

# The Post-Pandemic Era of Digital Teaching: A Qualitative Study of Teachers' Perspectives

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**Abstract.** As time passes, our society has embraced living with the highly infectious Covid-19 virus. As of March 2022, most restrictions have been lifted in Norway, and life is slowly returning to normal. Students are returning to university campuses, and classes are held again physically. However, the question remains whether universities will still apply digital teaching to offer students more flexibility. This research investigates the higher education teachers' perspectives towards the continuation of digital teaching in the post-pandemic era. This single case study provides in-depth information taken from interviews. The respondents are information technology (IT), computer engineers, and information systems (IS) teachers from the University of South-Eastern Norway. A thematic analysis explored patterns between the literature and the empirical study. The implications from this study propose a framework with six factors that affect teachers' perspectives towards digital teaching in the aftermath of the pandemic. Teachers promote a well-balanced mix of technology with physical teaching activities, suggesting that digital teaching tools should serve a specific purpose and contribute to the learning outcome. A well-balanced blend of technology with physical teaching activities suggests that digital teaching tools should serve a particular purpose and contribute to the learning outcome.

**Keywords:** Digital teaching, Higher education, Norway, Teachers' perspectives, Post-pandemic, Digitalization in education.

## 1 Introduction

The Covid-19 pandemic has had a significant impact on society worldwide. Education systems were not spared, forcing schools and universities to shift from face-to-face teaching to a digital format. As social distancing measures and quarantine protocols were implemented to prevent the spread of the virus, educators and students had to adapt to digital teaching methods. This implies teaching entirely online (i.e., remote) throughout the first waves of the pandemic, transitioning into hybrid forms (i.e., where part of the class can follow the class in-person whereas the other group follows online) when the spread was under control.

Digital teaching refers to using technology, such as computers, tablets, or the Internet, to facilitate teaching and learning. This involves using digital resources and tools to enhance the learning experience and make it more engaging and interactive. It also

uses digital platforms to facilitate communication and collaboration between students and teachers [1]. While digital teaching has enabled schools and universities to continue providing education to students despite the restrictions imposed, it has also presented challenges. Digital teaching has existed for many years, but the Covid-19 pandemic has accelerated its adoption in educational institutions worldwide [2, 3].

Given the unplanned nature of the shift to digital teaching, teachers had to abruptly change their approaches. The usual in-class lectures had to be replaced with digital alternatives. Moreover, higher education is expected to digitalize further, encouraging teachers to become agile. Therefore, exploring the experiences and perceptions of teachers is important, as it can offer insights into their preparedness for future disruptions, and help to identify areas for improvement in the overall pedagogical process [4]. Specifically, understanding the impact of the abrupt switch to digital teaching on teacher attitudes and their perspectives on the intersection of traditional and digital teaching is essential to ensure that the education system is equipped to adapt to similar disruptions in the future [5].

Until now, most published research has been conducted in relatively stable (before the pandemic) conditions and the involvement of HE teachers' viewpoints towards integrating digital teaching has been overlooked [6]. Considering that teachers play a central role in the educational process, it is imperative to understand their perspectives and experiences with the sudden shift to digital teaching. By exploring the experiences and perspectives of Norwegian HE teachers, this study will help to fill a gap in the existing literature and inform future pedagogical practices. Furthermore, we also address social sustainability aspects as digital teaching promotes accessibility, and inclusivity for both teachers and students. Additionally, a healthy teacher-student relationship is crucial. Including teacher's perspectives will set the grounding and enhance a framework for sustainable higher education.

This study aims to examine the perspectives of higher education teachers towards digital teaching in the post-pandemic era, with a specific emphasis on pedagogy and technology integration. The following research question has been formulated: *How do teachers perceive the implementation of digital teaching in the post-pandemic era?*

## **2 Background and Conceptual Framework**

Digital teaching can take many forms, such as online courses, flipped classroom approaches and hybrid teaching methods. Some examples of digital tools and resources used in digital teaching include multimedia content, such as videos, interactive simulations, online discussion forums, video conferencing software, learning management systems, and digital whiteboards. Digital teaching is an important and transformative approach to education that can improve learning outcomes and expand access to education for learners who may face barriers to traditional classroom-based instruction [1].

