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University Students' Readiness for Using Digital Media and Online Learning—Comparison between Germany and the USA

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Abstract: The year 2020 brought many changes to our everyday life but also our education system. Universities needed to change their teaching practices due to the COVID-19 pandemic. Words like "digital media", "online teaching" and "online learning" were present in all of the discussions. The main issues here were the technical infrastructure of students and universities all over the world. However, to have good technical infrastructure does not mean that everybody is also ready to use it. Thus, the present study focused on the issue of university students' readiness for online learning. The quantitative research goal was to evaluate German university students' readiness for using digital media and online learning in their tertiary education and compare them with students from the United States. Overall, 72 students from the researchers' university in Germany and 176 students from multiple universities in the United States completed the Student Readiness of Online Learning (SROL) questionnaire. Results show substantial differences between the two groups of students, with U.S. students being more ready for online learning. The results and limitations were discussed, and practical implications and further ideas were provided.

Keywords: readiness; digital media; university students

1. Introduction

The world has been facing changes since March 2019 due to the COVID-19 pandemic [1]. COVID-19 has impacted not only individuals' private lives with strict limitations but also resulted in enormous changes in teaching and learning in higher education, e.g., [2,3]. With the changes enforced, most of the university lecturers were not prepared for leaving the lecture halls, the seminar rooms and the laboratories. Students struggled with these changes as well and voiced the fear in tertiary education, e.g., [4].

Lecturers who faced the problem looked for solutions, e.g., [5,6]. In Germany, the discussions mainly focused on technical tools, internet access and technical infrastructure. A good internet connection, interactive tools and the newest teaching and learning methods were meaningful, e.g., [4]. The scientific community, including higher education educators, exchanged their experiences from this transition to online teaching and are still supporting each other, e.g., [7,8].

Online teaching has been used for more than two decades in tertiary education [8–12]. Online teaching encompasses innovative learning formats such as blended learning, e.g., [13], flipped classroom, e.g., [14,15], social and collaborative learning (e.g., using social media), e.g., [16], simulations and game-based learning, e.g., [17,18], synchronous and asynchronous video lectures,

e.g., [19], polling software, e.g., [20] or collaboration authoring tools e.g., [21]. This also includes designing and delivering courses with a learning management system (LMS), massive open online courses (MOOCs), e.g., [22], and the provision of materials such as open educational resources (OERs), e.g., [23]. Recent trends like augmented reality (AR), virtual reality (VR), e.g., [24,25], and artificial intelligence (AI), e.g., [26], are developed and discussed. Online teaching can make higher education more attractive, individualized, practical and flexible [9–12,27,28], enabling it to partly respond to the challenges faced by universities (e.g., adaptation of online teaching, changes of content and study goals for the labor market of the 21st century and adaptation of the university as an institution for lifelong learning) in Germany due to qualitative and quantitative changes in the student population [26,28–30]. Online learning allows flexible access to content and instruction at any time and at any place as well as providing a degree of interactivity, collaboration and reflection [9–12,31]. Digitization does not pursue the goal of mechanization but should lead to didactic, curricular and organizational innovations within teaching [32]. According to Kerres [33] and Bremer [34], the following tasks can be differentiated for media in university teaching within the framework of a course: knowledge presentation, knowledge transfer, knowledge application, knowledge construction and knowledge communication. Depending on the learning concept, these tasks can be fulfilled by various digital and traditional media. Teaching approaches that use digital learning concepts and media are often summarized under the term Teaching 4.0 [9,27], and almost all of the formats and ideas of online learning can be used in schools as well.

The students at the researchers' university in Germany are from schools where this kind of teaching was not practiced. In the International Computer and Information Literacy Study (ICILS) [35], only 4% of German students report daily use of digital media in class (ICILS 2018 international average: 18%, U.S. 43%). According to the ICILS, 23% of the German teachers stated that they use digital media in class every day (ICILS 2018 international average: 48%, U.S. 50%). The most common form of using digital media in a German class by far is the presentation of information in frontal teaching. In contrast, only 18% (ICILS 2018 international average: 40%, U.S. 49%) of teachers in German state that they use digital media for individual support, often to always [35]. These results show that students in German schools lack learning with digital media, compared internationally in general and to U.S. students in particular.

