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Exploring the transition to the digital age in higher education teaching

Abstract

The global Covid 19-pandemic led to many challenges for higher education (HE) teachers. However, it also provided an opportunity to not only re-evaluate a previously unquestioned teaching culture, but also to fundamentally question the capabilities of HE institutions and teachers to implement digitally supported education at the organizational, teaching, and learning levels. In this study, we analyzed data from 1,339 HE teachers' conclusions for post-pandemic teaching terms of instructional course quality. Our findings shed light on HE teachers' mindsets toward traditional face-to-face and online teaching, as well as (im)probable changes in academic teaching culture. Our results offer a "bottom-up" basis for recommendations on how institutions can support their faculty for digital transformations in HE based on teachers' expertise and perceptions of the advantages and hindrances of HE online teaching.

Keywords

academic teaching, blended learning, online teaching, face-to-face teaching, higher education teachers

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1 Introduction

Many researchers have investigated the various stressors to which education teaching and learning have been subject, mainly from the perspectives of students. Others point to the importance of HE teachers' attitudes (in times of online teaching during Covid-19) in order to illuminate inter-individual differences regarding the implementation of online technologies (e.g., DAUMILLER et al., 2021) but only few capture HE teachers' views in a qualitative manner. In our study, we analyzed open-ended responses of more than 1,300 university faculty in an online survey, without limiting them to querying predefined constructs. Because "it is the teacher who is at the heart of any process of change in education" (BRUGGEMAN et al., 2021, p. 1), we addressed HE teachers' beliefs and conclusions around online teaching and related pedagogy – drawing on their experiences in the pandemic, against the backdrop of their expertise in face-to-face teaching, and at a moment in time at which teachers in many places have expressed a desire to share their practical knowledge and learnings around online teaching. The aim of the present study – which formed part of a larger research project looking at long-term opportunities and barriers for faculty and students in relation to digital transformations in HE (FELDHAMMER-KAHR et al., 2021; MÖLLER et al., 2021; TULIS et al., subm.) – was to explore the future of academic teaching. We structured the qualitative data along a proposed framework of HE course quality dimensions.

2 Experiences in HE teaching: a faculty view

Prior to Covid-19, HE teaching in Austria and Germany was predominantly carried out in face-to-face formats, rarely enriched by digital technology use, and with only some HE teachers who realized blended e-learning scenarios (e.g., ENGLUND et al., 2017; SCHNECKENBERG, 2009). When designing online and blended learning courses, instructors' considerations and decisions about the instructional design are embedded in organizational conditions as well as HE teachers' individual characteristics and conditions (e.g., digital skills, teaching experience). Against this backdrop, faculty are the primary pedagogical decision-makers in their courses (GRAHAM & ROBISON, 2007), thus change agents in HE digital transformation. There has been relatively little work to date on the reasons for or against the implementation of

online or blended teaching and learning formats, which faculty members cite or take into account when making these decisions (see, for example, HUMBERT, 2007). Mass distance teaching and learning occasioned by the pandemic set the scene for a re-evaluation of previously unquestioned teaching practices and, due to the circumstance of almost *all* HE teachers being able and required to gain considerable experience with digital teaching formats, generated opportunities for teachers across virtually the entire HE spectrum to assess the possibilities and limitations of online teaching. Not only since the pandemic, but accelerated by its necessary changes in HE teaching formats, the capabilities of HE institutions and teachers to implement digitally supported education has been fundamentally challenged. Teachers' conclusions for post pandemic teaching in the light of instructional course quality are a relevant source for the actions to be taken to support HE digital transformation.

Our literature review on online teaching in higher education uncovered a possibly surprising dearth of research investigating this issue, therefore we attempt for a more "bottom-up" manner in the present study (for an exception see DAMŞA et al., 2021). The effectiveness of a teaching format is additionally related to its fit with the aspects of instructional quality considered important by the teacher. It is in the context of this intersecting diversity of aims, needs, and perceptions that researchers have put effort into studying the implementation of blended learning in HE (BECKER et al., 2017). The benefits of combining traditional face-to-face teaching with online learning include greater flexibility, the ability to provide differentiated instruction within the same group, and improved student engagement (BOELENS et al., 2018; JONKER et al., 2018; MESTAN, 2019). Another aspect of HE with a substantial influence in relation to the choice of format is the type of skills the course in question needs to deliver (e.g., LAMPE et al., 2010), and highlights the importance of HE teachers' competences to know why, when and how best to implement digital teaching formats (e.g., LINDBERG & OLOFSSON, 2012; SCHNECKENBERG, 2009).

