The Digital Transformation of Teaching in Higher Education from an Academic's Point of View: An Explorative Study

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Abstract. The process of digitalization challenges universities worldwide, in particular the universities' IT. Qualitative interviews with lecturers were conducted to gather information on service requirements. The lecturers' experiences and suggestions demonstrate that, from their perspective, an improvement of the IT infrastructure and equipment is only secondary for the digitalization of teaching at Münster University. Instead, a centralization of information, knowledge and expertise in the field of digital teaching is required. Lecturers wish for a 'center for digitalization' which they can contact for information and practical advice on existing IT services, for counseling on digital teaching concepts, and for support in the implementation of new digitalization ideas. From the lecturers' point of view, the university's perspective on digital teaching has to change as well, overcoming baseless concerns that digitalization inevitably results in an entirely virtual university. In addition, incentive systems for excellent new forms of teaching would give more value to lecturers' efforts.

Keywords: Digitalization · Qualitative study · Higher education
Teaching

1 Introduction

While the process known as digital transformation or digitalization changes all areas of society, universities – at least in Germany – seem to be widely unaffected by now [1]. Aside from research, where the digitalization is visible in large datasets and the increasing use of informatics even in the humanities, today's studies look very similar to those in medieval times: a professor in front of his students who writes on a blackboard and students who learn from books. Even if you replace the blackboard with a beamer and books with PDFs, it is just an introduction of digital substitutes but not an alteration of the process. Nonetheless, it appears to be just a matter of time until the digital transformation fundamentally changes university life. IT services show great promise particularly for teaching and that is why the subject increasingly receives attention [2–6].

In view of the future of universities in the digital era, a discussion has started recently about the influence of social megatrends such as individualization, globalization, mobility or lifelong learning on teaching. The Internet, for example, allows for

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new types of courses such as MOOCs (Massive Open Online Courses) and SPOCs (Small Private Online Courses) which students can attend online wherever they are [7–11]. Lecture recordings also remove place and even time constraints [12, 13]. In consequence, every university is capable of being a global distance university and can offer courses to everyone, not just to local students [14, 15]. A higher international awareness, an intensified exchange and a better integration into the global research landscape are some of the benefits and will attract more foreign students to study on-site as well [16].

Innovative digital concepts for teaching have the potential to substantially change the way courses of studies are formed because they allow for considerably more differentiation. In an extreme case, a student could completely personalize his course of studies based on modularized teaching content [17]. Moreover, real-time feedback provides an opportunity to individually adapt the learning pace and, thereby, increase the learning success. The combination of face-to-face courses and e-learning, also known as "Blended Learning", emphasizes the lecturer's role as a trainer or moderator [18–20]. New ways of communication between students and lecturers arise and new teaching methods like serious gaming [21–23], interactive videos [24, 25] or simulation models [26, 27] enhance the learning experience.

Without doubt, the students' perspective is highly important to avoid developments that are out of touch with reality or miss the users' demands. Our first study [28] and other work in this field [e.g. 30] show that students do not expect a digital revolution of teaching but a smooth digital evolution. This is an important finding. Nonetheless, it would be a mistake to be blinkered and neglect another major player in this context: the academics. The discussion and assessment of technical capabilities and innovative ways of teaching should take into account that lecturers are heavily affected from developments in this area, too. A digital transformation in teaching would affect their everyday work and job requirements dramatically.

Therefore, this explorative study aims to give first insights into the academics' perspective on the digitalization of higher education, and – in terms of a practical purpose – identify opportunities for the improvement of existing IT services and structures at the University of Münster (WWU), one of the largest in Germany with about 50,000 students. In combination with our previous study which centers students, it also serves as a starting point to describe a full picture of different expectations and needs as well as concerns and obstacles as to the digitalization of teaching and learning.

2 Literature Review

The number of papers and studies which focus on the digitalization in higher education has increased recently. Most of them focus on the situation of students [24, 30–37]. As Cope and Ward [38] point out, not just the students' perspective is important but also the perspective of the teaching person. While a good overview of the status quo of digitalization in the US is provided by the annual ECAR studies by EDUCAUSE – quantitative surveys conducted with approximately 50,000 students [34] and 13,000 lecturers [39] –, comparable statistics from Europe are missing. In Germany, the discourse still is driven mainly by politics, not science, and in consequence publications

are often working papers with a normative character or guidelines based on experts' opinions [1, 26, 40–42].

