versus rural) are slowly decreasing (Chinn & Fairlie, 2007; Pietrass, 2007; Unesco, 2020).

Second digital divide

Hargittai (2002) coined the term 'second (level) digital divide' and argued that online skills, in particular, play a role in the digital divide. This means that it is not only important to gain access to digital media, but also to have the ability to find and process information. In the literature, the term digital literacy is sometimes used for this ability. More recent studies, such as those by Niesysto and Nieysto et al. (2009, 2009), expand the approach of Hargittai (2002) and argue, following Bourdieu's theory, that not only is access to digital media unequally distributed, but that differences exist in the quality and intensity of use. Thus, they conclude that the use of digital media is strongly related to the users' initial conditions and their social context in real life. Family milieus and the educational capital available have a particularly strong influence on different forms of media acquisition among children and young people. Further information on the topic of the 'second digital divide' is found in empirical studies by Büchi et al. (2015), van Dijk (2006), Ignatow and Robinson (2017) and Scheerder et al. (2017).

People with disabilities

This group still has unequal access to digital media. Although digitalization can contribute to inclusion, new barriers are emerging for people with disabilities. However, people with disabilities do not form a homogeneous group. Depending on the type of disability, their needs vary such that someone with a learning disability has different needs compared to those of a blind person (Hargittai, 2002; Niesyto, 2009; Niesyto *et al.,* 2009). According to Who (2011), more than 15% of people worldwide have a disability, of whom 2–4% have significant functional disorders. In low-income countries, the proportion is slightly higher, at around 18%, than in high-income countries, where it is around 12%. The situation of people with disabilities is rarely addressed in media pedagogical publications. Nevertheless, this group should receive more attention. The use of computers and the internet is taken as an example. According to Vicente and López (2010), people with disabilities use computers and the internet much less than the rest of the population. There are many reasons for this,

such as a lack of technical innovations by the information and communication technologies industry. But other issues, such as financial resources and employment status, also play a role.

Heterogeneous life situations

Another aspect for the use of digital media is the heterogeneity of higher education students, which has risen sharply over the past decades. The heterogeneity manifests itself in highly divergent knowledge requirements but also in other areas, for example, heterogeneous life situations (commuters, students with children etc.). This creates new challenges for universities and, at the same time, for students and teachers. This group plays a minor role in discussions on the digitalization of teaching. Especially for learners in heterogeneous life situations, digital teaching concepts are rarely found; there are hardly any special courses for non-traditional students, such as employed people, commuters and people with children, although this group is continuously growing. Although virtual universities already exist, face-to-face universities only offer hybrid courses or the inverted classroom to a limited extent (Dolch & Zawacki-Richter, 2018; MacDonald, 2018).

2 Digital teaching – the students' perspective

Which prerequisites for the use of digital media did higher education students already have before the COVID-19 crisis? We will investigate this question here and show the problems and disadvantages, as well as the advantages, that have arisen from the COVID-19 crisis. Numerous papers, in the form of working papers, online contributions and others, serve as a basis. Empirical studies on the impact of the COVID-19 crisis on studies and university teaching are rare to date, as COVID-19 has only been spreading for a few months. Again, among developed countries, the USA represents North America and Germany for Europe in the findings presented here. For countries with fewer economic resources, we hypothesize that the situation is likely to be different.

Before the COVID-19 crisis

Prerequisites for the use of digital teaching include not only the students' technical equipment but also that of the universities. Based on the ECAR study (Study of Undergraduate Students and Information Technology), which is an annual survey since 2004 of about 10,000 students at US universities, it has been shown that the number of students owning a laptop has increased over the years: From around 45 % in 2004 to 91% in 2018 (Borreson Caruso, 2004, p. 2; Galanek *et al.,* 2018, p. 7). High-speed internet access was available to 65% of university students, although the quality of university internet access varies widely. In Germany, the numbers are comparably high (Gierdowski, 2019; Steffens *et al.,* 2018). On the part of the universities, the range of digital courses and tools also plays a role for the use of digital teaching. It would go beyond the scope of this paper to describe this point.