Research indicates that HE teachers often perceive online teaching as more time-consuming and demanding than face-to-face formats, and that this view seems to be accurate as far as preparing online content and activities, and time spent per student are concerned (CHEN, 2003; VISSER, 2000). Previous (pre-pandemic) studies have recorded further potential drawbacks of online formats, as perceived by HE teachers, as including impact on the quality of student interaction, difficulties

in managing online interactions, insufficient time for developing technology-driven pedagogy, and a lack of support (see, for example, LIN et al., 2014; OH & PARK, 2009; PORTER et al., 2016). The importance of interaction is underlined by work on remote online-based teaching in adult education, which has identified social inclusion as a particularly important motivator, giving rise to a recommendation that teachers using this format add interactive and social elements to their classes in order to create a sense of cohesion among the group and enhance learners' motivation (HETZNER & HELD, 2009; HETZNER & LEEN, 2013).

3 Tasks and dimensions of instructional course quality in HE teaching

One theoretical framework used frequently in online teaching within the context of schools is the Technological Pedagogical Content Knowledge (TPACK) framework (MISHRA & KOEHLER, 2006), combining teachers' content knowledge, pedagogical knowledge and technological knowledge. In addressing HE teachers' pedagogical knowledge and teaching expertise in a narrower sense, research identified several tasks in HE teaching (VAN DIJK et al., 2020). Similarly, PAECHTER & MAIER (2010) have identified five dimensions of instructional course quality that HE teachers need to address (see also EHLERS, 2004; YOUNG & NORGARD, 2006):

Instructional design (*course design, learning material, course environment*). In order to achieve the intended teaching/learning objectives, teachers should ensure that the design of the course as a whole and of its individual elements, such as learning materials, communication of knowledge, enhancement of self-directed learning, etc., is didactically coherent (cf. BROPHY, 1999).

Tutoring and interaction between instructor and students. The tutoring of students by the teacher encompasses numerous aspects. A teacher should, among other things, explain content, support the acquisition of knowledge, arouse interest, motivate, give feedback, and provide assistance to enable the students to engage in learning activities (BROPHY, 1999).

Interaction, communication, and cooperation among peer students. Research into online learning has highlighted the importance of various types of interaction, integrated meaningfully into the learning process – interaction between student and content, among students, and between student and instructor – to successful learning outcomes (BERNARD et al., 2009). Interaction is of no less significance to in-person than to online learning, but online teaching will need specific attention to and consideration of how best to support the different types of peer interaction in the remote setting. Mutual support and the feeling of group cohesion are related to students' experience of social presence; group work can promote knowledge sharing and development among learners (e.g., GARRISON et al., 2000).

Individual learning processes. In online learning settings, students may receive ample opportunities to practice and apply what they are learning. Self-organized and self-regulated learning is an important feature of technology-based teaching and learning settings. The literature on online teaching suggests that a carefully designed approach to using digital technologies can be highly effective in overcoming many of the traditional barriers of space and time (MURRAY et al., 2020).

Learning outcomes/successful learning (achievement of learning goals and skill acquisition). The European Qualifications Framework lists the core competencies which university education is intended to deliver as subject, methodological, social, and personal competencies. In university courses, students should not only acquire conceptual and methodical knowledge (e.g., the application of subject-specific skills, techniques, and methods; ANDERSON & KRATHWOHL, 2001), but also social and personal competences (e.g., competences in teamwork, in the self-regulation and monitoring of one's learning processes).

When designing online and blended learning courses, instructors' considerations and decisions about the didactic design may refer to these different dimensions of instruction, which are embedded in *organizational conditions* (such as IT support and equipment), as well as HE teachers' *individual characteristics and conditions* (e.g., digital skills/E-competence, or teaching experience). We examined the HE teachers' open answers in light of the quality characteristics of HE courses described above.

We addressed the following two research questions with qualitative analysis of open answers:

1. *Would HE teachers continue online teaching after the pandemic, and, if so, why? What are their "lessons learned" in relation to the various tasks of online teaching and along the dimensions of instructional course quality?*
2. *To what extent are these assessments associated with HE teachers' (perceived) digital competencies, teaching experience and satisfaction, and institutional support?*

We expected positive associations between (subjective) digital competence, online teaching satisfaction, institutional support, and a preference for online teaching formats.