In general, most scientific studies are either very specific [27, 43, 44] or they are designed as quantitative surveys which grant an overview but no in-depth insight into the subject [34, 45, 46]. What they have in common is that they place emphasis the students' point of view on digitalization: their needs, expectations, experiences, usage behavior, preconditions, etc. This emphasis and the thought of a generation of digital natives entering university [32, 47–49] might lead to the misconception that students were the only driver behind the process of digitalization and an improvement of studying its only objective. An improvement of learning, however, is inevitably connected with an improvement of teaching – the lecturers' domain. An interesting qualitative study among Turkish academics was done by Ocak [50], who identifies eight reasons for a low usage of digital environments: complexity of the instruction, lack of planning and organization, lack of effective communication, need for more time, lack of institutional support, changing roles, difficulty of adoption to new technologies and lack of electronic means. We want to know if those problems are still relevant.

Overall, there is still a lack of studies providing insights into the experiences, wishes and opinions of academics regarding the digitalization of university life, which could, amongst other things, be harnessed for university IT.

3 Research Methodology

In the absence of recent studies describing the digitalization of universities from the students' and especially the lecturers' point of view in-depth, we planned two pilot studies to examine each perspective and subsequently compare the results. Against this background it was important to design both surveys with a parallel structure. For our first study [28], focus group interviews with students were conducted in 2017. As the method had proved successful in delivering informative results, we only had to make minor adjustments for this follow-up study which focuses on the following question: From the lecturers' point of view, to what extent is teaching in higher education already digitized and which improvements are needed?

3.1 Research Questions

To answer this question, first, it is necessary to clarify how digitized the academic studies already are from the lecturers' point of view. In order to identify concrete improvement opportunities, we need to find out which university IT services are used by academics and how they evaluate their user experience. Eventually, the study also tries to spot necessary modifications, which the university should make to stimulate the digitalization process according to its lecturers. The following three research questions (RQ) reflect these aspects:

RQ1: To what extend is teaching already digitized at present?
RQ2: How do lecturers evaluate their experience with existing IT services?

RQ3: Which changes are necessary to foster the digitalization of teaching?

Based on experiences from our first study in this field, a guided focus group interview [51–53] was chosen as a suitable research method and an existing interview guideline was adapted to structure the discussion in view of answering the research questions and produce results which are comparable with our previous findings.

3.2 Interview Instrument

The interview guideline divided the focus group interview into three sections: In the first part, the participants had to describe their experiences with the use of IT at work and for teaching purposes in particular, in order to find out which parts are already digitized and which parts are still processed offline. In this context, the lecturers also listed the IT services they used and described usage situations and problems. Finally, the participants were asked to make suggestions on how the university could simplify their work by means of IT. In the second part, the academics were asked to write down the most important IT services that the university should offer to support teaching. These suggestions were subsequently presented and classified. In the third part, the participants had to prioritize the suggested services and give reasons for their respective decisions. For this purpose, each participant could assign ten points to the mentioned services, with the possibility to assign all points to one service. A ranking list was formed based on the prioritizations.

3.3 Focus Group Interviews

Academics of Münster University were informed about the project using a mailing list aimed at all employees, the IT center's website and its Twitter profile. A sample representing the university's different departments was desired, but could not be forced due to the self-recruitment procedure. Eventually, the sample consisted of eleven academics with teaching experience from six departments, mainly natural and life sciences. The group size should not extend six persons, in order to ensure a lively exchange, enough speaking time per person and an efficient management of the discussion [51, 52]. However, due to schedule difficulties, a last minute switch had to be arranged and the final groups consisted of four and seven persons, respectively. In the run-up, participants were given very limited and general information on the subject of the study to avoid framing [52]. The survey consisted of two 1.5-h guided focus group interviews. The interviews took place on two dates within a week in December 2017. The conversations were recorded and transcribed by assistants. The data were cleansed, structured and subsequently assigned to the research questions. Significant statements were extracted and clustered into subject areas [53].