The literature accentuated that the educational disruption due to the Covid-19 pandemic, has caught many teachers off-guard resulting in them being unprepared for the sudden shift towards digital teaching [4, 7]. This unpreparedness resulted in inadequate

online teaching materials as teachers were urged to upload a simple face-to-face content, without implementing more effective digital teaching strategies. This sudden disruption accelerated digitalization in HE, which may not have occurred at this rapid pace under normal or more stable circumstances [2], resulting in lack of job satisfaction and professional enthusiasm [4, 8–10]. Furthermore, the pandemic’s uncertainty required a new pedagogical approach, gaining researcher’s attention on post-pandemic teaching [6, 11]. This also contributes to a future sustainable higher education. Based on the existing literature on the topic, we established a conceptual framework with essential factors for digital teaching as briefly described in table 1.

**Table 1.** Conceptual framework of digital teaching

<b>Dimension</b>	<b>Description</b>
Benefits and Challenges	<p><b>Benefits.</b> Digital teaching is flexible as the course content can be accessed at any time and place. It allows teachers to create an engaging learning environment based on students’ needs by integrating digital elements in the course content [6, 8, 12].</p> <p><b>Challenges.</b> Any minor issue regarding technology will disrupt the digital classroom sitting. Additionally, students and teachers require digital skills (i.e., digital literacy) [9, 10]. Many teachers lack experience and expertise in digital teaching, hence they use the same curricula and materials as traditional teaching [11] increasing teacher’s workload [3] and resulted in lower levels of student engagement [6, 9, 10].</p>
Teaching Strategy	<p><b>Teaching Method.</b> The most widely used method is the <u>flipped classroom</u>, which heavily relies on technology [7]. Another prominent method is interactive sessions involving student-student, student-teacher, student-course content interaction [13].</p> <p><b>Teacher Profile.</b> Depending on the teacher’s profile, the quality of digital teaching is determined. Teacher’s attitude towards the use of technology, including their digital literacy play a significant role for delivering the course content and establish the learning experience [13].</p> <p><b>Course Design.</b> Including design elements such as animation, pictures, and videos can improve student engagement and understanding of the content [10]. Teachers agree that a well-balanced mix of pedagogical approaches, including orientation programs and workshops, enhances the learning experiences [3, 13, 14].</p> <p><b>Online Etiquette.</b> The rules that enhance the digital classroom experience include attendance, participation and engagement, and visual presence. Attendance can be solicited by turning on the camera and/or microphone, to provide the in-class feeling to both the teacher and the students. Participation and engagement can be ensured via the teacher by asking questions to actively engage their students. Lastly, the visual presence represents that both students and the teacher are in an academic mode in which they dress accordingly and find a suitable workplace to follow the lecture [8, 15].</p>
Institutional Support	<p>The teachers’ attitude towards digital teaching is directly related to the received institutional support [8, 16]. HE institutions must invest in developing and delivering high-quality digital teaching by providing training and support to teachers [13]. Teachers generally perceive orientation programs and workshops as valuable to familiarize with novel approaches of digital teaching [3].</p>
Future Perspectives	<p>The Covid-19 pandemic has highlighted the inevitability of digital transformation in HE institutions [3]. Hence, universities need to foster a culture that values technology in the course design process. It is important to note that while technology is important, the primary focus should still be on pedagogy rather than digitalization itself [4].</p>

### 3 Methodology

To explore the various perceptions from HE teachers about digital teaching after the pandemic, we conducted an empirical case study [17] at the University of South-Eastern Norway (USN). The overall research design is a qualitative case study in which the main data generation method were semi-structured interviews [18]. The data were analyzed using thematic analysis [19].