4 Methodology

4.1 Participants and procedure

In addressing these research objectives, we drew on data of 1,339 HE teachers from Austria (n = 911, 68.03%) and Germany (n = 428, 31.96%). Two-thirds of the participants (n = 888) answered the optional open-ended question, thus shared their thoughts about online teaching and their future commitment to online and face-to-face teaching, resulting in 1,836 codings in total (thereof 76 statements that cannot be allocated = residual). For a detailed description of the sample, see Table 1. Participation was entirely voluntary and in accordance with the ethical standards of the institutional research committee. Informed consent was obtained from all participants of the study.

Table 1: Participant demographics

Demographic		*n*	Percentage (%)
Gender	Female	723	54.0 %
	Male	605	45.2 %
	Divers	11	0.8 %
Institution	University	879	65.6 %
	University of applied sciences	269	20.1 %
	College of teacher education	191	14.3 %
Type of employment	Professorship	452	33.8 %
	Research and teaching assistants (pre- and post-doctoral level)	434	32.4 %
	Lecturers (with high teaching load or temporary contract for teaching only)	451	33.7 %
Scientific discipline	Natural and life sciences	353	26.4 %
	Educational sciences and teacher education	253	18.9 %
	Linguistics, cultural sciences, aesthetics, music	236	17.6 %
	Digital science, analytical science and technology	190	14.2 %
	Social sciences and humanities, media and communication sciences	168	12.5 %
	Law, business and economics, business education	110	8.2 %
	Theology, religious studies, philosophy	27	2.0 %
	Missing values	2	0.1 %

4.2 Measures

The survey was conducted online using Lime Survey. All institutions were contacted by e-mail and asked to distribute information about the survey to their faculty. After a short introduction about the aim of the study, demographic information was collected and questions were asked about the participants' current teaching situation. This paper is part of a larger research project, therefore only measures related to the research question are addressed in the following.

Against the backdrop of their current personal experiences with online teaching, we asked HE teachers for their goals and plans regarding future teaching practices and desired course design. Participants could select either "continue online teaching", or "combine face-to-face with online teaching", or "return to face-to-face teaching" (single choice question format with three answer options). After that, the participants had the voluntary opportunity to explain the reasons for their choice. Quali-

tative data were analyzed with EXCEL and the analysis software MAXQDA (2018) using a theory-driven approach (categories based on the dimensions of instructional course quality in higher education; PAECHTER & MAIER, 2010) and an inductive, data-driven approach. Guided by the qualitative content analysis according to MAYRING (2010), the open answers (= unit of analysis) were examined separately for each preference of future teaching format. In a first inductive step, the answers within the unit of analysis were condensed to the essentials. In the second step, similar responses were assigned to a corresponding category across all individuals, and finally assigned to the five predefined dimensions of instructional course quality: (A) instructional design, (B) interaction, communication, and cooperation, (C) learning goals and skill acquisition, (D) support for individual learning, and (E) tutoring; and two more dimensions: (F) organizational conditions, and (G) teachers' individual characteristics and conditions. In total, this procedure yielded in a total of 1,836 codings. Interrater agreement – based on 10% of the data (answers of 134 participants) that were coded by two independent and trained raters – was satisfactory (79% agreement). Other categories derived from the data, as well as a residual category including all statements that did not fit into any other category or were exceptional or did not represent the focus of interest, were added.

Ratings of competences, support, and satisfaction

The decision to teach online or face-to-face is subject to both contextual and personal influences. Regarding personal factors, we asked for *teaching experience* (ranging from 1 = *less than one year* to 5 = *16 years or more*), and teachers' competence in using digital technology in general (five-point scale ranging from 1 = *not confident in using digital technologies* to 5 = *very confident, "How confident do you feel in general when dealing with digital technologies?"*), and if they feel competent in using the current online tools provided or recommended by their institution (1 = *not confident* to 5 = *very confident*). Participants were also asked whether they had ever attended training in higher education didactics (yes/no) and specifically for online teaching (yes/no). Furthermore, we asked participants if they feel satisfied with their own teaching (1 = *disagree* to 5 = *agree*) and to rate their perceived support by their institution in (a) didactical and (b) technical aspects (one single item each, again ranging from 1 = *not true/not at all* to 5 = *true*).

5 Results

5.1 Teachers' conclusions and thoughts on future academic teaching culture

We had data from 1,154 participants who answered the question concerning future teaching practices and course design. Only 71 HE teachers (6.2%) stated that they would like to keep their courses online in the future. However, 814 (70.5%) of the participating university teachers were planning to keep parts of their courses online in terms of blended learning, and 269 (23.3%) of the HE teachers expressed their desire to completely return to face-to-face teaching formats.