4 Findings

In this chapter, the results of the focus group interviews will be presented with regard to the research questions.

4.1 Status Quo of Digitalization

"What does the digitalization of teaching mean? What do you digitize anyway? What is the aspired goal?" Though these questions are raised by only one of the participants and not sooner than in the middle of the discussions, it is worth starting with them here. They put in a nutshell a general uncertainty about the subject as such which most of the other participants described in less concise ways as well. The university does not provide a strategy of digitalization and there are hardly any strategic or practical guidelines on the part of the departments either (with the exception of the Faculty of Medicine), leaving it up to the lecturers to find their own concept:

Participant 01: "To me, at the moment, it is the tools which you can use. But that, I think, is not per se digitalization. In fact, my vision is that teaching content can also be offered in an individualized way [...] and that can only be achieved through digital content and support."

Participant 04: "To me, digitalization is what we did analogously before. That we ported that into the digital world with the most varied possibilities."

Most participants see themselves as trailblazers who have entered largely uncharted waters. Since their orientation and testing phase is predominantly unguided, it requires a considerable investment in time and effort and, thus, dedication for the subject. Some lecturers have started to explore progressive forms of teaching on their own or are involved in small, but ambitious digitalization projects.

Participant 06: "This year, I received a Fellowship for Innovations in Digital Higher Education. Then I changed my lecture to Just-in-Time Teaching and also provided materials as open-educational resources. It was a first try for me and I am convinced that this is the way to go."

Participant 02: "I am still looking for the optimal lecture design. I always switch between chalkboard and slides, and also do online surveys and stuff like that. But I have not found the ideal way yet."

The participants also noted that the majority of their colleagues is more reluctant or even opposed to digitalization, because of nescience, insecurity or a lack of time.

Participant 05: "It is definitely something that is neglected by many and perceived as an imposition. It is very heterogeneous. Overall, it is always the most important thing that the effort is as low as possible."

Participant 02: "There will always be individuals who have been doing this in a certain way for 20 years and actually do not really understand why they should change it. I think you have to push these individuals a little, because often [their restraint is based on] ignorance and insecurity."

One thing all participants can agree on is the fact that digitalization affects all aspects of teaching – lectures, material distribution, assessment, course evaluation, communication with students and administrative task – and that the status quo of digitalization can only be described as very heterogeneous, depending on the department, the chair and the individual lecturer.

Classic lectures and seminars with PowerPoint presentations and PDF handouts are still the normal case, but video content, audience response systems (e.g. Kahoot!, PINGO, TurningPoint, and the university's own system ZIVinteraktiv) and digital devices (e.g. smartphones and tablets) have conquered many lecture rooms as well.

Lecture recordings are currently tested by some of the participants and have resulted in ambivalent opinions. On the one hand, academics value that students can choose the time and speed of reception, but on the other hand, they doubt that students understand these offers to be supplementary and use them in an efficient way.

Participant 01: "I have recorded my lecture […] and use the extra time for exercises in form of chalk and talk. I have made very positive experiences with that. […] Now everyone can choose their own pace and time for reception."

Participant 01: "But if you offer too much digitally, students no longer use it as an additional offer."

Participant 08: "In the week before the exam […] [students] suddenly start to watch the lecture. This is of course extremely inefficient."

Even though lecture recordings implicate a substantial expenditure of time and effort, at least initially, they also open up time slots for alternative and more progressive forms of teaching, such as Flipped Classroom or Just-in-Time-Teaching. One participant noted changes at the department in this regard, another one had made first experiences himself.

Participant 09: "Overall, there is a lot of movement in medicine as far as teaching formats are concerned, and there is also a lot of commitment to use digital media and carry out more Inverted Classroom projects."

Participant 06: "I have tried Just-in-Time Teaching. It is like Flipped Classroom, where learning actually happens during self-study. In my opinion the lecture itself is not very suitable for knowledge transfer […]."

While these approaches promise additional benefits in teaching and learning, lecturers do not define all tendencies of digitalization per se as progressive. They notice that not all students are digitally savvy yet and not all content is suitable for digital teaching formats.

Participant06: "Even when I thought something was easy […], there were regularly catastrophic results. Not until then did I notice that I had already left most of the students behind and consequently there was no substantive discussion."