#### 3.1 Case Description

The University of South-Eastern Norway (USN) is the fourth largest university in Norway. USN is a new university that stems from a fusion of various colleges. On 1. January 2016 the University College of Buskerud and Vestfold fused with the University College of Telemark to form the University College of South-Eastern Norway. On May 4th, 2018, USN received its university status. The university has eight university campuses spread throughout the south-eastern region of Norway [20]

In March 2022, the Norwegian government proclaimed that the nation could control the spread of Covid-19 and lifted most restrictions [21]. As a result, universities resumed operations on their campuses, and classes were held in person in university buildings. At USN, the university board instructed teachers to conduct classes solely in person and use Zoom only when necessary. This necessitated teachers to adjust their teaching strategies, adapting to the new post-pandemic academic environment. As a result of teachers experiencing signs of "Zoom fatigue", the issue of conducting classes in a hybrid form in a post-pandemic environment has emerged as a topic of investigation. Therefore, this inquiry aims to explore teachers' viewpoints on this issue, including the underlying rationale for their opinions. It will investigate how different teachers perceive the transition to a post-pandemic academic environment, with each teacher's perceptions being unique to the specific circumstances.

#### 3.2 Sample and Data Collection

The principles of purposeful sampling were followed and adopted to reduce bias and increase trustworthiness of the collected data. Three sampling approaches were followed: maximum variation (heterogeneity), typical case sampling, and purposeful random sampling [22]. The selection criteria for our research were that teachers 1) need to have experience of conducting digital classes during the pandemic, 2) need to be from the IT, IS, and computer science field, 3) speak Norwegian, English, Dutch or Farsi, 4) working at USN. We opted to select teachers from the IS field to ensure focused and consistent perspectives. Considering that these informants are generally digital literate and are aware of digitalization, they will be providing intriguing insights.

Data was collected at different USN campuses; Ringerike, Vestfold, and Porsgrunn. The teachers were from the Faculty of Technology, Natural Sciences and Maritime Sciences (TNM) and USN Business School (HH). In total, 38 teachers were contacted, and eleven teachers accepted to participate in this research (Appendix 1).

The data were collected between March 2023 and April 2023. Out of the 11 interviews, six were held in person and five were held online. Participants were interviewed in English or Norwegian. The average duration of the interviews were 50 minutes. All questions were open-ended to facilitate discussions, allowing in-depth reflections of the participants. All interviews were recorded, transcribed, and anonymized.

### 3.3 Data Analysis

The data was analyzed using a thematic analysis [19] (Appendix 2). We have analyzed the meaning of teacher’s viewpoints and experiences within this context to better understand the phenomenon [23]. A conceptual framework was derived from the literature, hence a deductive data analysis approach was followed to expand upon the existing literature with more case-specific data and add unexplored themes [17, 24].

One interview was randomly picked for an initial calibration analysis. All authors analyzed this transcript to ensure alignment in the process. First, we individually selected the meaning units, condensed meaning units, and codes (Appendix 3). Forty-four codes were identified and then connected to preliminary suggested categories and sub-categories. After calibrating the codes for the first transcript, the other ten transcripts followed the same analyzing steps (table 2).

**Table 2.** sub-categories, categories, and main theme [24]

Sub-Category	Category	Main theme
i. Benefits	I. Benefits and Challenges	Digital teaching in the aftermath of the pandemic: Teachers’ perspectives
ii. Challenges		
i. Teacher profile	II. Teaching strategy	
ii. Course design		
iii. Online etiquette		
iv. Teaching method		
III. Institutional support		
i. Past perspectives	IV. Past and Future perspectives	
ii. Future perspectives		
V. Motivation		
i. Interaction	VI. Digital classroom environment	

### 3.4 Ethical Considerations

This study adheres to the ethical principles set forth by the Norwegian National Research Ethics Committees, with project reference number 377023. Before participating in the study, all participants were fully informed of its purpose. An informed consent was signed from all participants, and they were made aware of their right to withdraw from the study at any point.

## 4 Results

The results obtained from the interviews indicate a main theme: digital teaching in the aftermath of the pandemic: teachers' perspectives. This theme encapsulates six categories: benefits & challenges, teaching strategy, institutional support, past & future perspectives, motivation, and digital classroom environment. Two new categories have emerged from the thematic analysis: motivation and digital classroom environment. The category future perspectives have been expanded to additionally include past perspectives (Appendix 4).