The fact that it is not only technical equipment that affects access to and use of digital courses has already been discussed previously. A selection of other factors such as work, given that 69% of students in the USA in 2018 had a part-time job during their studies, of whom 57% worked between 10 and 29 hours per week. In Germany, 68% of students had a part-time job in 2016. Of all students in face-to-face full-time study (around 92% of all students), 68% worked up to 10 hours per week and 23% worked from 11–20 hours (Galanek *et al.,* 2018, p. 27; Middendorff *et al.,* 2017, p. 60, 168). But other aspects, such as parenthood or impairments, are factors influencing the use of digital courses: In 2017, about 25% of college students in the USA were parents of at least one child while in Germany, this was about 6% of all students in 2016 (Higheredtoday - American Council on Education, 2020; Middendorff *et al.,* 2017, p. 25). In Germany, 23% of students (2016) had physical, mental or sensory impairments. Eleven per cent of students stated that their studies were made more difficult in the long term due to their disability (Middendorff *et al.,* 2017, p. 175). Six per cent of students in the USA had a physical disability or learning disability, according to the 2019 ECEAR study (Gierdowski, 2019, p. 20). Of this group, only about half (53%) rated the support of their technology needs by HEIs as positive.

But what does the use of digital media at universities look like? A distinction must be made between the types of digital media used. Persike and Friedrich (2016)

used data from the CHE University Ranking to examine current students in Germany. They divided digital media into five groups, including traditional media (learning platforms, emails or PDFs etc.), social (chat, forums and social networks etc.), and interactive media (educational games, web conferences etc.). Around 30% of the students surveyed restricted themselves predominantly to the use of classic digital media, and only 21% of the students used a wide range of available digital media in their studies. There were significant differences depending on the subject studied: in computer science, 31% were 'digital all-rounders'; however, in physics, only 13% were. Sociology was not represented in the survey, but, in political science, 30% were classic users and 20% 'digital all-rounders'. It should be noted, however, that the type of digital media made available by the universities and the quality of these media were not taken into account.

Another aspect is the digital competence of students. In Germany, Senkbeil et al. (2019) found that 20% of first-year students did not have the level of basic digital literacy necessary for taking up studies. The results were based on a test (multicohort sequence design) carried out in the course of the NEPS (National Education Panel). Among the advanced students (sixth semester), as many as 53% did not have the digital skills required at that time. Among other things, there were disciplinary differences between the subjects. Students of languages and cultural studies had the lowest levels of competence, followed by law, economics and social sciences, while students of engineering had the highest levels of competence. Senkbeil et. al. (2019) also present results for North America with the ETS iskills assessments (Educational Testing Service). Comparable results to Germany were found for advanced students. Among prospective students, about 50% failed to meet the requirements.

The acceptance of digital media is also an important factor for the use of digital media. In the USA, the use and acceptance of online media in higher education is much higher than in Germany. When asked which teaching formats are used (multiple answers were possible) in the ECAR study at universities in the USA (2019), more than 50% of teachers shared that they use digital media, such as the inverted classroom, at least occasionally. Sixty-four per cent rated their digital skills as very good. More than 50% of the teachers enjoyed teaching in the form of blended learning scenarios. Among the students, about the same number (53%) favoured

blended learning scenarios, and 70% were in favour of face-to-face teaching. Students who were either employed, older than 25 years, living in partnerships or commuting preferred courses that were mostly or entirely online (Galanek *et al.,* 2018; Galanek & Gierdowski, 2019; Gierdowski, 2019).

Unfortunately, there are hardly any recent scientific studies that provide information on the socio-economic or socio-cultural background of students and media use at universities. Similarly, there are hardly any studies on the use of digital media in sociology, although Benson et al. considered this important many years ago: "However, systematic descriptive data on current practices by sociologists are not readily available. Irrespective of the ecology of use, digital technologies may have profound effects on the processes of teaching and learning" (Benson *et al.,* 2002, p. 142).

