Article

Students’ Experiences with Online Teaching and Learning in Norway: A Qualitative Study into Nutrition Education One Year after the COVID-19 Lockdown

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Abstract: The COVID-19 pandemic forced a rapid shift to emergency remote teaching due to the lockdown in March 2020. Following up on a mixed-methods study on emergency teaching among students in public health nutrition (PHN) at the beginning of the pandemic, the aim of this study was to explore the students’ experiences with digital teaching one year after the first lockdown. We especially want to shed light on factors that promoted or inhibited the online learning environment one year into the pandemic. Ten in-depth interviews were conducted (Zoom) among third year bachelor’s and first and second year master’s students in PHN. Using thematic analysis, four main themes emerged from the data: (1) ‘increased participation in digital teaching’, (2) ‘reduced learning quality’, (3) ‘motivation and social contact’, and (4) ‘important factors in digital teaching’. The students identified several advantages of digital teaching. More students attended class due to its accessibility, flexibility, and efficiency; however, the lack of social contact and collaboration with peers were challenging. Despite these challenges, active learning technologies, such as student response systems (SRS), shared documents, and the use of cameras, were important factors for successful digital teaching. The results indicate that active learning improves students’ digital learning environment.

Keywords: online teaching; students; COVID-19 pandemic; distance learning; technology; student response systems; active learning

1. Introduction

On 11 March 2020, the World Health Organization (WHO) declared COVID-19 a pandemic [1], and by the end of July 2020, COVID-19 had spread across more than 217 countries and territories, with nearly 17 million confirmed cases and many deaths [2]. As a result of the pandemic, educational institutions around the world closed and education moved online. Emergency remote teaching, which did not consist of well-planned solutions, quickly came into place in March 2020 [3,4]. Despite some challenges, both positive and negative perspectives on the implementation of online learning have been seen internationally, providing the opportunity to use online learning even beyond the COVID-19 pandemic, in the future curriculum [5,6]. Nevertheless, the pandemic had a major impact on the academic work of higher education students [7–10], and radically changed the lives of many students around the world [11]. Moreover, the rapid transition to digital teaching during the pandemic has embraced new technologies and teaching strategies. Here, student response systems (SRSs) constitute one of several technologies that have been used to increase students’ engagement and attention [12,13].
Learning in a digital format can be an effective, resource-saving, and participatory form of learning [14]. Previously, we investigated the Public Health Nutrition (PHN) students’ experiences at 2 and 12 weeks after the initial outbreak of the pandemic in a mixed method study [7]. The study showed that although most of the participating students seemed to have coped well, the sudden shift to digital teaching had also been challenging, with a lack of social interaction, and a feeling of being alone in their studies [7]. Although, students have been through a historical era including an overwhelming demand for digitalization in a short time, most of the conducted studies exploring students’ perceptions during the pandemic have been quantitative studies [15]. In this shift towards online education, knowledge is scarce on how students experienced their learning situation one year into the pandemic. Accordingly, to the best of our knowledge this is the first qualitative study that investigates a student group one year into the pandemic.

In our first study, we assessed the PHN students’ experience of the shift to digital teaching following the campus lockdown, where students were asked what might improve the learning outcome in future online teaching. The aim of this study was to explore the PHN students’ experiences with digital teaching one year after the first lockdown, using a qualitative design. We especially want to shed light on factors that promoted or inhibited nutrition students’ online learning environment one year into the pandemic. Although Norway is highly advanced in technology, the pandemic became an accelerator to digital transformation in higher education that has been underway for several years. These PHN students’ experiences, therefore, contribute to deeper implications to practice beyond issues that may be more prevalent in countries less privileged. Thus, this study contributes to enhanced preparedness for a teaching situation after the pandemic.

2. Online Learning in the First Wave of the Pandemic

2.1. Online Learning

Online learning often takes place in a virtual classroom, where technology platforms such as Adobe Connect, Microsoft Teams, and Zoom provides the video conference platform [16]. However, the use of such technologies does not ensure a successful online learning experience, but rather serves to help minimize the distraction technology could otherwise be so that students can focus on learning [16]. In addition, learning management systems (LMS) are functioning as a repository and used as an integral part of the learning activities [17]. In addition, LMS simplifies and automates the administrative functions of teaching and learning, and tracks students’ performances [17].

Online learning can be provided synchronous or asynchronous, where a synchronous learning environment is the closest to resemble face-to-face learning and is provided in real time [18]. An asynchronous learning environment, on the other hand, is supported through digital platforms so that the participants are not required to be online at the same time. However, synchronous, and asynchronous communication have different features and are beneficial in supporting different pedagogical aims [18].

Previously, online education was referred to as distance education, a method where the teacher and student are physically separated [19]. The evolution of distance education began with correspondence and the use of parcel post, radio and television [19]. Currently use of technology is widespread in higher education, either through blended learning, hybrid learning or online learning.

The last decades, online learning has become popular because of its potential for providing more flexible access to the learning content and instructions at any time. Online learning provides availability for students who cannot attend traditional face-to-face learning, is cost efficient, and enables instructors to handle more students [20]. Prior to the pandemic, obvious obstacles such as time constraints, poor technical skills, inadequate infrastructure, absence of institutional strategies and support and negative attitudes among the educators has been seen [21].
After the shift towards online education caused by the pandemic, several studies have focused on student satisfaction in this new learning environment [22–24], since satisfaction have been found to predict students’ learning engagement in online learning [25]. A large-scale study (N = 30,383 students from 62 countries) found that during the transition to online learning students were most satisfied with support provided by teaching staff and their universities, but struggled with computer skills and higher workload [11]. Male students with lower living standard and students from Africa or Asia were less satisfied with their academic work/life during the crisis [11]. One survey found that most teachers and students were satisfied with the implementation of online education during the pandemic [23]. Another survey (from France) found that the attendance of learners significantly improved with synchronous online classes, and among more advanced learners [24]. A recent systematic review reported positive perceptions of online learning related to instructional design of online courses, attractive learning content, and learning flexibility, however, negative perceptions such as internet access, health problems due to online learning, and difficulty in developing clinical skills online was observed [15]. In addition, an equal or higher motivation to attend exclusive online learning has been seen, when online learning was compared to classroom learning [15]. However, convenience and flexibility have a paramount influence on the learner’s motivation for online learning [26].