### 4.1 Benefits and Challenges

**Benefits.** A benefit is being able to record lectures and upload them on a learning management system (LMS). The LMS allows teachers to consult the statistics of the views of their videos which facilitates them to understand which topics require more attention. Nevertheless, not every teacher agreed that recording is always necessary “(...) *you can allow recording or not and people can go back some courses if you have that. For some people that is meaningful for other people it's not meaningful*” (R3). Moreover, several teachers argued the convenience that the courses can continue during any occasion and according to their observation, students seem to appreciate having the alternative of digital teaching. Digital teaching also offers flexibility to teachers for scheduling class hours as they are less independent in room and schedule.

Regarding accessibility, teachers observed that more students show up in the digital classroom as they can follow the class from any given location, at any device. Some of USN's students are international and/or work. On top of that, USN offers industrial programs in which students work part-time. Digital teaching enables these students to follow lectures, regardless of their working schedule. Lastly, some teachers mentioned the comfort of digital teaching. They experienced higher levels of comfortability since they are at a familiar environment.

**Challenges.** Most respondents mentioned that the technical challenge related to digital teaching has hindered them from conducting the classes as they aspire. Some of the technicalities mentioned is connection issues. Regarding hardware, teachers perceived difficulties with equipment such as cameras and microphones. Additionally, it has been noted that it is more challenging to draw (for illustration purposes) in a digital setting. For hybrid teaching in particular, teachers experienced that not all auditoriums have been set up properly, resulting in not optimal conditions. Hence, there is a need for professional production. Noteworthy, most teachers perceived conducting the hybrid form as distracting, resulting in a cognitive overload. Addressing two audiences, the physical and digital classroom, has been perceived as more challenging. Teachers have to focus on the technicalities, students in the classroom, and incoming chats from the students on Zoom. Most teachers unanimously agreed they cannot be fully present in both Zoom and the auditorium simultaneously. Automatically, more attention was devoted to the students attending the class physically.

Another challenge is that some teachers pointed out the extra workload for recorded video lectures “... *I need to change a bit. Add some new examples. And the investment*

*cost of doing that when you have to record the videos is a lot higher” (R2).* Noteworthy, teachers need to avoid the pitfall of not updating pre-recorded lectures. Teachers also have to consider GDPR compliance considerations during digital teaching. For recording sessions, teachers cannot always record the classroom experience as measures have to be taken to comply with the privacy regulation.

## 4.2 Teaching Strategy

**Teacher profile.** Teachers’ profile plays a role in how they teach and what style they would prefer, including their stance towards digital teaching. One teacher mentioned they have had always interest in computers and technology; hence they did not see any issues with conducting digital teaching. Another teacher added the importance of introvert and extrovert characteristics. Introverts would be fine being in front of a monitor whereas extroverts enjoy more social interactions. Lastly, the willingness to change is a crucial factor. Some teachers have set a strategy that works for them and the students.

**Course design.** First, integrating digital teaching tools can be part of the curriculum. Besides enabling interactivity in the classroom, tools can also provide hands-on experience for the students. Most teachers disclosed they did not need to invest much time to familiarize themselves with the tools they would implement for their classes. Nevertheless, searching for the appropriate tools was sometimes considered time consuming. *“It takes time also because there are many tools [...] it takes time to take a new one and try it. And of course, if there are many. So, which one is the best fit? Then you have to maybe know a little bit of all of these that you want to compare and then choose one. Otherwise, you may hear from someone that this one [software or tool] is good. I also know that some teachers wanted to try, let's say, but didn't have time [...] So, I think these are time consuming.” (R1)* Some teachers mentioned they have developed their software to assist them. One teacher explained they created their own forum website with frequently asked questions. Another teacher also elaborated upon an in-house developed tool, in which students are involved in the development process.