Since the COVID-19 crisis

Two hundred leaders of renowned universities from 53 countries took part in a survey by Times Higher Education (THE) in May 2020. Of the 200 universities, 189 stated that they were conducting at least a quarter of their courses online during the 'corona term'. Over 50% of the universities had offered all courses in digital format. The question of which of the various disciplines made the transition to online teaching and learning easy was most frequently answered in the affirmative by economics (42%), while medicine and dentistry were the most difficult to digitize. The social sciences came third with 39%. Among the teaching formats offered, video conferencing was most used (54.9%), followed by asynchronous teaching in the form of presentation slides (15.2%) and teaching videos (11.6%; Aristovnik *et al.,* 2020).

A selection of findings from studies on digital teaching during COVID-19 can be found below, they mainly refer to the following studies:

'Global Student Survey' is an international study in which more than 31,000 students from over 100 countries worldwide were surveyed online between May and June 2020. For the USA, the sample comprises 385 people and, for Germany, 368 (Aristovnik *et al.,* 2020).

'DigiLehreStud' is the first round of an online survey on digital teaching at the University of Marburg (Germany) in the Department of Social Sciences from June to July 2020 in which 305 students participated (Breitenbach, 2020b).

'PotsBlitz' is an online survey from the University of Potsdam (Germany) on digital teaching in the times of COVID-19 in which 3,795 students and 701 teachers from all faculties participated (Universität Potsdam, 2020). However, it should be noted that the results may not be representative due to the small sample size of some surveys.

Disadvantages and problems with digital teaching

Job loss: this aspect only indirectly affects digital teaching. Students mainly work simultaneous with their studies in order to finance them, as other financial resources are not sufficient. This means that many students are dependent on a part-time job. On an international level, 61.7% said they had lost their jobs because of the COVID-19 crisis but a breakdown by country is not available. In Germany, the number of students who lost their jobs is around 35% (Aristovnik *et al.,* 2020, p. 5; Juso Hochschulgruppe, 2020). This means that the situation for students with fewer economic resources is worsening, which intuitively will have a negative impact on their academic outcomes. This also applies to existential fears, which were mentioned more often by students in connection with losing their jobs.

Workload: the digitalization of teaching during COVID-19 has had a particularly strong impact on the workload of students. More than 42% of all respondents to the Global Student Survey stated that their workload had increased compared to their loads before the COVID-19 crisis. Students in Europe (58%), Germany (76%) and North America (54.7%) are strongly affected. The studies by the University of Potsdam and the University of Marburg have come to similar conclusions (Breitenbach, 2020b; Universität Potsdam, 2020).

Quality of the courses offered: around 20% of students worldwide stated that the quality of teaching had suffered due to the shift to digital teaching. According to the respondents, the attitude of the lecturers is the main factor that decides whether a switch to digital teaching is successful or not, and the subjects of medicine and dentistry have had the most difficulty in digitizing (THE, 2020). The majority of the social scientists surveyed (multiple responses possible), who were not satisfied with digital teaching, named the poor quality of digital teaching (58.8%) as the reason for their dissatisfaction. Digital teaching could not replace presence, was the main

reason (76.5%) for expressing negative opinions. However, the poor quality of teaching also led to fewer courses being taken than planned (Breitenbach, 2020b).