Regarding German tertiary education, Dittler and Kreidl [27] and Schmid and colleagues [36] show that the possibilities of digitization in higher education have so far been realized only inadequately and only selectively. Germany-wide student surveys show that only 50% of courses at universities use audiovisual media [37]. Students would like to see more digital media in teaching [27,38] and expect digital media to enrich university courses and offer new and meaningful opportunities [27]. In the United States, research shows that by fall 2015, more than six million college students (29.7% of all college students) were enrolled in at least one online course, and as a consequence, enrollment in online courses increased while enrollment in physical campus courses decreased [39]. Online learning has been one of the most important innovations in U.S. higher education in the last two decades [28], and the number of online courses offered continues to rise [40].

However, such changes in tertiary education and the implementation of new methods will only succeed if students' and teachers' beliefs, their knowledge and attitudes are taken seriously into account [41–43]. Bandura [44] explains it with personal beliefs which are the best indicator of why a given person behaves, acts and makes decisions in a certain way. Researchers unanimously agreed that each student and teacher has personal beliefs about teaching and learning science, which influence all of his/her respective teaching and learning strategies and behaviors [45]. The character of these beliefs and the fields where such beliefs come into play are very broad and multi-dimensional. For example, Koballa, Gräber, Coleman and Kemp [46] concluded that beliefs influence all interactions between teachers and pupils. They also found that teachers' beliefs about teaching and learning always include aspects of beliefs exclusive to their chosen discipline.

Evidently, beliefs influence peoples' actions by interacting with knowledge and information processing [47]. This is why teachers' beliefs about teaching and learning are crucial for establishing proper actions in classroom situations on different educational levels. In line with Pajares [47], beliefs are an inclusive construct that covers any mental predisposition a teacher or student teacher holds and that affects her/his behavior in the classroom [48]. Highly connected to beliefs, Bandura [49] defines self-efficacy as " . . . beliefs in one's capabilities to organize and execute the courses of action required to produce attainment" (p. 3).

Thus, concerning online teaching, we conclude from different research that not only the great infrastructure and best practice materials lead to the success of good teaching and learning. Our behavior in general and our usage of specific teaching and learning methods in general, depend on our knowledge but also on our beliefs. Thus, online learning at the tertiary level does not only mean having a great technical infrastructure but also having knowledge about usage of it and also having positive beliefs and attitudes toward online learning and usage of digital media. Thus, for implementing online teaching and learning with digital media in our tertiary education, it is not only knowing if students have all the technical support needed and if they have good internet access that is important to us. We need to know their beliefs about online learning at our university. We have to ask the question of whether our students are actually ready for online learning since the majority of them have never experienced learning by using digital media and online learning.

2. Theoretical Framework

2.1. Student Readiness for Online Learning

In a nutshell, the research of readiness for online learning explores the preparedness of learners and educators as well as contexts for successful digital education [50]. Students need to have online readiness to benefit from online learning settings [51]. Previous research determined that student readiness has a positive impact on students' achievements in online learning [52–54], satisfaction in learning experiences [55], self-confidence [56] and lifelong learning [57]. Student readiness increases interaction in digital learning environments [58] and is influenced by gender, ethnicity, class and financial aid [59].

Online learning and usage of digital media are getting into the focus of research and university programs. Student readiness for online learning was first described by Warner, Christie and Choy [60], dividing it into three facets: (i) student preferences for a form of delivery, (ii) student confidence in electronic communication for their learning and (iii) students' ability to engage in self-directed learning. Borotis and Poulymenakou [61] defined student readiness as being prepared mentally and physically for online learning. Current definitions focus on abilities, attitudes, learning contexts and outcomes for prosperous learning for students and educators [51,55–62].

In research, student readiness for online learning has been examined through a variety of dimensions and using various measuring instruments [63,64]. This variety shows that readiness for online learning is a multi-dimensional construct, which shows a lack of consensus about its components [63]. However, researchers try to identify the most commonly used and significant dimensions in the study of readiness. Online student attitudes/attributes [63–66], time management [64, 66,67], communication [63,64] and technical competencies [63–65,68] emerge as relevant and significant dimensions of readiness (Figure 1).