**Online etiquette.** Most respondents decided not to implement specific rules but followed a pragmatic approach as students were expected to act accordingly. It has occurred that students claim to follow the class in a noisy environment and hence cannot participate. Other teachers reasoned that observing their own behavior in online meetings has led to their decision to not impose students to turn on their cameras. The awareness of having the camera focusing on oneself throughout the lecture becomes stressful.

**Teaching method.** Three predominant teaching methods have been derived from the data: traditional method, flipped classroom, and interactive sessions. However, it is noteworthy that almost some of the teachers in question changed their teaching method when they transitioned into digital teaching. *“Before the pandemic, we used a lot of traditional lectures. And we tried to have flipped classrooms when we switched to online video lectures. So, we eventually tried to run more and more flipped classrooms. This means that the students will watch the videos in advance and that we run more projects, exercises, and discussions in class.” (R8).*

### 4.3 Institutional Support

The participants suggested that the HE institutions can further support teachers by providing relevant training in time and resources for digital teaching methods and technology. Some teachers highlighted the need for better guidelines and documentations when it came to new methods or technology taking place and needing to be used *“I did get the support, but this was after, you know, this was last autumn, so it was like, I get this training, after it’s relevant.”* (R5). Finally, support is crucial to the success of any employee, particularly in times of difficulty or uncertainty. This can include providing guidance, resources, and feedback and being available to answer questions and offer assistance. The teachers' experience regarding the provided support differed depending on the campus. Some conducted fully online courses before the pandemic, so they were more prepared and well equipped. However, most teachers expressed difficulty with lack of equipment.

### 4.4 Past and Future Perspectives

**Past perspectives.** The perspectives of digital teaching differed based on the individuals experience. Some teachers considered digital teaching part of the future curriculum, whereas others did not assume or expect its implementation would occur this promptly.

**Future perspectives.** All respondents acknowledge digital teaching is valuable as the world is becoming more digitalized. According to the teachers, it is important to maintain a balance between the physical and digital setting as more powerful tools and features will emerge. Mainly pointing towards the interactions. In general, most respondents are aiming to increase digital teaching. As some are required to travel to other campuses or universities, this has enabled them to cut down on traveling by creating videos and providing online learning materials to their students. *“Well, one good thing about the online teaching was that I at some point I was thinking OK maybe I can... I have all these recorded videos, maybe I can put them together and have like some online courses that I can sell for example.”* (R10)

### 4.5 Motivation

Motivation is a factor that differs based on personality. Some teachers' motivation got affected by less face-to-face discussions with students. Those teachers claimed that in a digital setting, it is harder to read the room (e.g., expressions) which reportedly was perceived as demotivating. *“Before the pandemic, I then experienced that there was much more, not MUCH more but at least more feedback from the students that now it is more difficult to get the students to speak for a dialogue [...] So, it can be a bit demotivating, for me it didn’t really matter as I can remember it now. But sometimes maybe a little”* (R4). Moreover, after the pandemic, some teachers observed less students attended physical sessions which heavily negatively influenced their motivation. Nevertheless, teachers also expressed that the pandemic caused a motivational boost due to new emergence of technologies and methods to explore but also presented a challenge to partake in.



## 4.6 Digital Classroom Environment

**Interaction.** All respondents noted that some students are not always paying attention in the digital classroom setting. Students can easily turn off their camera and do other activities that are not associated with the course content. One respondent mentioned that during digital sessions, some student groups tend to disappear when assigned to online breakout rooms. But all respondents unanimously agreed on the decreased level of interaction that emerges from the students during a digital setting. Some respondents feel uncomfortable seeing only black screens during digital class sessions. They highlight the missing visuals of seeing the students' expressions.