In 2020, a global cross-sectional study (N = 17,008, of which 3793 were students) observed that students had significantly higher risk of increased screen use and changes in sleep, compared to the general adult population [27]. However, research also suggests that both students and lecturers wanted to keep up with online learning in future curriculum [5]. However, a significant difference between students’ and lecturers’ perspective of the optimal amount of future online learning was observed, where students suggested 53.2% (24.9) and lecturers 38.6% (21.5) [5]. This might reflect challenges with emergency online teaching in the beginning of the pandemic [28]. Interestingly, it has been observed that the total number of students who registered increased considerably during and after school closures compared to the previous three years, however, the proportion of students engaged also decreased more rapidly over time [29].

Online education changes the components of teaching and learning, and there are several issues and challenges that needs to be considered to have successful online courses [30]. The students may have expectations for the online learning, such as instant feedback from the instructor, and the learners’ readiness, and skills to participate in online courses may differ and require both self-motivation and self-direction. The learners’ participation, and engagement in an online course, such as interacting with peers and instructors, listening, observing, or participating in discussions, might need enhancements related to audio or video. In addition, the instructors may have issues including transitioning from face-to-face to online, time management, and teaching styles. Teaching in online courses, often require predefined content prepared by the instructor, a change in teaching strategy, and the content issues often includes an integration of multimedia which requires competence in the area [30].

In online learning, the physical environment plays an important role, and includes the physical infrastructure and space, and ambient features together with its social environment may support or hinder the performance of learning activities [31]. Here, physical aspects, such as noise, lighting, and movement may particularly affect the online learners. Furthermore, our mobilities are also mediated by sound, and putting on the headphone to evade social interactions and to communicate the need for privacy seems to have become a new social norm [32].
2.2. Benefits and Barriers of Online Learning

2.2.1. Quantitative and Mixed-Method Studies

Several surveys have investigated benefits and barriers of online learning during the first wave of the pandemic (Tables 1 and 2).

In our previous mixed-method study, we found that two weeks after the lockdown most students (80%) agreed that the lack of social interaction had been challenging [7]. In a cross-sectional survey from the UK (N = 2721), Dost S, Hossain A, Shehab M, Abdelwahed A and Al-Nusair L [13] found that the greatest benefit of online teaching was flexibility, while the most common barriers were family distraction (27%) and poor internet connection (22%). Flexibility was also found a benefit for online teaching, both in surveys in the United Arab Emirates [33] and in Germany [34]. However, technical problems led to reduced student satisfaction in the former study [33]. In another study [34], students appreciated higher flexibility, time efficiency, tolerance towards the individual learning style and family circumstances, and valued the ability to work through lectures and e-labs at their own learning speed. However, the major complaints concerned diminished social contacts with instructors and fellow students, the inability to ask questions as they occur, and the lack of sufficient technical expertise [34]. In a Chinese quantitative study, the most influential barrier for students was the severity of the COVID-19 situation [35].

Technical challenges were also seen in a cross-sectional study among medical students from Malaysia (N = 160) (i.e., slow internet connection and poor communication) [36]. Regarding individual barriers, 74.1% of the students were not motivated for online learning, 71.5% of the students could not learn as well as they did in the classroom, and 58.2% disagreed that they would be taking online courses in future [36].

A Polish survey (n = 620) from thirteen medical faculties found that the major benefits from online teaching was increased convenience, enhanced quality, a sense of comfort and safety, however, among the major complaints were unsatisfactory content, technical issues, difficulties engaging, poor organization and lack of social life [37]. In addition, students claimed that online teaching required more self-directed learning and discipline, which was a negative issue among 58% of the students [37].

In a survey from Brazil, students regarded live interactive lectures as superior to traditional face-to-face lectures. Perceived conditions that hindered the implementation of the online teaching included difficulty separating study from home activities, lack of motivation and worsening of quality of life due to physical distancing from colleagues and the faculty. Overall, the remote teaching was positively valued by 80% of the students [38].

In a survey from France, the pros of online learning were a gain of time, and that learners liked having the option to play back the lectures. On the other hand, the cons expressed by the learners were concentration issues, absence of interaction with the teachers and their peers, and repeated technical difficulties (Wi-Fi issues for example). [24].

Selco JI and Habbak M [39] surveyed STEM students experiences with the COVID pandemic and online learning during the spring and fall in 2020 and found that 61% of students benefited from the flexibility, convenience, and increased productivity. In addition, the time students normally spent commuting was spent on other things, such as sleep, studying, working, and family.

Parkes RSV and Barrs VRD [40] found that students were positive about the impact of online teaching on time-management, due to loss of travel time. However, concerns about the reduced face-to-face interaction, loss of classroom atmosphere and contact with peers, in addition to technical problems.

Tasso AF, Hisli Sahin N and San Roman GJ [41] found that college students were affected by COVID-19 in a survey among 257 students, who reported fear of themselves or others in their social network contracting the virus, apprehension about the changes in coursework delivery and unclear instructional parameters, loneliness, compromised motivation, sleep disturbances, and depressive symptoms.
2.2.2. Qualitative Studies

Only a few qualitative studies have investigated the benefits and barriers of online learning during the first wave of the pandemic (Tables 1 and 2).

In a recent qualitative study, Suzuki et al., 2022, conducted in-depth online interviews to investigate medical students’ perceptions of online education in Japan and Europe during the COVID-19 pandemic (13 Japanese students and five from Slovakia, Norway, and Hungary) [42]. The interviews were conducted in September 2020. The thematic analysis revealed four themes (timesaving and flexibility, technical problems and lack of digital skills, unstandardized teaching skills, and lack of experience beyond medical school lectures). The study found that online education was useful in terms of saving time and creating a flexible learning environment, however, drawbacks such as internet and computer problems, unstandardized teaching skills, and lack of relationships with faculty and friends were observed [42].