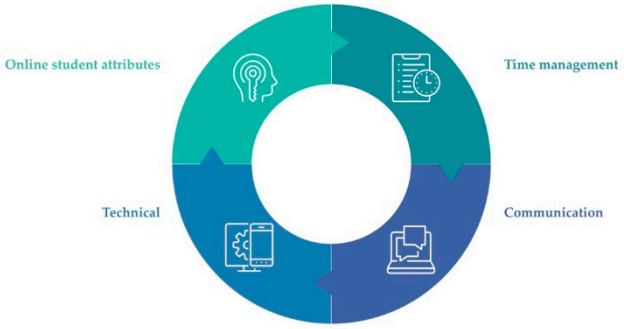

Figure 1. Dimensions of student readiness for online learning.

2.1.1. Online Student Attributes

Student-related factors play an essential role in the concept of readiness for online learning. Researchers have found that self-efficacy and self-directed learning influence the students' online learning process. Self-efficacy is the students' expectation or belief in his or her abilities to perform the desired action by himself or herself successfully [44]. It influences interest, goals, outcome expectations [69,70], motivation, persistence and performance [71]. In self-directed learning processes, students are responsible for their self-learning and make decisions about learning objectives, needs and activities [72]. Self-directed learning aims at the abilities and skills of the students [73]. Successful online learners acquire advanced levels of learner control [74].

2.1.2. Time Management

The research confirmed that student readiness for online learning is linked to self-management [66,67]. In the literature, time management as part of self-management is emphasized. Time management is challenging because it requires self-discipline to take sufficient time in class without synchronous or face-to-face meetings. Students need time-management competencies to keep up with assignments, submit work on time and communicate and interact with peers and lecturers [75,76]. It is crucial that the students have time-management skills to have success in online learning [77].

2.1.3. Communication

Online learning needs communication and participation through active interaction on digital devices [78,79]. However, students need to recognize the value of collaborative elements to engage intensely in learning to make online learning effective [80]. Research has identified that social and communication competencies are critical competencies [80] and influential predictors for learning outcomes and learners' satisfaction in online learning environments [81]. Interactive online learning environments improve students' responsibility, critical analysis and reflection [82]. Thus, it is no surprise that Demir Kaymak and Horzum [58] found a positive relationship between students' readiness for online learning and students' interactions in learning environments. Thus, communication is essential in the students' online learning readiness.

2.1.4. Technical

To use course and learning management systems, video conference software and digital media in online learning, students need to have robust technical competencies in working productively with these systems. In readiness research, technical competencies play an important role in different measurement instruments and have various names, e.g., computer skills, skills and relationships online and technology skills [63]. In research, technical competencies seem to be essential for students' online learning experience [83,84] and are recognized as an influential predictor for learning outcomes [85,86] and learning satisfaction [87].

2.2. Purpose of the Study

The purpose of the present study was to examine student readiness among German university students for online learning based on their perception of the importance of competencies and confidence for online learning and compare it directly with a group of students from the United States.

The research questions that guided this study were:

1. What competencies do German students consider as important for their readiness for online learning?
2. What are German students' perceptions of their confidence in their readiness for online learning?
3. What are German students' primary motivation for taking an online course?

Based on the data from Martin, Stamper, and Flowers [64], which had a similar research design, we formulated the following questions:

4. What differences exist between U.S. and German students on their perceptions of readiness for online learning?

3. Methods

3.1. Instrument

In this study, we used the Student Readiness for Online Learning (SROL) questionnaire, developed by Martin, Stamper, and Flowers [64]. The instrument has 20 items in four subscales: (i) online student attributes, (ii) time management, (iii) communication and (iv) technical. Each subscale has five readiness competencies. These 20 items were repeated to measure (a) importance and (b) confidence. To measure importance, students were asked to "rate how important these competencies are for you in your online learning" on a 5-point Likert scale: 1 (Not important at all), 2 (Unimportant), 3 (Neither important or unimportant), 4 (Somewhat important) or 5 (Very important). To measure confidence students were asked to "rate your confidence in your ability to accomplish the following competencies in online learning" on a 5-point Likert scale: 1 (Very unconfident), 2 (Somewhat unconfident), 3 (Neither confident or unconfident), 4 (Somewhat confident) or 5 (Very confident). In addition to the 20 items, there were demographic questions to document the student characteristics. There was also a closed-ended survey item on student primary motivation to take an online course. Content and face validity of the instrument was checked by sending the instrument to four online learning experts [64]. The overall reliability of the instrument from implementation in Germany was $\alpha = 0.87$, and in the United States, it was $\alpha = 0.93$.