## 5 Discussion

### 5.1 USN Case-specific Implications

A distinguishable result from this study is that the teachers' perspectives roughly differ per university campus. Each of the three campuses have their own distinctive characteristics and perspectives regarding digital teaching:

**Campus Vestfold.** This university campus is innovative and has an active student-environment. Campus Vestfold develops their own in-house tools to support teachers in digital teaching and all teachers mentioned they have received institutional support. From the interviewed teachers, most teachers were new to digital teaching and had to adjust themselves during the pandemic. Despite the lack of experience and unexpected shift towards digital teaching, teachers at campus Vestfold had either a neutral or positive attitude and stance towards digital teaching. This stems from their innovative mindset and the received institutional support. Nevertheless, all teachers acknowledged they were relieved when the students returned to campus, due to their student-teacher relationship culture. Teachers in this campus see the potential benefits of digital teaching in the future but opt for a right balance between on-campus and digital alternatives.

**Campus Ringerike.** Teachers from campus had little to no previous experience in digital teaching as all the study programs are campus-based. The teachers' opinions about digital teaching were strongly divided. Among our sample, some teachers had a fairly positive stance, whereas the majority showed an overall negative attitude towards digital teaching. The optimistic teachers from our sample indicated the opportunities technology have to offer. However, teachers had various reasons why they dislike digital teaching. Teachers identified digital teaching as disruptive. Considering the teachers had no prior knowledge, they deem digital teaching as overwhelming. According to teachers' perceptions, the institutional support received was insufficient, which negatively contributed to their motivation to teach digitally. Moreover, teachers observed that the student environment at this campus became rather passive after the pandemic and fewer students were showing up, which heavily decreased the teachers' motivation. Therefore, there is a strong desire for campus-based teaching after the pandemic.

**Campus Porsgrunn.** Unlike the other campuses, teachers in Porsgrunn already had experience in digital teaching as the campus offers industrial programs and pure online study programs since 2015. Therefore, the campus was already equipped with the

proper infrastructure and teachers were offered digital teaching strategy courses. Accordingly, teachers did not perceive the switch to digital teaching as disruptive, but as a natural learning process. Generally, the teachers expressed a positive attitude and stance for implementing digital teaching. The teachers did not allude to any issues with digital teaching and showcased open-mindedness when it comes to innovating their teaching methods. Campus Porsgrunn also develops in-house tools to enhance digital pedagogy and acknowledge the superiority of digital technologies for future education.

## **5.2 Digital Teaching in the aftermath of the pandemic according to Teachers' Perspectives**

The empirical findings of this research suggest that six factors influence the answer to our research question *How do teachers perceive the implementation of digital teaching in the post-pandemic era?* We have enhanced the derived conceptual framework and determined the main theme as Digital teaching in the aftermath of the pandemic: Teachers' Perspectives. The six building blocks in the framework are interrelated factors that contribute to teachers' perspectives of digital teaching after the pandemic. First, the perceived benefits and challenges from digital teaching shape the teachers' perspectives. Overall, when teachers identified more benefits than challenges, they acknowledge the superiority of digital teaching and vice versa. Flexibility, freedom when planning the class time, and accessibility were the most repeated benefits.

However, digital teaching also entails challenges. The foremost challenge that occurs is technical related. Essentially, digital teaching should not mirror physical teaching. In our case, teachers had not enough time change their strategies, hence digital teaching was perceived as disruptive. Moreover, the literature identified that digital teaching is associated with a higher workload [3]. Our findings elaborated the literature by identifying that teachers perceive a higher cognitive load in digital teaching. Remarkably, most teachers perceived conducting the hybrid form of digital teaching as distracting, resulting in a cognitive overload. Nonetheless, cognitive overload is not applicable in a pure online setting.

The adjustments in teaching strategy also play a crucial role for teachers [4]. In our study, the benefits and challenges were directly related to the teaching strategy. The inclusion of digital tools in a course can improve the students' engagement and understanding of the content [10]. However, not all teachers implemented additional tools due to the vast number of software available, encumbering the decision for finding an appropriate tool. Teachers that did include tools perceived them as useful for students as they provide students with hands-on experience and engage them. LMS, quizzes and digital collaborative blackboards were among the tools used by the participants, as well as development of their own software, for instance an in-house developed forum. This forum increased interactivity by adding gamification elements [25]. Noteworthy, our findings propose that GDPR compliance challenges are associated with digital teaching. Teachers have to consider privacy regulations. Digital tools that want to be implemented have to be first approved by the institution.

