

Article

“A Lot Takes Place Digitally Now, So It Can Be Good to Train on It”: A Large-Scale Repeated Cross-Sectional Study on Recording Live-Streamed Educational Activities among Health, Social, and Education Students

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Abstract: Audio recording is used in language and music education as an active learning resource to help students reflect on their performance and improve their accuracy. Recordings may be used to provide feedback on both verbal and nonverbal skills and to prepare professional candidates for talking to vulnerable users or other professionals. Despite its potential, recording among health, social, and education candidates to help them improve their digital relations skills is usually not part of pre-service training. Therefore, the objective was to assess the extent to which professional students were affected by recordings in live-stream settings and to explore their perspectives through qualitative elaboration. The design was a repeated cross-sectional mixed-methods study conducted in 2020–2021 (n = 1040 and n = 2238, response rate: 46% and 45%, respectively). Although participation was reduced, active online participation was low, regardless of recording practice. Educational background and age were determinants of active participation, regardless of the recording practice. Active students were the least affected by recording. Students wanted more recordings. Their perspectives revolved around different practices, privacy issues, and the recording used for traditional knowledge transfer instead of active learning. Although the General Data Protection Regulation must be met, we suggest that recording is an underused learning resource.

Keywords: videotape recording; nurses; social work; privacy; education; podcast; technology; recording; online learning; GDPR

1. Introduction

In language [1] and music [2] education, live voice (audio) recording has been used for many years as a learning resource to help students reflect on their performance and improve their accuracy. For various reasons, professional candidates from health (H), education (E), and social (S) study programs must prepare for digital communication and collaboration with children, young people, and their families. They need to be accurate in their digital communication with each other, the users, and their next-of-kin. The forced transition into online education due to the pandemic may be a catalyst for rethinking active learning practices in professional study programs because such candidates need to be able to communicate and collaborate with patients/clients/pupils/next-of-kin, as well as with each other, in both face-to-face and online settings.

1.1. Recording as a Learning Tool for Better Practice

In 2008, countrywide supervision in Norway concluded that “Norwegian municipalities must assess and improve their management and coordination of child welfare services, and health and social services for vulnerable children and adolescents. Organization and coordination of child welfare services are inadequate when it comes to identifying children who may suffer injury and assessing and following up on individual children. This also applies to young people who will need help or support from child welfare or social services after the age of 18” [3]. Moreover, based on the supervision of municipal child welfare services in 2011, children were given too few opportunities to talk with professionals, and regardless of whether or not the staff had conversations with children, how this was organized was left to chance [4]. An analysis of Norwegian educational policy documents covering 2006–2013 that examined how interprofessional collaboration (IPC) is reported in national educational documents in relation to children at risk and their inclusion in school, found that green papers, white papers, and legislation fail to offer clear recommendations, schools and teachers may not prioritize IPC [5]. These reports were published before the Internet and social media became a major part of both public and private life.

Today, students must be trained in building digital relational competence. Having digital interaction skills when dealing with vulnerable children or with children who have not had normal childhood experiences can make a big difference if the child feels safe digitally compared to traditional face-to-face meetings with unfamiliar adult professionals or helpers.

The various H, E, and S professions have a duty of confidentiality, and this is particularly important when they deal with matters involving users in the welfare service system that may not be able to speak for themselves, such as young children. The opportunities and challenges of confidential protection are complicated issues, and candidates need to be prepared to tackle real-life situations. Students also need to prepare for possible ethical dilemmas and emotional reactions when dealing with users experiencing challenges (such as violence, parental death, drug abuse, and suicidal thoughts) [3,4]. Case-based tasks to be solved in synchronous group work based on fictive case-based scenarios that challenge the respective professions, which are within the requirements of the General Data Protection Regulation (GDPR) and national laws [6–11], have long been recommended in pre-service training. Recording group work enables subsequent discussions of legislation and ethical dilemmas, as well as feedback for students on their digital relational competence.

According to the European Union’s GDPR, one must ask for the consent of everyone participating before recording. The Personal Data Act [6] incorporates the GDPR into Norwegian law. Although the Schrems II verdict [12] increased awareness among staff and students of the necessity of obtaining consent for recordings, this is not necessarily straightforward in a modern educational setting. Traditionally, students share written notes of lectures with each other after in-person educational activities, and patients/clients/pupils take written notes when they are in mandatory practical training. Currently, patients/clients/pupils might also want recordings [13], regardless if the students are trained or not for being recorded.

A major issue is whether a recording is used for its pedagogical potential in professional study programs. It is a challenging situation; education must comply with GDPR, but at the same time, students need up-to-date training in handling future work–life situations in which recordings may be taken with or without consent.