In order to gain more elaborated insights into the reasons and considerations for this decision, we analyzed the qualitative data acquired by the open answers and teachers' perceived advantages of different teaching formats. Due to the voluntary questions, a total of 888 participants elaborated on their choice, with multiple codings per participant allowed. Tables 2–4[2] show the categories, the number of codings and sample statements per category. Regarding the reasons for online teaching, participants' statements were coded in 23 categories (plus a residual category). Figure 1 depicts the relative frequencies (percentages of subjects, multiple responses considered) of these 23 categories, clustered along the instructional course-quality dimensions explained before. The most frequently stated reason for continuing to teach online in the future was organizational: teachers' own flexibility in terms of time and location, followed by the benefits for students due to increased time flexibility. In addition, specific benefits for instructional quality and didactics were considered, most notably the possibility of more varied, motivating online instruction through more diverse learning and assignment materials that can easily be accessed and used repeatedly by students. In addition to the expressed benefits of online instruction, six (plus one residual) categories were identified as additional benefits or specific reasons for blended learning formats, i.e., the systematically combining online with face-to-face instruction (Figure 2). The combination of "the best of both worlds" was expressed as the most significant/most frequent, besides more flexibility for students and teachers. Many responses also focused on supplemental online material or

2 Available at https://doi.org/10.25598/zfhe-etdahet-tables

online meetings in special cases (e.g., office hours). Finally, sixteen different reasons/categories (plus one residual category) were identified for the preference of face-to-face teaching (Figure 3). Aspects of more personal and more efficient teacher-student-interaction were mentioned most frequently, followed by considerations that certain subjects, primarily with a high number of practical exercises (see Table 4).

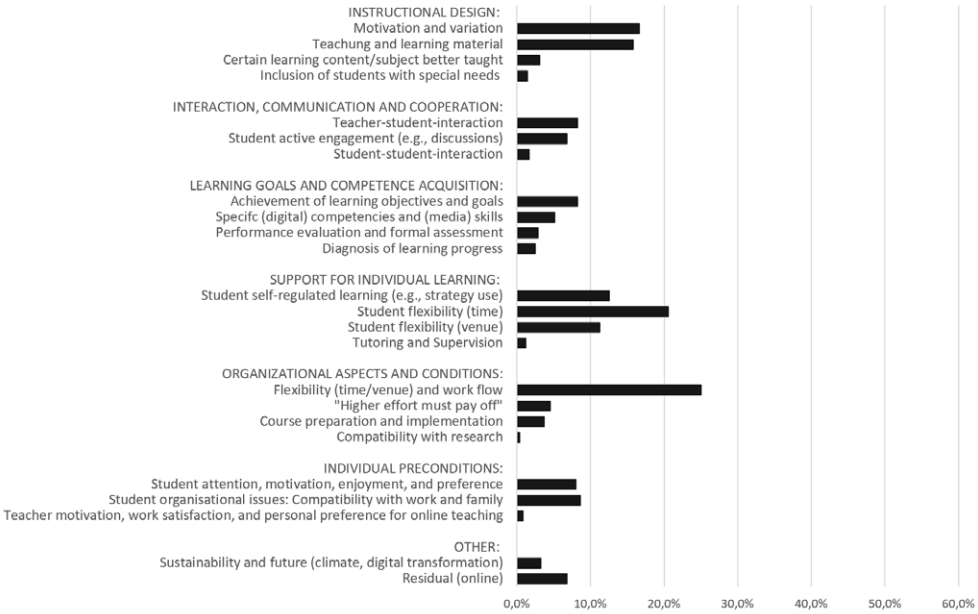

Fig. 1: Frequencies of categories coded for online teaching (accounted for multiple responses)

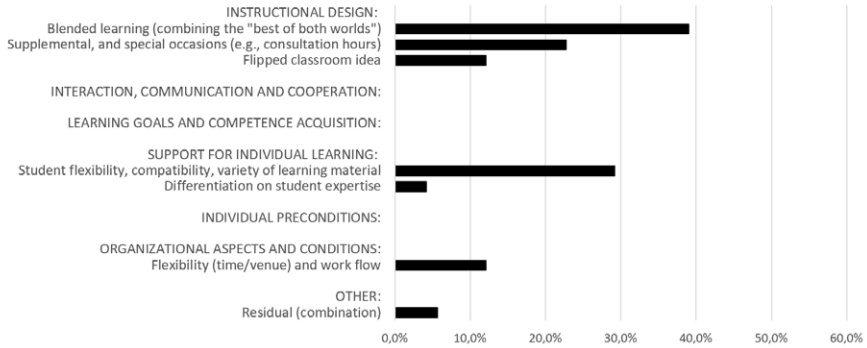

Fig. 2: Frequencies of categories coded for combining online with face-to-face teaching (accounted for multiple responses).