Reinhart et al., 2021, conducted six focus group interviews Germany (summer 2020) to investigate medical students’ and teachers’ perspectives, experiences, and attitudes, towards potential enablers/drivers and barriers/challenges during the lockdown [43]. Five major themes contributing to a successful use of online learning were revealed (communication, mental wellbeing, structure and self-organization, technical issues, and learning and commitment), where communication, generally high mental wellbeing, and alignment of content and assessment contributed to a high motivation and commitment of both students and teachers averting potential barriers [43].

In a qualitative case study from Pakistan, Mukhtar et al., 2020, conducted four focus group interviews with faculty members and students (two interviews per group) from March to April 2020 (medicine and dentistry) [44]. They found that the advantages of online learning were comfort and accessibility, while the limitations involved inefficiency and difficulty in maintaining academic integrity. In addition, the attention span during online learning was shorter than face to face sessions [44].

### Table 1. Benefits of online learning during the first wave of the pandemic.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Flexibility</th>
<th>Time Efficiency</th>
<th>Convenience</th>
</tr>
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<tbody>
<tr>
<td>Dost et al. (2020) [13]</td>
<td></td>
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<tr>
<td>Duszenko et al. (2022) [34]</td>
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<td>Elshami et al. (2021) [33]</td>
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<tr>
<td>Motte-Signoret et al. (2021) [24]</td>
<td>x</td>
<td></td>
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</tr>
<tr>
<td>Mukhtar et al. (2020) [44] *</td>
<td></td>
<td></td>
<td>x</td>
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<tr>
<td>Parkes and Barrs (2021) [40]</td>
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<tr>
<td>Pokryszko-Dragan et al. (2021) [37]</td>
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<tr>
<td>Rodrigues et al. (2022) [38]</td>
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<tr>
<td>Selco and Habbak (2021) [39]</td>
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<tr>
<td>Suzuki et al. (2022) [42] *</td>
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</table>

* Qualitative studies.

### Table 2. Barriers of online learning during the first wave of the pandemic.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Technical/Internet</th>
<th>Social Contacts</th>
<th>Concentration Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almendingen et al. (2021) [7]</td>
<td></td>
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<td>x</td>
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<tr>
<td>Dost et al. (2020) [13]</td>
<td>x</td>
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<td>x</td>
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<tr>
<td>Duszenko et al. (2022) [34]</td>
<td>x</td>
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<tr>
<td>Khobra&amp;ade et al. (2021) [36]</td>
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<td>x</td>
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<td>Motte-Signoret et al. (2021) [24]</td>
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<tr>
<td>Mukhtar et al. (2020) [44] *</td>
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<td>x</td>
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<tr>
<td>Parkes and Barrs (2021) [40]</td>
<td>x</td>
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</table>
Pokryszko-Dragan et al. (2021) [37] x x x
Reinhart et al. (2021) [43] * x
Rodrigues et al. (2022) [38] x x
Selco and Habbak (2021) [39] x
Suzuki et al. (2022) [42] * x x
Tasso et al. (2021) [41] x

* Qualitative studies.

3. Materials and Methods

3.1. Study Design

This qualitative study was based on in-depth interviews with PHN students at the Faculty of Health Sciences at Oslo Metropolitan University (OsloMet). The choice of sample size was informed by Malterud’s model of information power. [45].

To establish credibility of claims, in line with Malterud’s model, the sample size that provides sufficient information power depends on the aim of the study, sample specificity, use of established theory, quality of dialogue and analysis strategy (Malterud et al., 2016). In our study, our aim was narrow (to explore the PHN students’ experiences with digital teaching one year after the first lockdown) and required notably fewer participants than a study about how students generally experienced digital teaching. Furthermore, a less extensive sample is needed with participants holding characteristics that are highly specific for the study aim (compared with a sample containing participants of sparse specificity). Our study was supported by previous theories concerning digital teaching, requiring a smaller sample size than if our study were supported by limited theoretical perspectives. We included students from one single small sized study program, with no mandatory practical training. The interviews were conducted by experienced interviewers that used an interview guide to structure the conversation and the quality of the interview dialogues were good, with strong and clear communication between researcher and participants, requiring fewer participants to offer sufficient information power compared to interviews with unfocused dialogues. Our sample provided rich and substantial information on the subject under research. Thematic analysis was conducted among a purposive sample of 10 participants with diverse experiences providing sufficient information power for describing different experiences in this group of PHN students. We obtained sufficient and varied information from the sample. In general, a large sample size in qualitative studies can yield unmanageable amounts of data and the needed overview as the point of departure for an accountable, thematic analysis, would become difficult to grasp, present in terms of appropriate inter-subjectivity and organize for further analysis (Malterud et al., 2016).

3.2. Research Team and Reflexivity

PHN is a small-sized education at OsloMet, where the teachers know all the students. The interviews were therefore performed by two external independent researchers (EG and CT) who were not involved in PHN education and had no knowledge of the students. The two interviewers were middle-aged female teachers (nursing and teaching educators) working at the university—both have significant experience with digital education. The two interviewers were also part of our previous study from 2020 [7].

The PHN students who had begun their studies before the lockdown, and therefore had experience with onsite learning before the lockdown, were invited to participate. An invitation to participate was sent out to 39 eligible students via multiple channels (Facebook, Teams, Zoom, LMS Canvas, and SMS). The only eligibility criterion was being a PHN student in the spring of 2021. The invited students were in their third year of their bachelor’s degree (n = 13) or in their first (n = 16) or second year (n = 10) of their master’s programme in PHN at the Faculty of Health Sciences at OsloMet.
The report of this study was guided by the consolidated criteria for reporting qualitative research (COREQ) [46].

3.3. Settings

The scheduled on-campus lectures in the autumn of 2020 and the spring of 2021 were mainly offered as live-streamed plenary lectures lasting 30–45 min using the video conferencing tool Zoom. However, to improve the digital learning environment, use of SRS, synchronous activities in breakout rooms, and occasional assignments were used in order to keep the students active.