1.2. Recording of Educational Activities

Many lecturers tend to avoid recording due to numerous challenges (structural, pedagogic, legal, and ethical) [14].

Recordings of synchronous activities entail a digital capture of face-to-face sessions to be made available to students online and are generally unscripted and longer than pre-recordings. Recordings of simultaneous live-stream educational activities must not be interchanged with well-planned prerecords [15,16]. Pre-recordings are generally concise,

with the intent of providing key information points on a topic [16]. Prerecords often exclusively record the educators and not the students. Live streaming synchronous activities may exacerbate some problems that are also common in physical meetings, such as pedagogical and communication skills [13,17]. It may also raise issues that are unlikely in a physical meeting with no recordings, such as fear of exposing oneself, privacy issues, and data protection [18].

The word ‘recording’ has several meanings: audio recording is a way of preserving audio signals for later playback. Movies or video recordings are a way to preserve live images for later playback. Pre-recordings (podcast, PowerPoint with voiceover, and videos) have been used as an asynchronous learning tool since the 1980s [19]. The benefits and challenges related to the use of prerecords, for example, as part of a flipped classroom approach, were extensively summarized several years before the COVID-19 pandemic [20,21]. The benefits include that recording enables flexible learning for students who would otherwise be unable to attend lectures either due to sickness or work commitments or for students with learning disabilities [20,22]. Students can repeat lectures as many times as they want and at an accelerated speed to save time [19,20,22,23]. Concern has been raised that recording will lead to a decline in students attending lectures, poor learning outcomes, and reduced interaction between peers and educators [15,19,20].

Videoconference systems, such as Zoom, enable synchronous recordings of both live-streamed sessions during plenary sessions (main room) and small groups (breakout rooms). In a study performed during the first wave of COVID-19, only 30% of academic teachers in Norway reported having any previous experience with online teaching before the pandemic outbreak in March 2020; however, 80% used the video conference software Zoom within the first three weeks of full digital teaching during this period [24]. Furthermore, pre-recorded lecturing was used by most, many used live streaming (40%), live discussion (57%), and breakout groups (40%). In addition to technological challenges, pedagogical insecurity and concerns over data privacy were the main issues identified [24]. At the national level, in 2021, the majority of students (67%) in a Norwegian national student survey had experienced that over half or all/almost all of the teaching took place online from autumn 2020 until the response time in autumn 2021 [25]. The sudden switch from in-person education on campus to online education upended the educational landscape. Coinciding with the first outbreak, both students and educators could record each other simultaneously during live-streamed educational activities using video conference systems available through their own learning management system (LMS).

1.3. Related Research on the Recording of Synchronous Activities

According to Baillie et al. [15] and their review of the literature, previous research is limited to either studies on lecture recording use and its impact on academic performance or research that focuses on lecture recording availability and academic performance, with mixed findings [15]. The authors highlighted that positive results were restricted to students who used lecture recordings for supplementation, rather than replacement, of live lectures [15]. Moreover, lecture recordings may cause educators to be more self-conscious and more self-censoring and have a negative impact on the spontaneity and interactivity between teachers and students [15,20].

Morris et al. [19] published a mixed-methods study among 1734 undergraduate and postgraduate students in a variety of study programs and staff during 2014–2017. That university implemented an ‘opt-out’ policy in 2014. One major finding was that lectures that were not recorded had significantly higher attendance rates than lectures that were recorded. They also found that students had positive perceptions toward lecture recordings as a learning tool and that they requested recordings. Recordings are used for learning and assessment preparation and examination revision. Most students watched recordings when they missed a lecture. The staff had mixed views on the effectiveness of lecture recordings in supporting learning [20]. Morris et al. discussed the possible impacts on weak students, such as poor attendance, lack of attention, and lack of engagement, and that strong students

use it as an extra study device. In another study performed on medical students in 2020, Nabbout [19] found that lecture recordings (Pathology, Pharmacology, Virology, Parasitology, Bacteriology, Infectious Diseases, and Cardiology) may be a beneficial adjunct but not a replacement for live lectures. The authors concluded that attendance was important for knowledge acquisition and student performance in exams and that attendance was important for all students, but more significantly among the strong and weak students. A study of pharmacy students in a therapeutics course in 2017 [26] found that approximately 350 students attending lectures performed better than those who watched the recordings once. Nkomo et al. [22,23] also found in a mixed-methods study that undergraduates and postgraduates ($n = 660$) who accessed lecture recordings reported an enhanced learning experience. Lecture recording was regarded as a supplementary learning resource and not a replacement for lectures [26]. In contrast, Baillie et al. found that recording was associated with a significant decline in academic performance and an increased rate of failure in a quantitative study among 847 biomedical science students enrolled from 2017 to 2019 [15]. Horn et al. [27] reported that the lecture delivery method did not affect the assessment outcome for entire cohorts of optometry students ($n = 307$), but the weaker students benefitted from live lectures. Although some of these studies included professional students, none of these papers included aspects related to recording as a pre-service training tool for digital communication and collaboration.