Participant10: "Some things have to be touched and written manually; otherwise the transfer will not take place. When you develop something digitally, students start to wait until you are done and take a photo of it."

Seemingly outdated formats or equipment, on the other hand, are not condemned but used on purpose.

Participant 02: "In introductory lectures, […] I use the blackboard, because I have the feeling that the pace is slowed down."

When it comes to lecture materials, PDF handouts have become an established format for lecture notes and are distributed either via the university's e-learning platform Learnweb or via the department's website. Due to a special need for multimedia documents, one work group also produced e-books with iBook Author and InDesign as well as educational videos.

Participant 01: "We use Learnweb for everything in terms of communication with students. All materials are there."

Participant 07: "All videos of sports exercises that we do are uploaded to YouTube. […] Apart from that, we implemented a lot of curricula in form of digital e-books

which include videos, image series and texts, and which we distribute not through a store but via upload."

E-assessment is of little importance in most disciplines, but has become a standard at the Department of Medicine where exams are usually multiple-choice. Since there is a lot of criticism of multiple-choice test, e-assessment procedures are currently refined to be able to test practical knowledge (e.g. by using a digital microscope).

Unlike exams, course evaluations are mostly digitized, using various tools such as EVALuna, EvaSys, Unipark or Qualtrics. The conversion from paper to digital questionnaires does not always run smoothly though. While digital questionnaires can be answered quickly and comfortably on the smartphone, students feel less obliged to participate compared to paper questionnaires that are completed and handed it at the end of the course. Moreover, the existing questionnaires do not yet reflect the current transition from analogue to digital formats and are often useless in consequence.

Participant 01: "We have just switched from paper to electronic. Thereby the response rate has decreased dramatically."

Participant 01: "Due to the fact that I work with recordings now, the standard questionnaire [...] no longer fits. 'The lecturer was prepared.' Well, if it is a lecture recording, what should I tick? And now there are other forms of interaction that are not reproducible at all."

The lecturers perform administrative tasks – including exam administration, teaching reports and lecture room bookings – very reluctantly, because most bureaucratic processes are only partially digitized, and the resulting parallel structures are perceived as an additional burden and annoyance instead of a relief. Especially the booking of rooms is looked upon unfavorably, because of various systems and unclear responsibilities. The Medical Department is the only department where the administrative staff is solely responsible for allocating rooms, while lecturers are not involved in this task.

Participant 08: "Of what use is the greatest room management system, [...] if the person in charge does not use it at all or only halfway?"

Participant 01: "Booking rooms is a nightmare. I do not even do that myself, I always ask our secretary. [...] You cannot make a proper request. Instead, you must call someone who makes a request for you and who gets a reply two days later if the room is still available. I think it is a disaster."

At the end of each term, all lecturers must submit a teaching report documenting their lectures and seminars. Compiling this report is a task that has to be done digitally. Nonetheless, the administrative machinery is unable to process the report digitally as well which leads to irritation among the participants.

Participant 08: "The digitalization of the administration is a disaster. [...] When it comes to [...] teaching reports it is an idiocy: I compile a teaching report in a truly great system. [...] Then I print a few versions and send them to the deanery by internal mail. The deanery files some versions and sends the rest to the central administration by internal mail. [...] The administration completely lacks an understanding of digitalization and of IT processes."

Participant 02: "*You simply have to avoid media discontinuities on such platforms. The necessity to still print and sign documents should simply not exist anymore."*

In summary, the academics conclude that the digitalization at Münster University has developed inconsistently in different departments and different tasks areas, and has not progressed far enough yet (RQ1). Most participants see themselves as progressive with regard to digital teaching, despite having just entered a testing phase. This suggests that many lecturers are not yet dealing with the subject of digitalization at all. Audience response systems are increasingly used by the participants to diversify lectures and create interaction, but lecture recordings or new lecture designs such as the Flipped Classroom concept are still exceptions. Lecture materials (i.e. lecture notes and literature) are usually distributed in PDF format via e-learning platforms. E-assessment is of little importance in most disciplines, but course evaluations are mostly digitized. Administrative tasks (e.g. exam administration, teaching reports and room bookings) are only partially digitized, leading to frustration among the lecturers because they are confronted with parallel structures.