The situation concerning the physical learning environment was, due to the closure of campus, that students were working from their home office. Concerning the psychosocial learning environment, the educators were available for the students to a much larger extent than before the pandemic. They organized social coffee meetings at zoom, and deliberately used student activating tools such as SRS and collaboration activities in breakout rooms. The university also offered some online activities.

During spring 2021, the 3rd year bachelor students were writing their bachelor thesis, which is a 10 ECTS literature summary. The 1st year master students were offered different PHN subjects, which involved synchronous and asynchronous teaching and learning activities. The curriculum were subjects preparing them for writing their master thesis (60 ECTS). Finally, the 2nd year master students were finalizing their master thesis. During structured master seminars, they both presented the status of their own thesis using power point presentations (10 min), as well as gave opposition to another students’ presentation (10 min). They were instructed to prepare 5 questions to be used in the opposition. All PHN students, educators and external sensors were invited to these seminars. In this way, bachelor students were informed about ongoing master studies, and motivated for further master studies. Moreover, the master students received valuable training in digital presentation of their own work, but also in critically reviewing peers’ scientific work. In addition, the master students had regular contract with their supervisors, depending upon the focus of their thesis (some master theses are literature reviews, whereas others are parts of ongoing research projects on humans lead by the educators). Our university is one of the largest universities in Norway, and all students were offered digitally assistance from (librarians, tutorials for the use of digital tools, digital student meetings offered by student unions, digital training. In addition, since PHN is a small sized education, the educators were able to follow up each student individually. This may also be the explanation for the willingness among both students and educators to participate in the current and first study.

Since the first lockdown, educators had received training in digital teaching from the institution to improve their skills and increase the use of online SRSs (such as Padlet and Mentimeter) and tools to facilitate digital group work (Zoom/Microsoft Teams).

3.4. Data Collection

Ten in-depth interviews were conducted via the video conferencing system Zoom in the spring of 2021 (April–June), in line with the internal guidelines for using Zoom in research interviews at OsloMet [47]. The interviews lasted approximately one hour. To collect data, we used a semi-structured interview guide based on the aim of the present study and the results from our first study with PHN students [7] (Table 3). The interviews were recorded over Zoom; however, only the audio recordings were stored. The information was treated confidentially, and all recordings were deleted once transcribed (EG and CT). The interviews were transcribed by a professional external transcriber.
Table 3. Examples of questions from the interview guide.

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can you tell us about your experiences after the campus closed?</td>
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<tr>
<td>How did you experience teaching during the pandemic?</td>
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<tr>
<td>What do you think has worked well in digital teaching?</td>
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<tr>
<td>How has digital teaching influenced your motivation?</td>
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<tr>
<td>What can help improve the learning environment?</td>
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<tr>
<td>How did you perceive the teaching and group work?</td>
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</tbody>
</table>

3.5. Data Analysis

The data were analysed using a thematic analysis approach in line with Braun V and Clarke V [48], who used a reporting pattern consisting of six phases: (i) familiarisation with the data; (ii) generating initial codes; (iii) searching for themes; (iv) reviewing the themes; (v) defining and naming the themes; and (vi) writing the report (Table 4).

The analyses were performed by three external independent researchers (CT, EG, and JD) with previous experience in analysing qualitative data. Each step of the analysis was conducted separately and then discussed within the analysis group (CT, EG, and JD) before the next phase. The process was presented to the rest of the research team on two occasions.

Table 4. Examples of the coding strategy.

<table>
<thead>
<tr>
<th>Data Extract</th>
<th>Codes</th>
<th>Subthemes</th>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘The positive thing is that it’s nice to be able to get up and have breakfast at the same time as you’re attending a lecture and not have to go out, maybe especially in the winter, then it has been really nice to drop it, even if it’s not very far’. (P6)</td>
<td>More accessible</td>
<td>Availability</td>
<td>Increased participation</td>
</tr>
<tr>
<td>‘I did not have to spend three hours commuting... so I’ve had a lot more time to read the curriculum at home and then work’. (P1)</td>
<td>Reduced commute time</td>
<td>Efficiency</td>
<td>Increased participation</td>
</tr>
<tr>
<td>‘In an online lecture, it is much harder to dare to speak... and when no one does it, it gets even harder... and I noticed that the learning outcome is less than it is in a physical classroom, because if you’re wondering about something, it’s like—no, I will not bother to ask...’ (P9)</td>
<td>Challenging to speak in a plenary session</td>
<td>Communication</td>
<td>Reduced learning quality</td>
</tr>
<tr>
<td>“You do not arrange a Zoom group work right after a lecture, you might just stay behind after a lecture at campus and work together. So, when the lecture is finished, everyone leaves the Zoom meeting, and it’s kind of done.” (P9)</td>
<td>No time to talk to fellow students</td>
<td>Collaboration</td>
<td>Reduced learning quality</td>
</tr>
</tbody>
</table>

3.6. Ethical Considerations

The invitation included information about the project and the right to withdraw at any time and emphasised that it was voluntary to participate. Written consent was obtained by e-mail before the interview on Zoom. The interviews were conducted in line with the internal guidelines for using Zoom in research interviews at OsloMet [47]. The students could withdraw at any time by logging out of Zoom without any consequences for them as students. The nutrition researchers at the Department of Nutrition did not have access to information regarding who participated. The interviews were recorded over Zoom; however, only the anonymous audio recordings were stored. The information was treated confidentially, and all recordings were deleted once transcribed. The
interviews were transcribed by a professional external transcriber. The study was approved by the Norwegian Centre for Research Data (NSD, reference no. 771304). There were no experiments or interventions involving human participants or animals in this study.

4. Results

A total of 10 students were interviewed (one bachelor’s and nine master’s students). Nine of the participants were women. Four themes emerged from the interviews: (1) increased participation, (2) reduced learning quality, (3) motivation and social contact, and (4) important factors in digital teaching. The alphanumeric characters following each quotation represent the participant number in our anonymous coding; for example, (P1) represents participant number 1.

4.1. Increased Participation

The students identified several advantages of digital teaching: accessibility, efficiency, flexibility, and the fact that more students were able to participate to the digital classes.