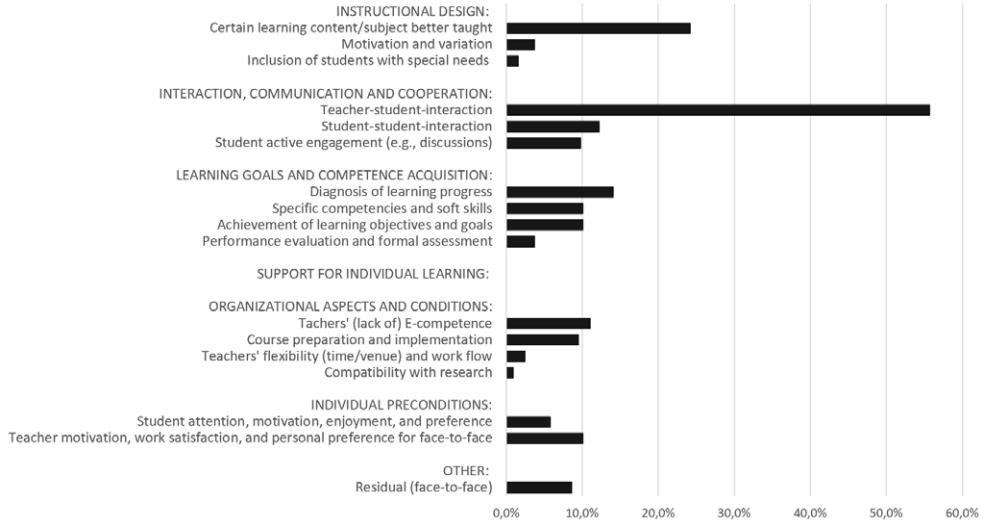

Fig. 3: Frequencies of coded categories for face-to-face teaching (accounted for multiple responses).

5.2 The role of teaching experience, digital competence, institutional support, and teaching satisfaction

Whether HE teachers were more likely to return to face-to-face teaching or keep their courses online was associated with different demographics and work-related variables.

Differences regarding gender, institutions, and teaching experience

Compared to male HE teachers, women more often wanted to keep online teaching formats (75.8% vs. 64.6%) and less women than men expressed a desire to completely return to face-to-face instruction (18.3% vs. 28.9%; χ^2 (4) = 19.82, p = .001, n =1,147). However, this effect was only significant for university faculty, not for teachers from universities of applied sciences and colleges for teacher education. Participants who attended (at least once) a training course for online teaching were more often in favor of keeping parts of their future teaching online (76.1% vs. 67.1%) and expressed less desire of going back to completely face-to-face teaching (18.2% vs. 26.3%; χ^2 (4) = 11.28, p =.004, n =1,147). To explore possible effects of teaching experience, we categorized participants into groups of different amounts of teaching experience (up to one year, 1–5 years, 6–10 years, 11–15 years and more than 16 years). Compared to highly experienced faculty (with 16 years or more of teaching experience), participants with teaching experience less than 16 years expressed higher desire to partly keep online teaching, and to use digital tools in their future courses, respectively (on average 80% vs. 66.9% in the group of more than 16 years of experience). In addition, this group of highest teaching experience indicated a greater desire to go back to face-to-face teaching completely (33.1% vs. on average 20%; χ^2 (4) = 21.56, p <.001, n = 1,076).

Subjective e-competence, teaching satisfaction, and perceived institutional support

We found that both, teachers' perceived competence in using digital technology in general and in using the digital tools provided by one's institution had an impact on teachers' considerations for future teaching (F (2, 1144) = 18.94, p < .001 for e-competence in general and F (2, 1144) = 32.02, p < .001 for the use of digital teaching tools provided or recommended by the respective institution). Moreover, high teaching satisfaction was associated with one's intention to continue online instruction (Table 5). Again, differences between all three groups were significant (F (2, 1144) = 132.56, p < .001).

Finally, we found no significant impact of provided institutional support (in a didactical or a technical way), see Table 5.