4.2 User Experiences with IT Services

Bearing in mind that most participants characterize themselves as pioneers of digitalization in their respective departments, it seems unlikely that university systems would meet all demands of their everyday work. Therefore, we were interested in their experiences and satisfaction with existing IT services.

The use of some of the university's IT tools is almost inevitable and it is no surprise that participants primarily discuss the most common services, including the e-learning platform Learnweb and the exam registration system QISPOS. Rather new offers such as the cloud storage service sciebo and the audience response system ZIVinteraktiv are mentioned as well. Other university services are of little or no importance in the discussion (e.g. standard software, printing service, e-mail service, communication infrastructure, and websites).

Overall, participants are satisfied with the e-learning platform Learnweb which they primarily use to distribute lecture notes and materials. However, they also note that they are far from exploiting the possibilities of the platform due to a lack of experience and a lack of time to familiarize themselves with its functionalities. In addition, when it comes to video material, the platform seems to meet its limits, making it questionable if it is suitable for distributing lecture recordings in the current state.

Participant 10: "Once you are familiar with it, it is relatively easy to upload something and update it. Nevertheless, you have to find the time to […] look into it in advance. That is one reason why it may not be as widespread as it could be. At least the basics are really comprehensible, even to […] normal end users."

Participant 07: "There is no course that is not supported by Learnweb. However, in 95% of the cases it is limited to download options, PDF and literature uploads, the assignment of tasks and the use of the mailing list. But we do not use it for interactive teaching, because we do not have any experience with it."

Participant 07: "[With regard to video content], Learnweb is complicated. It takes a long time to upload something. That is why we used YouTube."

While an intensive use of YouTube appears to be an exception, Dropbox was the most frequently used cloud service among employees until recently [54]. In 2015, the university launched the private cloud storage system sciebo to provide an alternative

that was in line with data security and privacy policies. Though the majority has adopted this alternative, two participants report that other solutions are still in use at their departments (ownCloud and Google Docs which is fully integrated into Google Drive). If sciebo is used, participants have made predominantly good experiences. However, the service seems to be more suitable for research than teaching and is sometimes neglected due to the Learnweb.

Participant 05: "Our experiences are very positive. […] The size of our genomics data gets very big rapidly and here it is very suitable. In my opinion, sciebo is very fast and it is easy to share things – which is good and very convenient."

Participant 04: "Sciebo is a service we use a lot. It is very good. And we are allowed to store certain materials […] for teaching there."

Participant 02: "I hardly use sciebo in teaching. If I upload stuff, then via Learnweb or websites."

While the Learnweb and sciebo receive overall positive evaluations, the exam administration system QISPOS has the greatest potential for improvement from the lecturers' point of view. At the moment, using the system is perceived as laborious and even impossible in parts. One of the departments uses FlexNow as an alternative which is not integrated into other university systems either, but perceived as convenient.

Participant 02: "QISPOS is very, very, very difficult – meaning cumbersome – to use. […] As regards the integration of QISPOS and Learnweb: They have absolutely nothing to do with each other."

Participant 08: "I am completely doing a blind flight in QISPOS: I do not know who is registered for the exam, I cannot enter the grades, I do not see anything. I have to have my own systems inevitably. [QISPOS] does not work at all."

As regards communication services, lecturers show a significantly different user behavior than the students questioned in our previous study [28]: While students need services to coordinate groups and make use of the same commercial networks and communication tools they favor for private purposes (i.e. Facebook, WhatsApp and Skype), the participants completely withdraw from these media in their role as lecturers. Forums, wikis and blogs are not used for communication purposes either; instead e-mail and personal communication dominate.

Participant 01: "I do not want to be permanently available to students."

Participant01: "I used Skype before. I would not do that again. […] It was an absolute chaos. The questions came so fast that I could not answer and it was pure stress."

To make lectures more interactive, all participants looked into audience response systems. Since the university's own app, ZIVinteraktiv, is widely unknown and perceived as limited in its functionalities, commercial apps, including Kahoot! and TurningPoint, as well other university's in-house developments, including PINGO and ARSnova, were heavily tested. According to the participants, Kahoot! is time-consuming in preparation and execution, and PINGO is rather complicated. ARSnova, on the other hand, was not criticized.