In a study on a law school [13], a recorded session was considered to be similar to an advice letter or email, but malpractice issues could arise in which the lawyer arguably gave incorrect legal advice during the meeting. Solid preparation ahead of online meetings with clients may avoid problems with advice offered prematurely [13]. Work in IPC settings may involve formal aspects, such as conflict, rights, and legislation, but also emotional aspects, such as grief and anger. The study based on data from law school [13] is thus relevant to professional study programs and the welfare sector because H, S, and E personnel must collaborate and be accurate in their communication with children, young people, and their families.

Against this background, it is essential to gain more insight into live-streamed recordings and pre-service students from H, E, and S study programs. Therefore, the objective was to assess the extent to which students were affected by the simultaneous recording of live-streamed educational activities and to explore the students' perspectives through qualitative elaboration. Although digital infrastructure was advanced before the COVID-19 pandemic, this study demonstrated that these students had low active participation in online education, regardless of simultaneous recording. The students expressed that recording occurred rarely, and despite its potential, it was not used as a learning resource in active learning. Their perspectives revolved around practices and privacy issues, and they wanted recordings. A novel finding was the difference between students from different programs. E students and older students were the most active and, at the same time, the least affected by simultaneous recording.

2. Materials and Methods

2.1. Design and Participants

Students from different E, S, and H programs of professional study at Oslo Metropolitan University (OsloMet) in Norway were included. The students comprised first-, second-, and third-year students. The only eligibility criterion was participating in the study programs in autumn 2020 and 2021.

The design was a repeated online mixed-methods cross-sectional study conducted in December 2020 and 2021.

The students were to attend a mandatory annual interprofessional learning course (IPL) in January 2021 and 2022, the Interprofessional Interaction with Children and Youth (INTERACT) project. The aim of the INTERACT project is to meet society's demand for better coordination of services relating to children and young people, involving better

interaction between professionals and better cooperation between children, young people and their families, and professionals [28,29].

2.2. The COVID-19 Pandemic and Measures on Campus during Data Collection

Although the Nordic countries have advanced digital infrastructure, the COVID-19 pandemic became an accelerator to digital transformation in higher education during the spring of 2020 [24,25,30]. In September 2021, most COVID-19 preventive measures initially introduced in March 2020 were removed at the national level in Norway [31]. Only a few weeks after the pandemic outbreak in March 2020, the first drafts of guidelines concerning routines for live streaming and recording digital teaching were published internally [32].

From the 2020/21 academic year, individual study programs at our university could, to some extent, choose the delivery mode of lectures if they complied with the disease control measures. Individual educators chose whether to engage with the use of recordings as part of their own teaching practices. The result was a situation in which education was offered online, hybrid, blended, or in a mixture. Consequently, students' learning and social environments at the university differed between study programs during data collection.

2.3. Online Evaluation Survey

In response to the unpredictable situation during autumn 2020, we aimed to develop survey questions on students' responses to recording, which would be relevant to all students, i.e., covering both small- and large-sized study programs located on two different campuses, and who were offered a mixture of online, hybrid, or blended education.

No previously validated questionnaire targeting our purpose was available in Norwegian; thus, the present survey questions were specially prepared. Drafts were discussed among colleges (academic and administrative) and accordingly revised. Due to the ever-changing situation and time constraints, no pilot test was performed in autumn 2020. The same questions were repeated in December 2021 because a repeated cross-sectional design is a "pseudo-longitudinal" study [33].