Table 5: Means and standard deviations for perceived technology skills, satisfaction with teaching, and institutional support by group

	Preferred teaching format in the future	*M*	*SD*	*n*	*Min*	*Max*
How competent do you feel using digital technologies in general?	Keep online teaching	4.37	0.,85	71	1	5
	Combine online with face-to-face	4.08	0.77	814	2	5
	Return to face-to-face teaching	3.78	0.89	269	1	5
I was content with my teaching during the digital "Corona-semester."	Keep online teaching	4.46	0.91	71	1	5
	Combine online with face-to-face	3.70	1.03	814	1	5
	Return to face-to-face teaching	2.68	1.25	269	1	5
How competent do you feel using the digital tools provided by your institution?	Keep online teaching	4.51	0.89	71	1	5
	Combine online with face-to-face	3.94	0.95	814	1	5
	Return to face-to-face teaching	3.50	1.16	269	1	5
I feel supported by my institution with didactical questions.	Keep online teaching	3.48	1.19	71	1	5
	Combine online with face-to-face	3.59	1.12	814	1	5
	Return to face-to-face teaching	3.41	1.20	269	1	5
I feel supported by my institution with technical problems.	Keep online teaching	3.55	1.34	71	1	5
	Combine online with face-to-face	3.61	1.20	814	1	5
	Return to face-to-face teaching	3.48	1.25	269	1	5

Note. N = 1,147

6 Discussion

Due to the Covid-19 pandemic, HE teachers were faced with constraints on their regular teaching and had to move to different teaching formats. Our findings provide a synthesis of HE teachers' teaching practices and their attitudes towards face-to-face and online (blended) teaching formats, not only during the pandemic, but also for the future.

Many clearly stated in their open answers that they had gained new experiences with online teaching and that they would like to change their future teaching. Most answers could be assigned to predefined areas of instructional course quality in higher education (PAECHTER & MAIER, 2010) which served as a framework for the qualitative analysis in this study. Former studies have examined teachers' approaches to technology-enhanced teaching and their conceptions of teaching in HE (e.g., KIRKWOOD & PRICE, 2014) but our study has sought to capture implications of HE teachers' conceptions of meaningful online teaching (in the light of pedagogical issues). Our findings indicate that the merit of online teaching formats is primarily seen in terms of student (and teacher) flexibility, but also for individual support, and new ways for participation, like chat or discussion forums, and international expert guest talks. In fact, research illustrates that online discussions (synchronous or asynchronous) can be valuable for deeper learning (e.g., TSAI & TSAI, 2014). In our study, many of those teachers who opted for online teaching in the future highlighted the benefits of online discussions as well. Other aspects, such as the diagnosis of (psychomotoric) skill development, and social interaction were rated higher in traditional face-to-face instruction. Important to note: in-person teaching was less frequently considered beneficial for student motivation than online teaching.

Many of the arguments of those who opted for face-to-face teaching reflect the belief of these HE teachers that they can provide individual support, diagnosis of learning progress and feedback only in face-to-face teaching. For these HE teachers in particular, the possibilities of digital teaching formats must be made clear and tangible in appropriate training courses.

A limitation of our study might be that data was collected during the pandemic. Ratings in favor or against online teaching might differ from teachers' attitudes in pre- or post-pandemic times. However, many had tried something new, and want to keep some of these new tools and formats in the future. As the pandemic is still not

overcome, following up on changing attitudes of teachers and students would be interesting.

We believe that the urgency of remote teaching had the potential to enrich evidence-based instructional practice in HE. Indeed, the majority of HE teachers who participated in our study opted for blended learning in their future teaching. The main reasons for this were, to be able to combine the "best of both worlds" (i.e. to utilize the specific advantages of each teaching format at the same time), and the increased flexibility, variety of learning material and compatibility with other tasks/obligations. However, some teachers still see online tools as a mere "supplement", although online teaching is more than that and should be integrated in didactical concepts. Therefore, teacher trainings about blended learning seem necessary. Additionally, advantages of flipped classroom concepts need to be addressed in practice and research (overviews are given by CHEN et al., 2018; DELOZIER & RHODES, 2017; VAN ALTEN et al., 2019). In addition to didactic support, the framework conditions for this teaching format must be clarified and taken into account accordingly in module handbooks and HE institutions' examination regulations in order to provide HE teachers with guidance and orientation.

As our study has made evident that HE teachers see different merit in both teaching formats – online and face-to-face – and more than 70% of the participants expressed their desire to combine them in their future teaching practices, we propose more didactic support in the future to promote the transition to such modern teaching concepts.

7 Compliance with Ethical Standards

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Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

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Appendix

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