In summary, the discussion about the quality of existing IT systems and services (RQ2) was rather brief and focused on a limited number of tools. Overall, the users' experiences are ambivalent. The university's e-learning platform and cloud storage service are considered exemplary, even if most participant do not have the time to delve

into their functionalities and use their full potential. QISPOS, the university's exam administration tool, is criticized in many ways and cited as an example for complicated administration tools and laborious bureaucratic processes. Lecturers would highly welcome an elimination of parallel structures and media disruptions as well as a reduction of bureaucracy.

4.3 Need for Improvement

The lecturers' suggestions for improvement can be divided into six categories: university strategy, information policy, lecture content, lecture administration, equipment and infrastructure, and others (Table 1). By prioritizing the suggestions, individual opinions were filtered out and a clear favorite could be identified. To foster the digitalization of teaching, lecturers need practical support in creating digital content (34 of 110 points).

Table 1. Prioritization of ideas for improvement

	G1	G2	Total
University Strategy	0	13	**13**
Incentive systems for excellent (digital) teaching			
Digital teaching strategy			
Information Policy	11	12	**23**
Central contact point			
Exchange with experts			
Exchange with other academics			
Visibility of existing tools & services			
Newsletter "Digital Teaching"			
Lecture Content	18	16	**34**
Central support office			
Support in video recording			
Support in creating digital teaching materials			
Support in legal questions (e.g. copyright)			
Lecture Administration	5	9	**11**
Equipment and Infrastructure	1	18	**19**
Software, hardware & media equipment			
Integration of central IT services			
Other	5	2	**7**
Total	40	70	**110**

Participant 07: "Many do not have the know-how. They know the content, but nothing about filming, cutting, or using InDesign – there must be support. You should be able to go somewhere with the content and say: This has to be implemented digitally."

Participant 01: "If you take the step towards a digitalization of teaching, didactic questions are raised as well – I am not trained for that. I think challenges of a very different nature will come up to the university and that should be reflected as well."

Moreover, lecturers require centralized information on existing IT tools and services, that is to say a more effective information policy (23 of 110 points). Currently, there is no overview of existing possibilities in digital teaching, no directory with contact persons, and rarely any exchange of information among lecturers. This lack of information and transparency leads to an unnecessary expenditure of work.

Participant 01: "I think that the information policy could be substantially improved. […] I think you need central solutions."

Participant 04: "You just have to show what is possible and I can guarantee that many will say: I have always wanted it that way."

Both tasks, information and practical support, should be performed by a central contact point and support office: a 'center for digital teaching'.

Participant 02: "I would like to have such a center for digital teaching for advice. […] It could organize the search for ideas and simple tools, and, of course, offer training and further education in this field."

Interestingly, none of the participant mentioned the ZHLdigital, the university's center for digital teaching, which was reconstituted recently and is supposed to exactly fulfill those tasks. A statement made by one of the participant in a different context fits perfectly here: "Probably it already exists and we just do not know it." It sums up that information and communication need to be intensified considerably to establish such an institution. The center needs to approach the lecturers actively to become known.

Furthermore, the participants want to initiate a rethinking of the university's appreciation of digital teaching. They consider it a cliché and an obsolete argument that digital forms of teaching would supersede classroom teaching and create a solely virtual university. On the contrary, they expect an enhancement of classroom teaching beyond basic knowledge transfer by means of an increased interaction and discussion. Therefore, teaching should be revalued by introducing incentives similar to those existing for excellent research.

Participant 01: "After 6 years, I am not measured by whether I had a great digital lecture, but by the number of my publications."

Participant 02: "I think an incentive system for improved teaching is quite appropriate – to encourage young scientists in this regard."

In summary, a digitized university is not equivalent to a virtual university but definitely implicates significant changes in teaching, from the lecturers' point of view. These changes should be reflected in the university's strategy and structure in form of incentives as well as a central point of contact, information and practical support (RQ3). These expectations already go beyond the students' picture of a digitized university which is rather pragmatic [28]: Students do not ask for a fundamental change of teaching and studying, but prioritize an integration and standardization of existing IT services. In concrete terms, they expect a portal which merges the most important information and tools. The academics agree that an integration of the basic structures could already be an enormous improvement, but they do not highlight this aspect.