Closed questions with predefined alternatives were selected to ensure comparability, simplicity, and neutral non-leading language. The students were asked the following identical closed-ended questions: 'Have you done any of the following activities this autumn (in your own study program)? (1) Asked questions to the lecturer during a live-streamed lecture when no recordings were being made; (2) Asked questions to the lecturer during the live-streamed lecture when recording; (3) Participated actively in group discussion during live-streamed colloquium/group work when no recordings were made; (5) Participated actively in group discussion during live-streamed colloquium/group work when recording.' The students could respond on a 6-point Likert scale (from 0 = "completely disagree" to 5 = "completely agree"). The students were also asked to elaborate on their answers regarding recording in an open question: 'If you wish, please explain your answer'. Open-ended responses were used to explore and understand the participants' experiences and perspectives. An open-ended question in a survey poll is a question in which possible answers are not suggested, and the respondents answer in their own words; these questions facilitate a spontaneous response. Additionally, they were asked to report demographic data (age group and educational background). One reminder was sent to increase the response rate. The responders wrote their answers on a computer or mobile phone. The study questions were fitted to anonymous self-administered online questionnaires described previously [34] using Nettskjema [35]. Nettskjema is a tool for designing and conducting online surveys with the capacity for large-scale surveys with many simultaneous deliveries. Nettskjema is easy to use, and the respondents can submit answers from a browser on a computer, mobile phone, or tablet. Nettskjema has the most common features for designing/managing online surveys. In addition, it is specifically designed to meet Norwegian privacy requirements [6]. None of the questions were mandatory. The online questionnaire was provided as an Internet link embedded in the students' LMS.

2.4. Data Analysis

Descriptive statistics were used to present the demographic data and the mean, standard deviation (SD), and 95% confidence interval (CI). When the 95% CI for the means does not overlap, there is a statistically significant difference between the means (at the 0.05 significance level). The analyses were stratified by study programs, dichotomized into H, S, and E study programs, as well as by age category. Due to the exploratory nature of the study, no adjustment was made for multiple hypothesis testing. Statistical analyses were performed using Microsoft Excel and the Statistical Package for the Social Sciences (SPSS), version 27. Free-text responses were categorized and used to elaborate on the quantitative data. The test responses were analyzed using a thematic analysis approach following Braun and Clarke [36], who used a reporting pattern consisting of six phases: (i) familiarization with the data; (ii) generation of initial codes; (iii) search for themes; (iv) review of themes; (v) defining and naming the themes; and (vi) writing the report. The analyses were performed in Word after having imported all text responses from 6 Excel files (generated by Nettskjema), starting with 2020 first-year students and ending with 2021 last-year students. First, all of the responses for familiarization with the data were read using manual notes. Second, the 'Find and Replace' function in Word was used to search for the words 'recording' and 'make records'. All such appearances were replaced with a highlighted version of the same words. Other responses were also relevant to the aim of the study, and these were marked consecutively in the text using different colors. The next step was to use the 'Insert a Comment' function to generate initial codes, such as 'no recording' and 'privacy issues'. Thereafter, all quotes were rearranged under headings according to these initial codes. Searching for the themes and reviewing them was an overlapping process, consisting of reading all of the text responses again for possible rearranging. Only quotes relevant to the aim were included before defining and naming the themes.

2.5. Ethics

The Ethical Guidelines for Research at OsloMet were followed [37]. These guidelines are based on the Act relating to Universities and University Colleges for Ethics and Integrity in Research and pursuant regulations and related to the ethical norms prepared by the Norwegian National Committees for Research Ethics. According to the criteria of the Norwegian Centre for Research Data (NSD) [38], the study was considered completely anonymous, with no sociodemographic information beyond the participants' age and gender and thus was not subject to reporting requirements (NSD reference number 741649). The data were collected from an anonymous online survey using Nettskjema [35], in line with ethical guidelines [37]. Gender was not included due to the low number of male students. All of the participants were over 18 years old and received written information about the study beforehand on LMS Canvas. The respondents' voluntary participation and anonymity were emphasized, and they were informed about the study's purpose and how the data would be used. The participants' informed consent included the publication of anonymized responses. Answering the questionnaire was considered informed consent to participate. The students could withdraw at any time by not logging into or logging out of Nettskjema before answering the questionnaire without any consequences for them as students. The study complies with the Declaration of Helsinki.

3. Results

3.1. Quantitative Data

The age and study program of the responding students are shown in Table 1. The response rate in 2020 was 46% (N = 1046) and 45% in 2021 (n = 2238). About 2/3 were below 25 years of age, and they were participating in a range of professional studies within H, S, and E study programs. Around half of the students were first-year students, of which the majority were from different E study programs.

Table 1. Characteristics of students in the academic years 2020/21 and in 2021/22 ¹. The numbers are stated as frequencies and percentages.