More students attended class because they found it more accessible—attending from their home offices made it easier to participate. All they needed to do was turn on their computer. One student explained, ‘The positive thing is that it’s nice to be able to get up and have breakfast at the same time as you’re attending a lecture, and not have to go out, maybe especially in the winter, then it has been really nice, even if it’s not very far’ (P6).

The students felt that digital teaching was efficient and time-saving, with more free time that they could use for activities other than travel. One student recounted, ‘I did not have to spend three hours commuting... so I’ve had a lot more time to read the curriculum at home and then work’ (P1). Several students also pointed out that they had previously spent more time commuting than the actual lecture/class lasted.

Digital teaching was also flexible and could be combined with work or training. One student combined the digital class with work: ‘I have also combined a little myself, with the fact that I am at work and have a lecture in my ear. Luckily, now I can just go out and participate in discussions, and I can see the PowerPoint presentation and things like that along the way, so I’m able to keep up pretty smoothly’ (P8). Digital teaching was further viewed as an advantage for people in groups with a high risk of serious illness if infected with COVID-19 who were not able to participate on campus.

4.2. Reduced Learning Quality

The students experienced several challenges related to reduced learning quality due to poor communication, a lack of collaboration, and disturbing elements technical challenges.

It was challenging to hold a dialogue because short questions, clarifying comments, and nonverbal communication—which are normally part of a physical classroom—were missing in the digital classroom. Specifically, it was hard to speak up in plenary sessions, and one student stated, ‘In an online lecture, it is much harder to dare to speak… and when no one does, it gets even harder… and I noticed that the learning outcome is worse than it is in a physical classroom, because if you’re wondering about something, it’s like—no. I will not bother to ask...’ (P9). Another student said, ‘I felt it is harder to interrupt when someone is talking digitally, even if they say, “just stop me” or “just say something”; but as they may not to see all of us, it’s easier in a classroom—being able to say, “hello, I have a question”, or they already see it on our face’ (P10). In addition, it was difficult for the students who had not met their fellow students before the pandemic because it deterred them from speaking up and being active.

The participants also found it difficult to ask questions and take part in classroom activities if no one talked to them. One student said that there should be guidelines for etiquette in a digital classroom—for example, to say ‘hello’ and ask how the others are
doing at the beginning of the class. In this way, the students could connect more easily. It was also more difficult to get to know and collaborate with others in the digital classroom because no one took the initiative to meet for group work or gather in their free time. In the organised lectures, the digital class both started and ended abruptly, and there was no time to talk or discuss with fellow students. One student explained, 'You do not arrange a Zoom group work right after a lecture; on campus, you might just stay behind after a lecture and work together. So, when the lecture is over, everyone leaves the Zoom meeting, and it’s kind of done' (P9).

The students experienced it as more demanding to be in breakout rooms than to listen to a lecture because they had to participate actively in the groups and not just be passive observers. Nevertheless, the students reported greater learning outcomes when actively participating in a breakout group in Zoom. Sometimes the students withdrew from the online class before they reached their breakout room. One student recounted, 'to use breakout rooms... it sounds good, but then it does not quite work in practice. It depends on which groups you end up in. I’ve seen in lectures that if we are placed into breakout rooms, there are often people who leave; then you sit there alone in the breakout room, and there has not been much interest in participating in these breakout rooms' (P4). Another student stated, 'when they place us into breakout rooms, one is kind of forced to participate; it is challenging, but I notice that my learning outcome is much better...' (P1).

Several students felt that it was difficult to keep up due to disturbing elements in digital teaching. One student said, 'There has been a reduction in the quality of teaching. I certainly do not feel like I’m left with much by attending classes when you cannot have one-on-one conversations and raise your hand, and it’s harder to ask questions on Zoom: you get interrupted and have an unstable internet connection' (P1). In addition, when teachers could not create digital breakout rooms or make their presentations work, the focus shifted away from the subject, disrupting the flow of teaching.

4.3. Motivation and Social Contact

The students experienced a lack of social contact and a loss of motivation when they could not meet. It was lonely sitting by the computer and having to make active choices, such as inviting fellow students out to the park to get to know each other. One student said, 'Yes, I think increased unity among fellow students is something that increases motivation, whereas, yes, when there’s no contact and you do not hear anything from anyone, then it’s like you’re just sitting at home with the computer... then you sit very alone in your own world, so it’s quite demotivating when you feel that you are not in contact with the world...' (P7).

The students missed the small talk in the classroom, discussing subjects, and making friends, and this feeling grew as time went on. One student explained, 'The informal conversation and exchange of, yes, how you are, what you are struggling with, what you are working on now, then, you get tips and support without thinking about it. The unconscious that is a part of a working day, quite simply, disappears' (P2).

It was difficult to keep up and concentrate on what was being taught, and the students felt that their performance had deteriorated after the teaching became digital. One student recounted, 'But it certainly lowers the motivation that I do not feel like I’m performing what I could have done if it were physical. I certainly do not feel like I’m a good student these days because I only participate in that three-hour lecture, but then do other things' (P1). Another student explained that sitting so much inside and just staring at the computer made the student a lazier person. The gym was closed, so the students could not keep their activity levels up. Interestingly, it was pointed out that it was not the digital teaching but the sitting alone at home and not being physically active that took away the motivation.

4.4. Important Factors in Digital Teaching

The students expressed that several factors were important for the digital teaching to be successful and emphasised that SRSs and the use of a camera in addition to the shared documents were especially important factors.
The use of SRSs, such as Kahoot! and Padlet, made the students feel as if they were a part of the teaching and not simply observers. SRSs also contributed to increased motivation and a sense of mastery whilst being social and fun. The students found that quiz tasks motivated them and allowed them to test themselves. One student reported, ‘in terms of motivation and the feeling of mastery… then I think it’s really okay, for example, Kahoot! or Quiz and like that, because then it becomes more social, you learn things, and it’s a little less scary, in a way; it should be a fun educational thing...’ (P6).