3.2. Data Collection

The data were collected in fall 2018 in the United States and in the spring of 2019 in Germany through an online survey. The data were collected by different researchers in their courses that included seminars and lectures. Students in the German sample visited eight seminars for education, pedagogy and science education. The link was shared using the learning management system Moodle. The participants were instructed on the goal of the study and that the data would be collected anonymously. Finally, it was vocalized that participation was voluntary, and students could drop out anytime. In the United States, data were collected at one southeastern university and by emailing six program directors across the country. More information about the U.S. data collection can be found in [64].

3.3. Participants

The participants were students of the researchers' university in Germany, who were enrolled in hybrid courses which included a combination of online learning and presence. In total, 149 students were approached, and 72 responses were received, resulting in a 48.3% response rate. A

purposive sampling approach was conducted in eight different courses in order to reach students in different semesters and subjects at the researchers' university. Of all students, 52.7% were in a Bachelor's and 39.2% in a Master's program. Most of the participants were female (86.5%) and were enrolled in a teacher education program (94.4%). The participants in this study were mostly pre-service teachers, who studied two subjects (such as Physics, German, Sports or History) next to pedagogy. German participants were strongly heterogenic on the subject level. The average participants' age was 23.5 years (Germany-wide average student age is 24.7 years [88]). The majority of the participants had a typical school career: finishing grammar school with graduation (Abitur) and entering directly in tertiary education. The group of German students in this study is comparable to other student teachers all over Germany. This led to the assumption that the participants can be seen as an exemplary and valuable sample of German students. However, the data should not be seen in the sense of generalization.

The reference group from the United States included 176 students from various U.S. universities, who were enrolled in online studies in various disciplines with a focus on education studies. In this sample 78.9% of the participants were female and 45.2% were enrolled in the discipline of education. More details about this group can be found at Martin, Stamper, and Flowers [64].

3.4. Data Analysis

Descriptive statistics (means and standard deviations) are reported for the four subscales. Multivariate analysis of variance (MANOVA) was used to examine the differences between U.S. and German students in their responses to the survey. Effect sizes are reported as partial eta squared. We used η2 (small = 0.01; moderate = 0.06; large = 0.14) to document effect sizes [89]. Demographic details and primary motivation to take online courses are reported by frequencies and percentages.

4. Results

4.1. Student Perception of the Importance and Confidence of Online Learning Competencies

The means and standard deviations within each of the four subscales (online course attributes, time management, communication and technical) rated on importance and confidence are reported in Table 1.

Table 1. Student readiness for online learning competencies: German and U.S. students.

Student Readiness for Online Learning Competencies	ImportanceM (SD)		ConfidenceM (SD)	
	Germany	USA	Germany	USA
Online Student Attributes				
Mean (SD)	4.04 (0.93)	4.60 (0.83)	3.87 (0.97)	4.54 (0.79)
Reliability	0.77	0.94	0.77	0.93
Time Management				
Mean (SD)	3.96 (0.93)	4.63 (0.84)	3.73 (1.07)	4.40 (0.88)
Reliability	0.65	0.95	0.79	0.92
Communication				
Mean (SD)	3.49 (0.99)	4.22 (0.85)	3.47 (0.98)	4.33 (0.85)
Reliability	0.75	0.88	0.82	0.88
Technical				
Mean (SD)	4.14 (0.80)	4.56 (0.81)	3.81 (0.96)	4.63 (0.72)
Reliability	0.79	0.91	0.89	0.91

Overall, the means of the German participants are in the middle and high range of the 1–5 scale with values between 3.47 to 4.14. It stands out that the German university students from this study rate the importance of readiness competencies higher than their confidence in their ability

to accomplish them. This applies to all four subscales. The most considerable difference between importance and confidence can be seen in technical competence and the lowest in communication competence. Comparing to the U.S. participants, German participants from the researchers' university rated all four subscales both in the importance and confidence of student readiness for online learning competencies significantly lower.