5 Conclusion

This study was designed as an explorative pilot study to gain first insights into the digitalization of teaching from an academic's point of view. Naturally, these insights are subjective assessments and therefore not representative. Moreover, the results have to be evaluated in relation to the specific situation at Münster University and are not necessarily transferable to other universities. Nonetheless, we are convinced that the study complements our examination of the students' perspective [28] in a meaningful way and provides valuable information, especially for those involved in university management, administration and IT. We are aware that additional focus groups with lecturers from the humanities and social sciences are necessary to complete the picture. Subsequent quantitative surveys with both groups, lecturers and students, would allow testing the validity of the results and supporting them in a representative way.

Lecturers describe the status quo of digitalization (RQ1) as very heterogeneous, depending not only on the department, the chair and the individual lecturer, but also on the task area – a result which is generally in line with the students' experiences [28]. However, when it comes to the details, certain differences in the perceptions of both groups are revealed. Academics describe their current situation as a testing and orientation phase. Digital tools such as audience response systems have found their way into lectures, but lecture recordings as well as new lecture designs and formats (e.g. Flipped Classroom, Just-In-Time-Teaching) are exceptions. This coincides with the findings of Ocak [50]. Students do not elaborate on this topic, which suggests that digital lectures do rarely or not at all occur in their studies. Insofar, the experiences of both groups reflect that digitalization has not yet changed lectures fundamentally. In general, students welcome lecture recordings or interactive elements as additional possibilities, but do not claim them insistently. Academics, on the other hand, are more eager to experiment with new forms of teaching and learning, and, unlike students, do not consider classic chalk and talk lectures as future-oriented. As regards lecture materials, academics usually provide lecture notes and literature in PDF format and distribute them via e-learning platforms. In contrast, students report that digital formats and the Learnweb indeed gain in importance, but printed scripts are still very common, too. E-assessment is of little importance in most disciplines, but course evaluations are mostly digitized. When performing administrative tasks (e.g. exam administration, teaching reports, room bookings), lecturers are confronted with parallel structures, because relevant processes are only partially digitized. The students also recognize this heterogeneity, stating that the registration for exams is largely digitized, while the administration of the examination results is largely paper-based.

The academics do not discuss the quality of existing IT services (RQ2) extensively, but have quite clear opinions: The university's e-learning platform and cloud storage service are considered to be exemplary, while the exam administration tool QISPOS is criticized for being complicated and laborious. In this context, lecturers recommend an elimination of parallel structures and media disruptions. Students, on the other hand, have very high requirements due to commercial models and believe that university services cannot compete, in particular with regard to the ease of use and the interface

design. As a matter of principle, university systems have an image problem among students [28] and some are not even given a try if commercial alternatives exist.

When comparing the lecturers' with the students' focus group interviews [28], it is evident that the discussions differed considerably: Students have a rather conservative opinion as to a digital university and understand digitalization primarily as the digital provision of lecture notes, the digital organization of their studies and online interaction possibilities. Since these basics already exist, their discussion of improvement opportunities (RQ3) centered on the optimization and technical integration of existing IT services. Due to their comparatively progressive attitude, lecturers, on the other hand, discussed strategical and structural changes that would facilitate a digitalization of teaching and enable new teaching formats. Their vision is much closer to a reformation of university teaching. In consequence, they do not primarily request an improvement of the IT infrastructure and equipment, but a clear direction of the university and a centralization of information, knowledge and expertise in the field of digital teaching. A 'center for digitalization' could bring together relevant players, including IT professionals and didactics experts, to provide information and practical advice on existing IT services, offer counseling on digital teaching concepts, and support lecturers in the implementation of new digitalization ideas.

Ultimately, however, the lecturers' perspective is differentiated: Even though the participants are eager to experiment with digital approaches, a digitalization of teaching is not seen per se as the future of teaching, but rather as a means to an end. To them the basic question is: "In what way do we want to teach our students in the future and what way is best?" They agree that concepts are crucial and whether they are digital or not is a completely different question. At this point, lecturers expect the university to develop and implement a future-oriented and visionary teaching strategy that also values extraordinary commitment and excellence in teaching.

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