In the digital classroom, the students shared their screens and worked systematically in a shared document instead of writing separately. They felt that this gave them a better overview and helped to strengthen the cooperation in the group. The students also felt that they had become better at finding solutions on digital platforms than before. Several of the students pointed out that it was important to use the camera and that to have the camera on increased the student’s attention to teaching. One student recounted, ‘Yes, I follow the lecture better if the camera is on; otherwise it is easier to do a load of laundry or turn on the dishwasher; if your camera is on, it forces you to be present in the lecture’ (P4).

The students expressed that it did not feel good to be met with black screens and that it would have been better if everyone could see each other. One student said, ‘[They] have used the camera because they know it creates a better dynamic in the group. It becomes more personal’ (P3).

If the students only listened, it was easy to just turn off the camera, but if they participated in the discussion, more people would turn their cameras on. A more open dialogue and specific questions from the teacher contributed to more people being included in the conversation and, therefore, use their camera.

Communicating without cameras was more challenging because the students did not receive confirmation of whether what they said was understood. In addition, the students felt monitored if they were the only ones to have their camera on, something that could cause the students to turn off their cameras. One student stated, ‘When the others do not use their camera, I feel very monitored and then I do not want to use my camera either, but as soon as one or two do it then I’ll do it too, and then it’s okay, I feel’ (P10).

5. Discussion

The purpose of this study was to determine how PHN students experienced digital education one year after the campus closed during the first wave of infection in March 2020 to better understand the factors that improved or worsened the digital learning environment.

The key findings of this study revolve around the four themes that emerged from the interviews, i.e., increased participation, reduced learning quality, motivation and social contact, and important factors in digital teaching. The students experienced increased participation in digital teaching due to availability, efficiency, and flexibility. However, there were also challenges, such as reduced learning quality and a lack of motivation and social contact. Interestingly, tools for interacting and collaboration, such as the use of SRSs and working in shared documents, were important success factors in the students’ learning environment. In addition, the use of the video camera was an important factor in digital teaching. It was emphasised that these factors made the students feel part of the teaching, not simple observers.

5.1. Increased Participation

In this study, more students attended class because it was more convenient, they avoided the long journey to campus, and all they needed to do was turn on their computers. In addition, digital learning was flexible and could be combined with both working and training.

The availability and cost efficiency of online learning have been appreciated among students even before the pandemic [20]. Previously, online learning was found to be
beneficial due to flexibility [13,33,34,38,42,44], efficiency [24,39,40,42] and convenience [37,39,44] even in the beginning of the pandemic.

In a previous cross-sectional study, it was found that students had positive perceptions about the impact of online teaching on the time management of their learning due to the absence of travel time [40]. Interestingly, this is in contrast with what we found in our previous mixed-method study, in which all the students wanted to return to campus 12 weeks after lockdown [7]. One year later, the students found digital teaching accessible, convenient, and time-saving. They enjoyed the flexibility and to be able to combine their studies with other things.

Selco et al. (2021) explored the effectiveness of online learning from students’ perspectives in a survey of 584 science, technology, engineering and math (STEM) students from California, US, during the spring and fall of 2020. Despite the difficulties they faced during the pandemic, 61% of the students reported that they benefited from flexibility, convenience, and increased productivity [39]. In a cross-sectional survey from the UK (N = 2721), Dost S, Hossain A, Shehab M, Abdelwahed A and Al-Nusair L [13] observed that to students, the main advantages of online teaching were the time and money saved from less travelling and the associated flexibility. In our study, the students expressed that they had more time to read the curriculum at home when they did not have to spend time commuting.

Allowing flexible time to study may be a shift towards student-centred learning when moving forward after the pandemic. Here, instructional strategies, such as flipped classrooms, may be beneficial. For example, when pre-class lectures are held digitally, the students’ knowledge is anchored more deeply when discussing with fellow students and lecturers in seminars.

Interestingly, the students in our study emphasized that flexibility and time-saving were the biggest advantages of online learning. However, they also pointed out that this flexibility required more self-management. Nevertheless, flexibility can be challenging for students due to procrastination, poor time management, or lack of self-regulation skills [49].

5.2. Reduced Learning Quality

The challenges experienced with digital teaching were mostly related to reduced learning quality due to poor communication, a lack of collaboration, and technical difficulties.

It was challenging to hold a dialogue because clarifying comments and body expressions, which are normally a part of the physical classroom, were missing. Nonverbal communication and gestures are fundamental components of language and contribute meaningful and unique information in a spoken message, reflecting the speaker’s underlying knowledge and experience [50]. In a digital room, both nonverbal cues and turn-taking are challenging because eye contact, facial expressions, and gestures often disappear [51]. In addition, a lack of visibility and audibility may produce misunderstandings and stress [51]. To follow the conversation, the participants have to increase their effort to send and receive extra cues and consciously monitor nonverbal behaviour, signals, and attention, which in turn may lead to cognitive overload and Zoom fatigue [52].

The students also found it difficult to speak up in plenary sessions because they felt that they were interrupting when the teacher could not see all the students. In Zoom, participants can raise their hand or send a message in the chat. Communicating in a digital environment can be challenging due to time lag, unstable internet, and bad sound, which in turn may cause interruptions in the conversation. A previous exploratory study found that disruptions in a conversation may decrease feelings of belonging and perceptions of group entitativity independently of the conversation content [53]. These feelings are driven by the subjective experience of conversational flow but may occur largely beyond individuals’ control [53]. It was also challenging to get to collaborate with the other
students because the lectures started and ended abruptly and there was no time for the students to talk freely with their peers.

Previous studies have found that technical or internet challenges were barriers for online learning, especially in the beginning of the pandemic [13,24,34,36,37,40,42]. However, Suzuki et al. 2022 found that technical problems and lack of digital skills were still an issue for students in several countries even in the autumn of 2020, six months after the beginning of the pandemic [42]. In the same study, more than half of the students reported problems with accessing the course materials and tutoring sessions, due to system errors, Wi-Fi settings at home, and the use of visual/audio devices [42]. In our study, we found that technical challenges one year into the pandemic were related to lecturers’ competence, such as when the teacher did not manage to create the digital room or make their presentation work, which distracted and disrupted the flow of teaching. A previous review found that the key barriers affecting the development and implementation of online learning in medical education included poor technical skills, inadequate infrastructure, absence of institutional strategies and support, and negative attitudes of the involved parties [21]. In our previous study, poor internet connection and technical problems influenced the students’ learning situation negatively [7], which also have been found in other studies [13,15,24,34,36,37,42,43,54]. However, internet connections may vary depending on where one lives and one’s technical competence and seems to have been most pressing during the first wave of the pandemic [7,54]. Interestingly, a recent Norwegian report examining the educational use of digital technology in higher education found that students do not necessarily have sufficient digital skills to use digital tools in an educational way, even though they are large consumers of digital technology in their everyday lives [55].