4.2. Student Perception of Importance of Online Learning Readiness Competencies

The German participants rate the importance of student readiness for online learning competencies comprehensively as somewhat important. They rate technical competence with the highest value (M = 4.14). Not particularly important for German students is their communication competence (M = 3.49). On the item level of online student attributes, German students rate the ability to learn from a variety of formats (M = 3.81) and following instructions in these formats (M = 4.00) as not especially important. In contrast, they rate self-discipline with studies as important (M = 4.41). Regarding time management competencies, utilizing course schedule for due dates (M = 3.24) is somewhat important for the German participants, but the completion of activities on time is important (M = 4.42). It is interesting that in the subscale communication, German students tend to rate the competence of asking the instructor for help (M = 3.68) lower than asking their classmates (M = 3.96). In the subscale of technical competence, it stands out that German participants from the researchers' university rate the competence to participate in course activities as somewhat important (M = 3.78). For them, basic computer operations are more important (M = 4.34).

Results from the MANOVA comparing U.S. and German students show statistically significant differences in their perception of the importance of online learning readiness competencies measured through the SROL survey, $F(4, 246) = 16.38$, $p < 0.001$, Wilks' Lambda = 0.21. A test of between-subject effects shows that the U.S. students' perception of importance is statistically higher in all four subscales (online student attributes, time management, communication and technical) compared to the German students. For online student attributes: $F(1, 249) = 26.12$, $p < 0.001$, partial $\eta 2 = 0.09$ (medium effect); time management: $F(1, 249) = 38.04$, $p < 0.001$, partial $\eta 2 = 0.13$ (large effect); communication: $F(1, 249) = 43.10$, $p < 0.001$, partial $\eta 2 = 0.15$ (large effect); and technical: $F(1, 249) = 16.40$, $p < 0.001$, partial $\eta 2 = 0.06$ (medium effect). Figure 2 shows a visual representation of the comparison of the competencies.

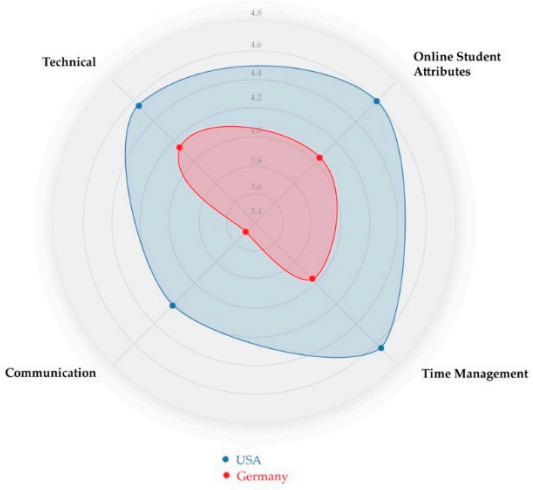

Figure 2. Student perception of the importance of online learning readiness competencies.

This characteristic applies to all 20 items of the SROL survey that was used. The greatest differences between the German and the U.S. participants lies in the subscale of communication ($M_{German} = 3.49$; $M_{US} = 4.22$). To use asynchronous technologies ($M_{German} = 3.30$; $M_{US} = 4.47$) or ask the instructor for help ($M_{German} = 3.68$; $M_{US} = 4.48$) is rated far more important by the U.S.

participants. Concerning online student attributes, the difference in the valuation of importance is substantial. U.S. participants rate learning form a variety of formats (M_{German} = 3.81; M_{US} = 4.48) and following instruction in these (M_{German} = 4.00; M_{US} = 4.69) as well as utilizing additional resources (M_{German} = 3.84; M_{US} = 4.47) much higher than German participants.

4.3. Student Perception of Confidence in Online Learning Readiness Competencies

The German participants from the researchers' university rate their confidence in their ability to accomplish the competencies in online learning as less than somewhat confident. They are the most confident in online student attributes (M = 3.87) and technical competencies (M = 3.81). Students' confidence in time management (M = 3.73) is slightly lower. Parallel to importance, the confidence in communication competencies is ranked the lowest (M = 3.47). On the item level of the four subscales, it is analogous to the reported values of the student perception of the importance of online learning readiness competencies but with lower values.