Variable	2020/21 n = 1040 (%)	2021/22 n = 2238 (%)
Age category (years)		
>21	415 (39.6)	883 (39.5)
22–24	291 (27.8)	633 (28.3)
25–27	136 (13.0)	284 (12.7)
>28 or older	195 (18.6)	435 (19.4)
Study program		
Early Childhood Education and Care	147 (14.0)	400 (17.9)
Primary and Lower Secondary Teacher Education	261 (24.9)	485 (21.7)
Supplementary Teacher Education ²	-	10 (0.4)
Specialized Teacher Training in Design, Arts, and Crafts	39 (4.7)	82 (3.7)
Social Work	105 (10.0)	205 (9.2)
Child Welfare	80 (7.6)	201 (9.0)
Occupational Therapy	50 (4.8)	67 (3.0)
Physiotherapy	65 (6.2)	131 (5.9)
Prosthetics and Orthotics	-	12 (0.5)
Paramedic Science	-	32 (1.4)
Nursing	250 (23.9)	470 (21.0)
Social Education	42 (4.0)	140 (6.3)
Education category		
Teaching ²	447 (43.0)	977 (43.7)
Social ³	185 (17.8)	406 (18.2)
Health ⁴	407 (39.2)	852 (38.1)
Year of study		
First	615 (59.1)	1052 (47.0)
Second	225 (21.6)	818 (36.6)
Third	200 (19.2)	368 (16.4)

¹ Data were collected in December 2020 and 2021 in a repeated cross-sectional design, a “pseudo-longitudinal” design [33]. ² Early Childhood Education and Care, Primary and Lower Secondary Teacher Education, Supplementary Teacher Education, Teacher Education in Design, Arts and Crafts. ³ Social Work and Child Welfare. ⁴ Occupational Therapy, Physiotherapy, Prosthetics and Orthotics, Paramedic Science, Nursing, and Social Education (health education programs that lead to a license or authorization).

Regarding asking questions of the lecturer during a digital plenary lecture with no recording, the means were 1.50 in 2020 and 1.82 in 2021 (a scale of 0–5) (Table 2). Regarding active participation in digital group work (breakout room), the means were 2.73 in 2020 and 3.43 in 2021, when no recordings were made.

The comparisons of the student responses in 2020 and 2021 were highly significant ($p < 0.0001$). More students asked questions during digital lectures in 2021 than in 2020, regardless of recording practice. The students reported being more active during digital group work in 2021 than in 2020 if no recordings were made. In contrast, the student participation in group work during recording was lower in 2021 than in 2020.

The number of students who reported being passive (score zero) increased during recording, both during plenary lectures and during group work. In contrast, the number of very active students (score 5) seemed to be less affected by recording.

For students from all participating educational programs, the mean scores for student engagement in sessions without recording were higher in 2021 than in 2020. The opposite effect was found in sessions with recording. Stratified by educational background (Table 3), the E students had higher mean scores in 2021 than in 2020 for both asking questions during plenary lectures and participating in the digital group when no recordings were made ($p < 0.0001$). In contrast, student activity was reduced both during plenary lectures and in the breakout room during recording ($p < 0.0001$). The same pattern was found for the S and H students, although the increase from 2020 to 2021 regarding the variable asking questions in plenum when not recording was not significant.

Table 2. Distribution of responses to statements in an online questionnaire in the academic years 2020/21 (n = 1040) and 2021/22 (n = 2238): ‘Have you done any of the following activities this autumn in your own education?’ Numbers are stated as frequencies and percentages ^a.

Question: Have You Done Any of the Following Activities This Autumn in Your Own Education?									
Variable	Year	Scores (n. %)						Mean (SD)	95% CI
		0	1	2	3	4	5		
no recordings were made		Asked questions to the lecturer during a live-streamed lecture when:							
	2020	474 (47.9)	108 (11.0)	99 (10.0)	146 (14.7)	68 (6.9)	93 (9.5)	1.50 (1.75)	−0.452 to −0.198
	2021	722 (33.0)	325 (14.9)	318 (14.6)	422 (19.3)	225 (10.3)	173 (7.9)	1.82 (1.66)	
recordings were made	2020	364 (37.0)	69 (7.1)	95 (9.6)	139 (14.1)	132 (13.4)	186 (18.8)	2.16 (1.98)	1.082 to 1.329
	2021	1371 (63.0)	196 (9.0)	199 (9.1)	229 (10.5)	106 (4.9)	76 (3.5)	0.96 (1.47)	
Participated actively in group discussion during live-streamed colloquium/group work when:									
no recordings were made	2020	255 (29.5)	60 (6.1)	74 (7.6)	156 (15.8)	186 (18.8)	255 (25.8)	2.73 (1.85)	−0.824 to −0.576
	2021	160 (7.3)	114 (5.2)	230 (10.5)	440 (20.1)	605 (27.7)	636 (29.1)	3.43 (1.49)	
recordings were made	2020	334 (34.2)	49 (5.0)	75 (7.9)	120 (12.3)	125 (12.8)	272 (27.8)	1.69 (1.85)	0.647 to 0.937
	2021	1019 (47.0)	151 (7.0)	195 (9.0)	311 (14.3)	274 (12.6)	218 (10.1)	2.73 (1.85)	

^a Participants could respond on a scale from 0 to 5 (where 0 means “Completely Disagree” and 5 means “Completely Agree”).