The literature suggested implementing online etiquette for an enhanced virtual classroom experience [15]. However, the findings of our study show that these rules are not

necessary as HE students created a pragmatic etiquette. Regarding their teaching strategy, some teachers switched to flipped classroom in digital teaching. These teachers also maintained this approach after the pandemic as they see the superiority of flipped classroom. Nevertheless, flipped classroom requires high levels of authority from the students. Hence most teachers opted for interactive sessions which are guided by the teachers and engage students in critical-thinking activities, Teachers agreed that more research should be devoted to developing novel strategies for digital classrooms to promote more optimal learning environments.

At USN the student-teacher relationship has been highly valued, and most teachers prefer having interactions with their students. Most teachers pointed out these interactions deteriorated in a digital setting which negatively impacted their motivation. The motivation of the teacher is important to incorporate in the framework as teachers have to stand behind the idea of implementing digital teaching. Our findings suggested that motivation was heavily affected by the institutional support and the perceived digital classroom environment. Specifically, teachers from campuses that received substantial institutional support exhibited positive attitudes towards digital teaching, while teachers from campuses with limited or minimal support expressed no future plans for integrating digital teaching methods.

However, institutional support extends beyond technological provisions. Flexible decision-making processes and informal communication channels are crucial in fostering a supportive environment for digital teaching. Equally important is the development of faculty members' digital literacy, which can be achieved through training and ongoing support. Overall, teachers appreciated the efforts given by the university but admitted there is room for improvement if they want to advance in digital teaching.

The literature also emphasizes the need for a hybrid approach to education that combines both digital and face-to-face modalities [11]. Similarly, the teachers in this study expressed the importance of maintaining a balance between the physical and digital settings, particularly in terms of fostering meaningful interactions. They recognized that digital teaching should serve as a means of supporting and enhancing the learning experience rather than completely replacing face-to-face education.

### **5.3 Contributions to Practice and the IS Field**

Further digitalization in education has been a hot topic ever since the technological disruption caused by the pandemic [4]. Therefore, it is essential to understand further technological developments in higher education in the aftermath of the pandemic [5]. To date, most literature has been focused on digital teaching in a student-centered context [26, 27]. Hence, understanding more in detail teachers' perspectives towards the implementation of digital teaching in a post-pandemic setting contributes to a better understanding of sustainable future developments of education as it completes the overview of future digital teaching. Additionally, the literature addressed concepts of Education 4.0 in which technology is integrated into teaching and learning [28]. Our study contributes to this concept by providing a deeper insight of the important elements that contribute to the acceptance of technology according to teachers. The fundamental implication for practitioners entails finding an appropriate balance between pedagogy and

technology. Digital teaching has the opportunity to complement teaching and enhance the learning experience.

## 6 Strengths, Limitations and Future Research

A strength in this study is the rich and deep data collected from teachers' perspectives, which significantly contributes to the contextual understanding of their stance of implementing digital teaching in the aftermath of the pandemic. Another strength stems from the internal reliability and internal validity of our study [17]. Having unanimous interpretation elevates the trustworthiness of the data analysis, enhancing the quality of the results. All the steps of the data analysis have been documented transparently.

A limitation is the gender imbalance in our sample regardless the taken steps to achieve a gender balance. Future research can hence contribute to this study by comparing the various perspectives from different genders. Moreover, for scoping purposes, our case-study only included teachers from the IT and IS field, who have higher levels of digital literacy and do not require laboratory classes. Future work can address different areas of study to identify the different needs from teachers as this may affect their perspectives towards digital teaching. Moreover, future research can also focus on comparing digital teaching strategies before and after the pandemic and assess how the concept has evolved. Lastly, our work discussed digital teaching in relation to the pandemic, which may have a confounding effect. Therefore, future research about digital teaching in a non-pandemic context might raise different implications.