Results from the MANOVA comparing U.S. and German students show statistically significant differences in their perception of their confidence in online learning readiness measured through the SROL survey, F (4, 246) = 16.19, $p < 0.001$, Wilks' Lambda = 0.79. A test of between-subject effects shows that the U.S. students' perception of confidence is statistically higher in all four subscales (online student attributes, time management, communication and technical) compared to the German students. For online student attributes: F (1, 249) = 37.92, $p < 0.001$, partial η2 = 0.13 (large effect); time management: F (1, 249) = 32.16, $p < 0.001$, partial η2 = 0.11 (medium effect); communication: F (1, 249) = 56.30, $p < 0.001$, partial η2 = 0.19 (large effect); and technical: F (1, 249) = 55.63, $p < 0.001$, partial η2 = 0.18 (large effect). Figure 3 shows a visual representation of the comparison.

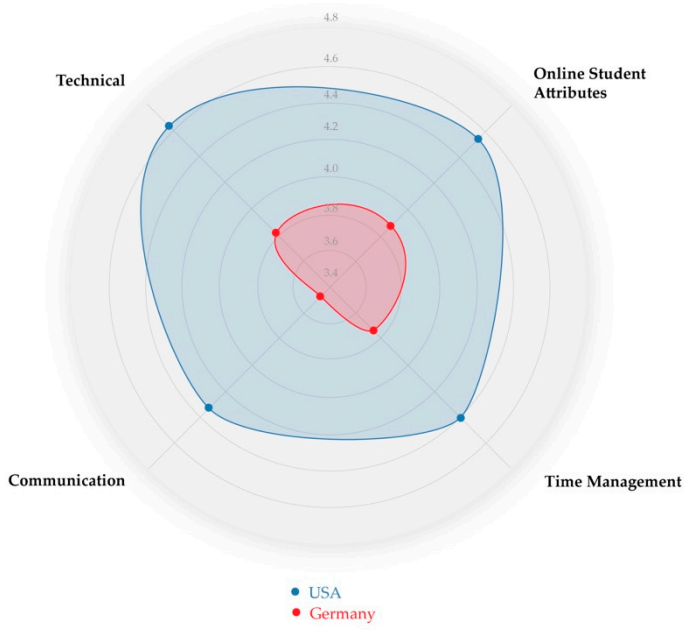

Figure 3. Student perception of confidence in online learning readiness competencies.

This difference between U.S. and German participants' confidence is greater than the contrast of the students' perception of the importance of online learning readiness competencies. It applies to all items of the survey. The most considerable difference between the German and the U.S. participants lies in the subscale of communication (M_{German} = 3.47; M_{US} = 4.33) and technical (M_{German} = 4.81; MUS = 4.63) competencies.

4.4. Student Motivation to Take an Online Course

In Germany, the participants from the researchers' university rated flexibility in terms of place (M = 4.26) and pace (Self-pace) (M = 4.03), which is flexibility in time for course completion as the primary motivation to take an online course. For them, it is also somewhat motivating to communicate with the teacher easily (M = 3.77). The German participants state that they are not motivated because of easy communication with classmates (M = 2.61) and not by a course schedule that meets their needs (M = 2.49).

When asked about students' motivation to take an online course, 48% (n = 84) of the U.S. students state flexibility in terms of time (participate in the class at any time), while 47% (n = 87) of the U.S. participants report flexibility in terms of place (participate in the class from anywhere) as the primary motivating factor to take an online course. Although there are differences in the rating of competencies, the primary motivation to take the online course is similar in both groups.

5. Discussion

In general, one can say that the German students see the importance of online learning. However, comparing both groups of students, the German students do not see themselves as confident as the U.S. students. These differences can be explained by cross-cultural differences in the culture of teaching and learning in secondary schools but also the tradition of teaching and learning at the university level. Different education systems, academic styles, political differences and needs in the countries influence the beliefs and knowledge of the participants [90]. While in the U.S. secondary schools, students are already taking online courses, in Germany this is not the case. This is similar at the university level as well. Furthermore, the majority of the participants in Germany were taking a teacher education program, which is traditionally not online. In addition, a cross-cultural comparison has found cultural differences in U.S. and German classrooms. While American classrooms were more interactive, and American instructors used questions to enhance student-teacher interaction, German instructors relied on lectures [91,92]. This cultural practice might make the move to online teaching harder in Germany. While examining instructor readiness for online learning, it was found that German instructors rated themselves lower in terms of importance and confidence in course design, course communication, time management and technical competence in comparison with U.S. instructors [93].