Table 3. Responses to statements in an online questionnaire in the academic years 2020/21 (n = 1040) and 2021/22 (n = 2238) stratified by education. Means, standard deviation (SD), and 95% confidence interval (CI) ^{a,b}.

Question: Have You Done Any of the Following Activities this Autumn ^a in Your Own Education?					
	Year	N	Mean (SD)	95% C	p Value
Education students:					
Asked questions to the lecturer during a live-streamed lecture when					
no recordings were made	2020	430	1.60 (1.77)	−0.789 to −0.410	<0.0001
	2021	953	2.20 (1.61)		
recordings were made	2020	428	2.55 (2.00)	1.353 to 1.737	<0.0001
	2021	949	1.00 (1.52)		
Participated actively in group discussion during live-streamed colloquium/group work when					
no recordings were made	2020	429	2.63 (1.99)	−1.177 to −0.820	<0.0001
	2021	953	3.63 (1.33)		
recordings were made	2020	426	2.72 (2.07)	0.765 to 1.206	<0.0001
	2021	945	1.74 (1.86)		
Social students:					
Asked questions to the lecturer during a live-streamed lecture when					
no recordings were made	2020	174	1.18 (1.73)	−0.541 to 0.060	0.12
	2021	399	1.42 (1.67)		
recordings were made	2020	175	2.49 (1.98)	1.480 to 2.035	<0.0001
	2021	398	0.73 (1.33)		
Participated actively in group discussion during live-streamed colloquium/group work when					
no recordings were made	2020	174	2.01 (1.97)	−1.199 to −0.554	<0.0001
	2021	399	2.88 (1.74)		
recordings were made	2020	175	2.34 (2.20)	0.760 to 1.430	<0.0001
	2021	396	1.24 (1.72)		
Health students:					
Asked questions to the lecturer during a live-streamed lecture when					
no recordings were made	2020	385	1.53 (1.72)	−0.267 to 0.134	0.51
	2021	833	1.60 (1.63)		
recordings were made	2020	383	1.59 (1.80)	0.385 to 0.766	<0.0001
	2021	830	1.01 (1.45)		
Participated actively in group discussion during live-streamed colloquium/group work when					
no recordings were made	2020	384	3.17 (1.78)	−0.493 to −0.110	0.002
	2021	833	3.47 (1.48)		
recordings were made	2020	375	2.28 (2.01)	0.199 to 0.665	<0.0001
	2021	827	1.85 (1.86)		

^a Repeated cross-sectional design, in a “pseudo-longitudinal” design [33] (academic years 2020/21 and 2021/22).

^b Participants could respond on a scale from 0 to 5 (where 0 means “Completely Disagree” and 5 means “Completely Agree”).

The same pattern was found for all participating study programs separately, except for nursing students who had a higher mean score for active participation in group work

during the 2020 recording compared to 2021 ($p = 0.02$). Furthermore, the social educator students had higher means in 2020 than in 2021 for asking questions in plenary sessions ($p = 0.046$) and active participation in group work when not recording ($p = 0.007$) (data not shown).

The data presented in Table 4 show that older students were less affected by recording than the younger students, regardless of the year of inclusion and recording or not recording (all $p < 0.001$).

Table 4. Responses to statements in an online questionnaire in the academic years 2020/21 ($n = 1040$) and 2021/22 ($n = 2238$) stratified by age category. Means, standard deviation (SD), and 95% confidence interval (CI) ^{a,b}.