It is important that online learning is facilitated by technology access, possession of basic computer skills, pedagogical design of online courses, and learning flexibility [15]. In addition, usability, system quality, information, technical support, and lecturer characteristics such as student-friendly and supportiveness have been found to be main factors influencing the students’ acceptance of online learning [56]. This is in agreement with a recent qualitative study that investigated students’ perceptions about their engagement, and found that the most crucial criteria mentioned in regard to positive student-teacher relationships was respect and caring, credibility, feedback, and the communication style [57]. However, to improve educator skills, incentives and rewards for the development and delivery of online content are needed, in addition to institutional strategies, support, and a positive attitude among those involved in both the development and delivery of online content [21].

5.3. Motivation and Social Contact

In this study, the students experienced a lack of social contact and a loss of motivation when they were not able to meet, and they felt lonely just sitting inside, staring at the computer. Interestingly, it was not digital teaching that took away the motivation but sitting alone at home and not being able to be physically active.

Several studies have reported that students lacked social contact during the pandemic [7,24,34,37–39,41–43]. We previously found that during the COVID-19 pandemic, the new normal was social distancing and that students were already experiencing social isolation and a general loss of motivation at the beginning of the pandemic [7]. In addition, concerns about the reduction in face-to-face interactions with the loss of the classroom atmosphere and the reduced interaction with peers were reported in a cross-sectional study [40]. A recent survey found that students felt disconnected from others, not being able to show the effort they put into the course and not knowing where to go for help [39]. Furthermore, students felt it was hard to adapt and manage the workload and schedule, feeling disconnected from others and learning [39]. A large survey, including more than 134,000 participants from 28 countries, found that students were affected by COVID-19 on several levels, including concerns about changes in coursework delivery and unclear instructional parameters, loneliness, compromised motivation, sleep disturbances, and
anxious and depressive symptoms [41]. Lack of motivation was also found in a survey from Brazil, where 53% of the students did not feel motivated with the remote teaching [38]. During the pandemic, many have experienced uncertainty and a loss of freedom due to quarantine. A review of the psychological impact of quarantine suggests that social isolation may have a psychological impact—even more so in the long term [58]. One qualitative study that explored the public perceptions and experiences of social distancing and social isolation related to the COVID-19 pandemic found that loss of (in-person) social interaction, structure, and routine led to psychological and emotional ‘losses’, such as a loss of motivation, meaning, and self-worth [59]. In that study, demotivation was suggested to be associated with the participants’ physical health, as not going out reduced their physical activity levels [59]. This is in agreement with our study, which showed that a lack of motivation was linked to a lack of physical activity.

Loss of motivation among students was found to increase during the pandemic. In our previous mixed-method study, the students experienced decreased motivation 12 weeks after the lockdown: 95% of the students (n = 21) agreed that their motivation and efforts had decreased [7]. A recent survey found that 46% of students had weaker study motivation in 2020 compared to the previous semester in 2019 [60]. Interestingly, the authors found that even though students did not fear that they learned less digitally, their motivation for studying suffered as part of the social distancing. Previously, a reduction in total physical activity was found to have a negative impact on psychological health and well-being in an Italian survey [61]. In our study, we found that sitting alone at home and not being physically active took away the participants’ motivation. Loneliness, depressive symptoms, fatigue, and mood disturbance have been found to be negatively associated with physical activity in a US survey [62]. Students’ motivation plays an important role in their academic success, which has also been stated by the Association for Medical Education in Europe (AMEE) [63]. A scoping review found that students in general appreciated individualised and self-paced learning and that digital formats increased their motivation to learn [14]. Both students and lecturers had a predominantly positive perception of the implementation of online learning in a survey, demonstrating the potential of using online learning even beyond COVID-19 in the future curriculum [5].

5.4. Important Factors in Digital Teaching

In our study, the students reported that interacting actively with SRSs, the use of the video camera, and working in shared documents were important factors for success in digital teaching.

Active learning is generally defined as an instructional method that engages students in their learning process. A recent systematic review found that active learning reduces achievement gaps in examination scores and passing rates when compared to traditional lecturing [64]. The active learning approach places greater responsibility on the learner. However, in a controlled implementation of active learning versus passive lectures, students do not always prefer active learning over passive learning [65]. This was also found in our study, in which the students expressed that working in breakout rooms was more demanding than just listening to a lecture. However, it was pointed out that the students experienced greater learning outcomes when they were actively participating in a breakout group in Zoom. Active learning engages learners in the process of learning, something that requires higher-order thinking, which can be more demanding for the students [66].

In this study, the participants felt as a part of the teaching and not as mere observers when response systems were used. This is in agreement with a descriptive study in which active participation in live polling gave a ‘sense of belonging and contributing’, which they may have not experienced in a passive learning environment [67]. Student-active learning methods, such as the use of SRSs and flipping the classroom, have been found to increase motivation and improve learning outcomes [68,69].
In our first study, the students indicated that SRSs, such as Mentimeter, Quizlet, Padlet, and Kahoot!, and the use of polls were motivating factors; however, it depended on the context in which they were used [7]. A Finnish survey found that incorporating social-emotional activities, such as using online game-based platforms, increased students’ motivation and engagement [70]. In particular, Kahoot! has several features that increase students’ engagement, which has been observed in a cross-sectional study from Egypt [71]. Previously, a link between mental fatigue and task disengagement was found in a psychophysiological experimental study [72]. Engaging with SRSs may therefore decrease Zoom fatigue.