## 7 Conclusion

Further digitalization in education has been a hot topic ever since the disruption technology caused during the pandemic. Therefore, it is essential to understand further developments in higher education in a post-pandemic era. The present study explored teachers' perspectives towards the continuation of digital teaching. The implications of our study propose a framework with six factors that affect teachers' perspectives towards digital teaching in the aftermath of the pandemic: benefits and challenges, teaching strategy, institutional support, past and future perspectives, motivation, and digital classroom environment. Teachers promote a well-balanced mix of technology with physical teaching activities. Nevertheless, the participants emphasized the importance of student-engagement and pedagogy rather than digitalization. Meaning that technology has to be integrated as a complementary tool to enhance the learning experience. The chosen integrated technology in digital teaching should have a purpose and contribute to the learning outcome.

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## Appendices

### Appendix 1: Participant Demographics

Respondent	Gender	Education	Specialization	Position	Teaching	Teaching Since
R1	Male	PhD	Information Systems	Associate Professor	Bachelor Master	2011
R2	Male	PhD	Information Technology & Social Science	Associate Professor	Bachelor Master	2013
R3	Male	PhD	Cyber Security	Professor	Bachelor Master PhD	1993
R4	Male	Master	Information Technology	Associate Professor	Bachelor	1995
R5	Male	Master	Software Engineering	Assistant Professor	Bachelor	2020
R6	Male	Master	Information Technology	Assistant Professor	Bachelor	2017
R7	Female	PhD	Information Systems & Cyber Security	Associate Professor	Bachelor Master	2011
R8	Male	PhD	Information Technology	Professor	Bachelor Master PhD	2006
R9	Male	Master	Computer Science and Automation	Associate Professor	Bachelor Master	2003
R10	Male	Master	Information Systems & Statistics	PhD Researcher & Lecturer	Bachelor Master	2018
R11	Male	PhD	Cybernetics	Professor	Bachelor Master PhD	1986

**Appendix 2: Phases of the Thematic Analysis [19]**

<b>Phase</b>	<b>Description of the process</b>	<b>Outcome</b>
1. Familiarizing ourselves with the data	Our unit of analysis were interviews, these were transcribed and translated. Observations (i.e., gestures, laughter, silence) were also added into the transcripts as they provided the underlying meaning	Transcripts in both English and Norwegian
2. Generating initial codes	In this step we classified the interesting features of the data in terms of the categories	Initial codes for each category
3. Searching for a theme	A theme was selected and generated based on the conceptual framework and theoretical implications	Theme: Digital teaching in the aftermath of the pandemic: teachers' perspectives
4. Reviewing the theme and its underlying categories	Validate whether the theme and its categories work for the coded extracts and the whole unit of analysis	Connect the codes to the categories of the main theme (table 5)
5. Defining and naming the theme and its underlying categories	Refine the details of the theme and each category and provide the overall story with explanations of the themes	Result section
6. Producing the report	The final analysis of the codes relating to the research question, existing literature, and theoretical implications	Discussion section



**Appendix 3: Example of the Data Analysis Process [24]**

<b>Manifest Level</b>		<b>Latent Level</b>		
<b>Meaning Unit</b>	<b>Condensed Meaning Unit</b>	<b>Code</b>	<b>Sub-Category</b>	<b>Category</b>
But what is the big challenge is those hybrid things, because the hybrid teaching was bad in the sense that the teacher will have too much to focus on, you have to focus on all the technical stuff, and you have people present	Hybrid teaching is overwhelming since the teacher has too much to focus on (students and technicalities)	Cognitive load	Challenges	Benefits and Challenges
I think that to use these tools in the teaching, they're they are like educational in the sense that [...] this got this hands-on feeling. Technically, it doesn't really matter. Because they could read the table, [...]. But if you want to internalize it and get it like now you feeling this is how it is, "I know I tested". Then that's something you do yourself, and it's much more valuable than to just listen to a lecture or reading a table.	Tools can provide more hands-on experience which is more valuable rather than listen to a lecture or reading a table	Digital Teaching tools	Course design	Teaching strategy

**Appendix 4: Digital Teaching in the aftermath of the pandemic according to Teachers' Perspectives**