Question: Have You Done Any of the Following Activities This Autumn ^a in Your Own Education?							
2020				2021			
	Age Category (years)	n	Mean (SD)	95% CI	n	Mean	95% CI
Asked questions to the lecturer during a live-streamed lecture when							
no recordings were made	21 or younger	392	1.30 (1.60)	1.14 to 1.46	852	1.39 (1.56)	1.29 to 1.50
	22–24	282	1.16 (1.63)	0.97 to 1.35	622	1.83 (1.61)	1.70 to 1.96
	25–27	128	1.80 (1.90)	1.46 to 2.13	280	2.11 (1.71)	1.91 to 2.32
	28 or older	186	2.23 (1.87)	1.96 to 2.50	429	2.50 (1.65)	2.34 to 2.65
recordings were made	21 or younger	388	1.42 (1.75)	1.24 to 1.59	850	0.73 (1.32)	0.64 to 0.82
	22–24	284	2.60 (2.00)	2.37 to 2.84	620	0.81 (1.36)	0.71 to 0.92
	25–27	128	2.54 (1.98)	2.19 to 2.89	278	1.13 (1.55)	0.95 to 1.31
	28 or older	185	2.81 (1.90)	2.53 to 3.09	427	1.50 (1.66)	1.34 to 1.66
Participated actively in group discussion during live-streamed colloquium/group work when							
no recordings were made	21 or younger	391	2.95 (1.84)	2.77 to 3.14	854	3.21 (1.54)	3.11 to 3.32
	22–24	280	2.29 (2.05)	2.05 to 2.53	623	3.43 (1.48)	3.32 to 3.55
	25–27	128	2.73 (1.97)	2.38 to 3.07	280	3.65 (1.42)	3.48 to 3.82
	28 or older	187	2.95 (1.92)	2.67 to 3.22	426	3.72 (1.38)	3.59 to 3.85
recordings were made	21 or younger	387	2.11 (2.03)	1.91 to 2.31	849	1.65 (1.81)	1.53 to 1.77
	22–24	279	2.63 (2.12)	2.38 to 2.88	619	1.53 (1.79)	1.39 to 1.67
	25–27	125	2.68 (2.07)	2.31 to 3.05	275	1.63 (1.89)	1.41 to 1.86
	28 or older	184	2.91 (2.04)	2.61 to 3.20	423	2.02 (1.94)	1.83 to 2.20

^a Repeated cross-sectional design, a “pseudo-longitudinal” design [33] (academic years 2020/21 and 2021/22).

^b Participants could respond on a scale from 0 to 5 (where 0 means “Completely Disagree” and 5 Means “Completely Agree”).

3.2. Qualitative Data

The students were invited to elaborate on their answers to the closed questions on the recordings in an open question. There were 181 total responses for the open-ended question from all study programs, with 49 responses in 2021 (25 from first-year students, 14 from second-year students, and 10 from third-year students) and 132 responses total in 2022 (63 from first-year students, 38 from second-year students, and 31 from third-year students). Several responses were not restricted to recording but covered digital transformation and emergency teaching. However, in the search for initial codes, the word ‘recording’ appeared 52 times and ‘recorded’ 24 times. The following main themes were identified: Recordings of live-streamed educational activities are lacking; students want recordings; varied practices between study programs; privacy issues; educators’ role; student activity; and dilemmas.

3.2.1. Recordings of Live-Streamed Educational Activities Are Lacking

The most dominant theme was that live-streamed recordings were not performed by the educators during lectures or group work. Typically, the students responded quite shortly that ‘no recordings are made’, or seldom, as illustrated by this quote:

Has only had a recording of one lecture in the entire semester. (first year, Physiotherapy, 22–24 years old, 2021)

3.2.2. Students Want Recordings

Several students called for recordings. Arguments included increased flexibility, avoidance of zoom fatigue, better quality of life, and that each student learns differently. The following quotes are illustrative:

All lectures should be recorded and posted. It creates more flexibility for us in an unpredictable everyday life. In addition, teachers should plan for more activity when it is digital. It makes it easier to follow. (first year, Social work, 28 years old or older, 2020)

Challenging with digital teaching when no recordings are made. Is it difficult to structure your study day when you have classes from 8.30 a.m. to 10.15 a.m., for example. (second year, Nursing, 22–24 years old, 2020)

We do not take recordings of the teaching and it is very hopeless. (third year, Primary and lower secondary teacher education, 22–24 years old, 2020)

Stop being so afraid of digital teaching. . . . This should be considered as a regular feature/alternative even after COVID-19. (third year, Child welfare, 28 years old or older, 2020)

Want less mandatory attendance at seminars and lectures. Gets a feeling of being a school student, even though I'm actually a student. Not everyone learns the same way. (first year, Physiotherapy, 21 years old or younger, 2020)

A lot takes place digitally now, so it can be good to train on it ('it' is referring to recordings). (first year, Primary and lower secondary teacher education, 22–24 years old, 2021).