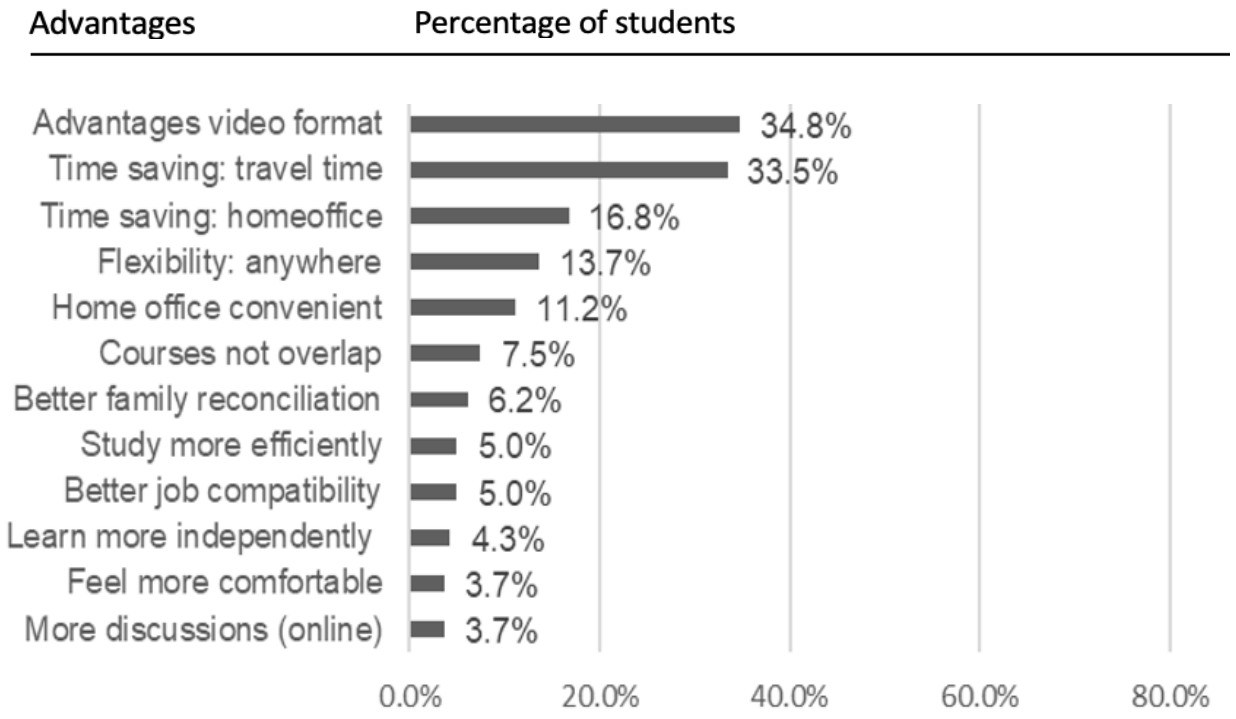
Isolated learning: there are many negative aspects of isolated digital learning. For example, self-motivation, self-discipline and self-initiative become more important, which means that one has to adapt one's learning habits efficiently in order to minimise stress and the feeling of work overload (Aristovnik *et al.,* 2020, p. 23). Students taking part in the Potsdam (29%) or Marburg (both German universities) survey were less able to organise themselves. This was partly due to the lack of technical equipment, as well as problems caused by taking care of children or family dependents, etc., on their own (Breitenbach, 2020b; Universität Potsdam, 2020). The open questions on the disadvantages of digital teaching point to the fact that 13.9% of those surveyed have increasingly postponed work (Breitenbach, 2020b).

Mental stress: the extent to which students are burdened by digital teaching could be determined using data from the 'Global Student Survey' (Aristovnik *et al.,* 2020, p. 15). The most frequent manifestations of stress were anxiety (45.2%), followed by frustration (39.8%), anger (39.1%) and hopelessness (25.9%). Mental stress was also frequently mentioned in the open questions of the Potsdam and Marburg studies (8.2%; Breitenbach, 2020b; Universität Potsdam, 2020).

Other important findings relate to exchanges and communication: The reduced contact between students was perceived as particularly problematic, as it could not be compensated for by online communication or the use of social media. Over 70% found contact with fellow students in the digital semester more difficult than before COVID-19, and communication in the seminars and with teachers was also made more difficult by digital teaching. These points were particularly mentioned in modules that rely on class discussions, such as in the social sciences (Breitenbach, 2020b).