However, the results of this study have implications for further research and practice at the tertiary level. Based on the knowledge from this study, German university educators can plan seminars and usage of different tools, think about didactical concepts of university teaching and weigh the support students need. Thus, this would mean that university educators should not only focus on students' learning of content but also offer additional material that supports students' readiness for online teaching.

In order for digital media to be used didactically and meaningfully integrated into schools and thus realize their potential, a number of requirements must be met. In addition to a suitable and usable digital infrastructure, teachers who have been trained in digital learning concepts and media didactics are required [36,94]. Studies show, however, that German teachers often lack these skills, e.g., [95]. Only 15% consider themselves well-versed in the use of digital media, and only a quarter recognize the potential for success that learning with digital media has [36]. Currently, teachers rarely use digital media in Germany [96].

The study and especially the comparison with the U.S. students support the current literature, which identifies a high need for professionalization for current and future teachers in the field of teaching and learning with digital media, e.g., [36,90,96]. In its strategy paper "Education in the Digital World" [97], the Ministry of Education in Germany also calls for teachers to have general media skills and media expertise in the subject. Teachers should have competencies in the areas of media didactics, media ethics, media education and media-related school development. They should continuously develop their own general media competence in order to be able to plan, implement

and reflect on safe and adequate use of digital media. In doing so, they should identify suitable materials in the multitude of educational media offered and be able to use didactic possibilities of digital media in the classroom. Furthermore, the importance of media and digitization in the pupils' lives should be recognized, and concepts should be developed with which pupils can develop media competence. Schoolchildren should be supported in learning with and about the media and being able to design media appropriately, reflectively, creatively and socially responsibly. This kind of teaching in secondary schools will prepare students for online learning at the tertiary level. Starting from here, further research on concrete reasons for the differences should be done. Here, not only research on the secondary and tertiary levels is needed but also further discussion with further stakeholders like university presidents and policy-makers.

On the other hand, university (teacher) educators also need to reflect on their teaching. A high majority of the students belong to the so-called "digital natives" group, and this is how lecturers see them. Most teachers assume that students are confident and ready to learn online [98]. For Germany, the results of this study are promising, but students are still not as confident as needed. Next to the needed reform at the secondary school level, systematic implementation of online teaching at the university level can be one possible consequence. Thus, the students would have a chance to feel confident and develop their confidence by online learning but also have a possibility for non-online courses. Furthermore, extra preparation courses and programs for the students at the beginning of their tertiary education should be offered, focusing on, e.g., the topic "how to learn online?".

Finally, keeping the current pandemic in mind, the question about the readiness of university staff for online teaching must arise. The staff needs competencies in online course design, communication with students, time management and technology tools to design effective online learning in higher education [93]. Martin and colleagues [93] examined that U.S. faculties rated their faculty readiness to teach online higher compared to German faculties and argued that this could be based on many barriers concerning online teaching in German tertiary education.

In contrary to the U.S. sample, which is nation-wide, the present study was done only at one university in Germany. This is to be seen as a limitation, as well as a small sample size on both groups. A further limitation is the tendency of the sample toward educational science and the collection of the data only online. Despite these limitations, the study can be characteristic for both educational systems and teaching and learning cultures and can show important indications. The results show that the differences are there. Finally, the study can also be transferred to other similar, comparable educational systems but should not be seen as general in its nature. Further studies in different educational systems and countries are needed. Further, it is to be said that the study was based on the self-report of the participants. The study did not say anything about participants' competencies to learn online. To gain this knowledge, the study should be different in nature and measure the competence. The current study shows that university programs aiming for online teaching need to consider students' readiness and their beliefs on online learning. While technical infrastructure is needed to implement online teaching and learning at the tertiary level, student and instructor readiness is also important. Educators should revise their didactical concepts, reflect on their view of students' readiness and provide technical support. Universities should consider offering preparation courses for students and should remove barriers in online teaching for educators. These orientations and workshops should include topics on course attributes, communication, time management and technical competencies examined in this study.

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