A previous empirical study found that students who actively used response systems expressed satisfaction, engagement, and motivation, performing better academically with gamified versus non-gamified audience response systems [73]. In our study, several SRSs were used. Especially Kahoot! has been preferred among students, due to the game-based response system which can transform a classroom temporarily into a game show [74]. Online anonymous academic competition offers an alternative digital method for students’ engagement and assessment, effectively reworking the way students approach learning [75]. In our study, the teachers already had some training in the use of a variety of technology software and the flipped classroom model.

One qualitative study recently reported that internet access was one of the most significant barriers, both for students and teachers [76]. We found that technical problems, such as digital rooms or presentations that did not work, reduced the quality of teaching. The students’ focus was shifted away from the subject, and the flow of the digital teaching was disrupted.

The use of video cameras was highlighted as an important success factor in digital teaching, increasing students’ attention to what was being taught. This is in line with a previous survey in which the use of video cameras encouraged focus [39]. In our previous study, most (76%) of the students expressed that it was important that everybody had their camera on [7]. However, ‘black screens’ (students turning off the camera) do not necessarily reflect the students’ lack of motivation or attention but a lack of digital training or technical issues, such as poor bandwidth [39,77]. The latter was also found in our previous study [7]. In addition, students may be concerned about their personal appearance or their physical location being seen in the background, as found in a US survey [77]. However, the latter can be dealt with using filters that hide your background. In our study, it was important for the dialogue for the students to be able to see each other. Interestingly, the participants pointed out that they felt monitored if they were the only ones with their camera on and that they would turn off their camera if the others did not turn it on. However, seeing their classmates created a sense of community and made the situation more personal. This is in line with a previous survey [39].

5.5. Implications for Post-Pandemic Education

The current study addresses a knowledge gap regarding students’ experience with digital teaching one year into the pandemic. To the best of our knowledge, this is the first study exploring students experiences one year into the pandemic. In our first study, we found that the most pressing concerns among the students were a lack of social interaction, housing situations, insufficient data bandwidth, and an overall sense of reduced motivation and effort [7]. In this study, a lack of social interaction and a sense of reduced motivation and effort were still issues; however, it seemed like the students had adapted to the situation. Interestingly, it was not the online teaching, but sitting alone at home without activity that took away students’ motivation. Many of the challenges students experienced related to reduced learning quality in an online learning environment could also happen on-campus (i.e., difficulties to speak up in plenary sessions or teachers not managing to make their presentation work). However, some of the challenges are closely related to internet capacity (i.e., time lag) or digital competence (i.e., lecturers’ competence).
The availability, flexibility, and efficiency of digital teaching were important for the students’ autonomy. The use of digital technology, such as SRSs and shared documents, supported active learning and improved students’ motivation and sense of mastery, providing a more student-centred learning environment. In particular, the use of SRSs, such as Kahoot!, can activate students’ acquired experiences, knowledge, and competence, and therefore be used as a basis for teaching and future learning [78,79]. The use of such digital technology may also contribute to variations in the students’ learning situation by approaching the same subject matter in different ways, increasing cognitive support for the learners, which is important when using digital technology pedagogically [80].

The overall message that emerged from this study is that the students enjoyed the flexibility but struggled with loneliness and isolation. When students actively engaged in their learning, the digital learning environment improved. The interactive use of SRSs made the participants feel as a part of the teaching and not as mere observers. In addition, the use of web cameras made it easier to communicate and ensured participation in the digital learning space. It is therefore important that educators have both knowledge and access to digital tools and are aware of the importance of web camera usage and its implications for the students’ learning environment.

5.6. Strengths and Weaknesses of the Study

This study has several strengths. All the participating students had previously been students before the pandemic, which made it easier for them to reflect on the changes due to digital teaching. The interview guide contained only general questions about digital teaching and no questions about nutrition, which makes it easier to compare this study with other studies investigating students’ experiences with digital teaching. Furthermore, the qualitative design allowed us to collect rich data, which made it possible to explore these experiences.

The research team was heterogeneously composed of members with both pedagogical and health professional backgrounds. The inclusion of researchers with different professional and research backgrounds in the reflexive analytical process likely enhanced trustworthiness [81]. Furthermore, the research team consisted of both external moderators providing objectivity and a fresh perspective and internal evaluators who were familiar with education and the students. We also used the same experienced interviewers as in our previous study [7]. A strength is that the interviews were transcribed and anonymised by a professional external transcriber to ensure accuracy. The analyses were conducted by researchers with extensive training and experience in conducting qualitative research. Each step of the analysis was conducted separately and then discussed within the analysis group before the next phase to strive for broad involvement to maximise variation [81]. The process was also presented to the rest of the group on two occasions to ensure a reflexive approach throughout the process.

We cannot rule out selection bias in the sample and whether this sample was representative of the perspectives of all students in small sized educations. Another limitation of this study is that we have no information on the different teachers’ use of SRSs. The students who volunteered for the digital interviews were positive and seemed to reflect on a more general level, not restricted to their own personal situation. This also invites reflection on the external validity: our results might not apply to digital students in other fields during a time of digital transformation.

6. Conclusions

The findings of the present study provide insights into PHN students’ experiences with digital teaching one year after the campus closed. The educational situation was still challenging one year after the lockdown; however, the students perceived digital teaching as more accessible, flexible, and efficient, and more students participated in online classes. However, the lack of social contact, motivation and collaboration with peers were
challenging for the students. Noteworthily, it was not the online teaching, but rather the loss of activities when sitting home alone, that took away motivation. In addition, active participation with SRSs and the use of webcams is important for the students’ digital learning environment and motivation. The findings from this study provide insights that help to improve the quality of online learning in education in the future. When we are aware of the barriers and possible solutions, we will be better prepared to face the digital age.


Funding: This research received no external funding.

Institutional Review Board Statement: Information removed for double blind review

Informed Consent Statement: Removed for double blind review

Data Availability Statement: The data are confidential, and sharing is not in accordance with the consent given by the participants.

Acknowledgments: This research received internal funding for the transcription, English editing service, and publication fee.

Conflicts of Interest: The authors declare no conflict of interest.

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