Neither the 'Global Student Survey' nor other studies have provided sufficient information on the problems faced by student with disabilities. Many universities refer to standards for digital accessibility, but much more information is not yet available. In the Marburg study, 16.7% of students were disabled. The maindisadvantages mentioned in this group were in terms of excessive workload, lack of discussion and exchange in courses. Problems with the internet were mentioned and the quality of online teaching was often rated lower than face-to-face teaching. (Breitenbach, 2020b).

Table 1. Advantages of digital teaching



Advantages of digital teaching

The advantages of digital teaching largely coincide with those of studies on digital teaching formats in general. For this reason, they are only presented in bullet points. Nevertheless, it is important to keep an eye on the advantages as well as the disadvantages when discussing the future of digital teaching at universities. Only the Marburg study asked a question about the advantages of digital teaching. The question is an open question, whereby multiple answers were possible. For the sake of clarity, the responses are presented graphically, with only the advantages with the most responses being represented.

Flexibility is one of the most frequently mentioned advantages, especially the possibility of learning at any time or place. Surprisingly, there are even students who participate more often in discussions when courses are held online. Remarkable results can be found among students with

disabilities with regard to the delivery of classes in video format. They stated more often than other students that they see advantages in it. This may be due to the fact that, in Marburg, many of the disabled students have a visual impairment.

Flexibility with regard to the place of learning was also often mentioned by them as an advantage. Otherwise, the answers hardly differ from those of other students.

As expected, students who commute long distances see the home office as an advantage in terms of time savings and convenience. Flexibility in terms of the place of study and time management is also frequently mentioned. They also see better compatibility of family and studies as an advantage of digital teaching. The results are less clear for employed students. They seem to prefer certain advantages of the video format, such as the independent acquisition of content. They also see travel time savings and time savings through the home office as advantages. Only a few respondents have children of their own or care for family members, so no conclusions can be drawn about this group on the basis of the data (Breitenbach, 2020b, 2020c).

Correlations

According to the assumptions of the 'second digital divide', both the social and socio-economic context play a role in dealing with digital media. It can be assumed that the heterogeneity of students also has an influence. Non-traditional students, such as commuters or those with children, should have different needs for digital teaching and evaluate digital teaching differently. To this end, two questions of the Marburg study were analysed: 'Do you think that digital teaching offers and tools can sufficiently replace face-to-face teaching in the COVID-19 crisis? (= replace face-to-face) and 'I have the feeling that by using digital teaching offers and tools (e.g. video conferencing, teaching videos), I can master the challenges of my studies during Corona' (= mastering challenges). The following variables are included in the analyses as independent variables: commuters, students with a part-time job, with disabilities, with a migration background, with slow internet, the education of parents and gender. Other variables, such as the amount of time spent on care and single parents, could not be taken into account. Children and family members cared for only accounted for a few students on a larger scale, and nobody claimed to be a single parent. A table is used to show the results of correlations (Spearman). Only significant results ($p<0.05$) are described in detail.

All significant results indicate slight correlations based on the coefficient: there is a correlation between employment and mastering challenges (-0.141).

Table 2. Correlations of two questions from the Marburg study

	Replace face-to-face teaching 1=very good; 7=not good	Mastering challenges 1=strongly disagree; 7=strongly agree
Part-time job (hours)	0.109	-0.141*
Commuters (minutes)	-0.206**	0.086*
Disabilities (yes/no=ref)	-0.033	-0.246***
Migration background (yes/no=ref)	0.066	-0.079
Slow internet(yes/no=ref)	0.259***	-0.168*
Education mother (school type)	-0.155*	-0.030
Education father (school type)	-0.163*	-0.052
Gender (f/m=ref)	-0.070	-0.058

*p<0.05; **p<0.01; ***p<0.001 (2-tailed)

The more hours students were working before the COVID-19 crisis, the more likely they are to suspect that they are not up to the challenges. This could be because these students have fewer financial resources (which is why they work) and are therefore more affected by the COVID-19 crisis.

The more time students spend commuting, the more likely they are to think that digital teaching can replace face-to-face teaching sufficiently well (-0.206) and the more likely they are to think they can meet the challenges (0.086). Disabled students tend to be unable to cope well with the challenges to their studies posed by the digital courses on offer (-0.246). Students with slow internet access assume that digital tools cannot replace face-to-face teaching well (0.259) and that they are not as good at meeting the challenges (-0.168) as compared to the face-to-face teaching. The educational background of the mother and father plays a role: the higher the education of the mother or father, the more likely it is that the children believe that digital teaching can acceptably replace face-to-face teaching (-0.155/-0.163). The results indicate that there is a correlation between the evaluation of digital learning opportunities and various socio-demographic characteristics. However, further analyses based on larger samples and the checking of third-party variables are necessary to draw further conclusions.

3 Digital teaching – the teachers' perspective

How do teachers deal with digital teaching? On what problems do they focus? These questions were investigated with a survey of teachers. For this purpose, all teachers in the Department of Social Sciences were asked to participate in the first part (time point) of an online survey, in which 36 interviews were realised. The survey ended only a few days ago, which is why this paper will essentially only deal with two aspects and will not present international studies. In addition, the findings of the Potsdam study and an online survey by the University of Kiel (May 2020, response: 377 complete interviews) among teachers of all faculties are included. Gender differences are an important issue. However, the data do not allow for meaningful analyses, as the results are not representative (small sample size (Marburg); convenience sample (Kiel)). Therefore this aspect is largely excluded, although initial empirical studies suggest significant gender differences due to COVID-19. Previous findings of various national and international studies show that women, in particular, are much more negatively affected by the COVID-19 crisis than their male colleagues, for example, in terms of scientific publication output.

Workload: the majority of teachers report an enormous increase in the workload related to teaching. According to the Potsdam study, over 81% consider the workload to be very high or high in reference to regular semesters. Similar results are found in the Kiel and Marburg studies. Marburg and Potsdam teachers were also asked about the change in general workload, which, in their opinion, has increased exorbitantly. In this context, Marburg teachers refer to the sharp increase in emails from students as one reason for increase in workload. Gender effects were examined in the Kiel study, but no differences between women and men could be identified. Slight differences in the workload caused by online teaching were found for teachers who take on care tasks (for children or relatives) in the Potsdam study (Breitenbach, 2020a; Klonschinski, 2020, p. 8; Universität Potsdam, 2020, p. 10).

Research: a sharp reduction in research activities and output accompanies the increased workload. The majority (Kiel 57.3%; Marburg 62.5%) stated that they had done significantly less research in the last two months. Almost as many of those questioned in the Marburg study (54.2%) were unable to carry out their

research as planned. The fact that the quality of research has suffered was mentioned by 45.9% of the Potsdam respondents. As reasons for the impairment of research activity, the teachers mainly cited the burden of the switch to digital teaching, childcare, lack of access to literature and the research field (Breitenbach, 2020a; Klonschinski, 2020, pp. 16-20).

Another point should be mentioned – the high level of teachers' commitment in the transition to digital teaching. How many teachers have partially or completely converted their courses is not apparent from the studies. Digital teaching is not as well developed in Europe as in the USA, where about half the teachers use digital courses and tools from time to time. As a result, the majority of teachers have had to familiarise themselves with a new skill in a short time. Hardly any of the Marburg teachers had experience with interactive media such as online courses. Only two people claimed to have worked with instructional videos before COVID-19, and none with the inverted classroom. Nevertheless, the majority of the teachers prepared themselves for digital teaching in the following ways: 80% used video tutorials, 68% were supported by colleagues, 56% by the university computer centre and 20% made use of specialist literature (Breitenbach, 2020a).

4 Opportunities

What needs do students and teachers have for teaching and learning in the future? Which opportunities do they see from COVID-19? The IAU online survey received 576 replies from 424 universities and other HEIs in 111 countries. Many of the respondents see the experience from the COVID-19 crisis as a good opportunity to learn from this exceptional situation. They have tried out new digital forms of teaching and would like to continue to offer more flexible learning opportunities, blended or hybrid learning and mixed synchronous and asynchronous learning. (IAU, 2020, p. 26). Since the quality of digital teaching has been criticised by students in some studies (see above), teachers should make use of support and further training courses as required. The same applies to students who often have too few digital skills. Digital courses and the use of tools should be regularly evaluated and, if necessary, revised.

The universities could invest more in technical infrastructure and the expansion of digital services. This applies both to the digitalization of administrative processes and access to digital teaching material or libraries (IAU, 2020, p. 26). The majority of teachers (58% Potsdam; 77.3% Marburg) would like to offer more online or digital teaching in the future, but they also stressed that face-to-face teaching should not be abandoned. Similar tendencies are evident among students (Breitenbach, 2020a, 2020b; Universität Potsdam, 2020). The Marburg students attach particular importance to synchronous teaching (online formats) and asynchronous but interactive media. Classical digital media (PDFs, learning platforms) play a subordinate role, while they would prefer to see the use of instructional videos, quizzes and the inverted classroom for the post-COVID-19 period. Teachers increasingly indicate that they would like to use the inverted classroom, instructional videos and online (office) consultation hours post COVID-19, but digital quizzes or tests only to a limited extent (Breitenbach, 2020a).

Another aspect relates to the reduction of mobility on the part of students and teachers in the wake of the COVID-19 crisis. Students and teachers travelled to a lesser extent: students could hardly participate in exchange programs anymore, while teachers had to forgo attending conferences. This has led to the increased use of alternative tools, such as video conferences. In the future, these alternatives could be used to a greater extent to reduce the burden on the environment by reducing individual transport.

Conclusion

In this paper, central aspects influencing digital learning were addressed, such as the technical equipment, but also influences arising from the social inequality between students. One focus is on the challenges that have arisen for teachers and students due to the transition to digital teaching. The findings of international and national studies show the diverse effects of the abrupt switch to digital teaching on learning. Problems and disadvantages, as well as advantages, have been identified. The following figure shows the students' perspective. For this purpose, the open answers of the Marburg study were categorised (see figure 1).

Figure 1. Word cloud: Advantages and disadvantages of digitisation

Whether certain groups of students are more affected by the switch to digital teaching than others was investigated using bivariate analyses. Differences were found in the evaluation of digital teaching depending on various socio-demographic characteristics or heterogeneity characteristics. For example, students from more highly educated parents consider digital teaching to be a good substitute for face-to-face teaching more often than others. People with disabilities state more often that they cannot cope with the challenges of studying during COVID-19. However, further studies are needed to draw far-reaching conclusions. Nevertheless, it has become clear how important it is to pay attention to the social context of the students and to include appropriate questions in surveys.

The discussion about the negative consequences of the COVID-19 crisis should not ignore the opportunities that have emerged. As the authors of the IAU study point out,

> this unplanned and unprepared experiment in distance teaching and learning has led to capacity building of staff and faculty who have learned and tested new tools and systems to enable distance teaching and learning. lt is therefore possible that a shift in mindset is happening or that this experience has opened a new horizon of opportunities for teaching and learning" (IAU, 2020, p. 26).

The COVID-19 crisis should be used as an opportunity for better teaching, to meet the different needs of learners. Both students and teachers would like to use more digital teaching courses in the future; a mixture of synchronous and asynchronous teaching seems desirable in this context. Students attach particular importance to interactive media, such as instructional videos, the inverted classroom, quizzes or formative tests. Special attention should be paid to students with disabilities by making available materials accessible to them.

In the current situation, however, it is necessary to consider the problems of students and teachers. One issue mentioned by both groups is the enormous increase in workload. It would be desirable to credit the hours of work involved in the creation and supervision of digital courses and virtual courses. In order to support students, care should be taken when planning future courses to ensure that they do not have a higher workload than the courses before COVID-19. For students with slow Internet access, for example, offline materials, such as material on USB drives and on-loan laptops, could be provided.

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