3.2.3. Varied Practice between Study Programs

The continued ad hoc emergency teaching situation during the autumn of 2020 was both directly and indirectly reflected in some of the responses. Some students had outdoor education due to indoor restrictions, whereas others had returned partly or fully to campus. A varied practice between the study programs was explicitly commented on, as illustrated by the following quote:

I wish that the . . . study programs X . . . could publish the lectures digitally like . . . study program Y . . . and like other studies (first year, Social education, 21 years old or younger, 2020)

3.2.4. Privacy Issues

Some students had observed that students with low confidence turned off their cameras and expressed that their privacy should be respected. In particular, some students felt that educators forced them to turn on their cameras against their own will:

I also react to the fact that many students have felt pressured to have a webcam on and that teachers have said that you must turn it on, when many really don't have to. I know there are many people who are uncomfortable to sit in front of a webcam with many students in the room. When it is recorded by teachers, it is often in a way that suggests that those who are not on camera do not sympathize or participate, but that is certainly not always the case. (third year, Early childhood education, 28 years old or older, 2020)

I have reacted to lecturers who have spoken disgracefully to those with their camera turned off. (third year, Social work, 28 years old or older, 2020)

Some students expressed that educators used privacy as an excuse for not recording, as expressed by the following two student quotes:

Neither had a recording of a single lecture, nor had a hybrid lecture. I think this is too bad. Should be possible to arrange for after 2 years of pandemic. Can't blame privacy

when other subjects in primary school teacher education get it done. (third year, Primary and lower secondary teacher education, 22–24 years old, 2020)

It has not been allowed to record as long as I have studied at Oslomet, at least That's what our lecturers have told us. (third year, Early childhood education, 22–24 years old, 2020)

3.2.5. Educators' Role

Some students commented that the educators had not been prepared for the sudden digital transformation. The following quote discloses a challenging situation that is not compatible with recording:

We have had some problems with sound when some have been at the university, and some have joined live via zoom. In other words, the teacher has forgotten those on zoom, those on zoom were not always heard when you turned on the sound and spoke. (second year, Nursing, 21 years old or younger, 2021)

Some students wrote that when recordings had been made during live-streamed lectures, the educators had monologs without student participation. They described intense online lectures, which provided limited time and opportunity for asking lecture questions. One student wrote:

Until now, there has been no opportunity for active participation when recordings have been made. (first year, Nursing, 28 years old or older, 2020)

3.2.6. Student Activity

Some students expressed satisfaction because they had returned to 'ordinary' traditional education on campus, and at the same time, they did not mention recording in their responses. Others clearly expressed that recording did not affect their activity:

We have not had lectures that were recorded. Don't mind participating in discussions or asking questions if that should be the case then. (second year, Primary and lower secondary teacher education, 22–24 years old, 2020)

I don't think there was any recording of the live streaming. It wouldn't stop me from talking anyway. (second year, Social education, 18 years old or older, 2020)

Some older students had perspectives beyond their own personal situations, such as:

I have taken the position that I will participate by asking questions and participating in the teaching, regardless of whether it is digital or not. I'm 42 and I'm not afraid to speak in assemblies. My hope has been to "pull with me" other students to participate more. It often helps to break the ice. So far, I have not seen a very big impact on the younger students, who make up the vast majority. (first year, Occupational therapy, 28 years old or older, 2020)

Others praised the flexibility of recordings and that they could be reused during unscheduled group work:

I have also taken the initiative to meet colloquiums outside the scheduled classes and to meet them during the seminars so that we can look at them together. (first year, Nursing, 21 years old or younger, 2020).

Regarding online group work, some expressed that group composition was more crucial online compared to face-to-face group work. Some students wrote that Zoom was not suitable for group work but should be restricted to plenary sessions. Fear of exposure was highlighted as a major challenge even after 2 years of digital education:

... We have had almost two years of digital teaching where none of the students have dared using either their microphone or camera in breakout rooms with their own classmates ... (second year, Early childhood education, 22–24 years old, 2020)

Although not explicitly asked, some students expressed that hybrid teaching did not affect them if they were physically present on campus themselves:

... When there has been a hybrid lecture and I am physically present, I have nothing against participating. (second year, Social work, 28 years old or older, 2021)

Some students described asking questions in the chat (on Zoom) as an alternative to the 'raise hand' function.

3.2.7. Dilemmas

Students' opinions on the recordings were also expressed through dilemmas. Rerecording provides flexibility, as they would have lost teaching otherwise, but individual asynchronous learning was associated with less contact with peers. They understood the challenges for the educators but were frustrated over issues relevant to the themes.

4. Discussion

A major finding is that, although recording is associated with a reduction in active student participation, students' online participation was low overall. Novel findings showed that E students and older students were the most active. The students expressed a desire for recordings, but concerns were raised about privacy, educators' digital skills, and some other aspects relevant to online educational settings. Recording was infrequently used between the study programs and mostly used for traditional knowledge transfer or passive learning and not as a learning resource for active learning.

4.1. Low Participation with or without Recording

Few of the students in our study reported asking questions during digital lectures, even when no recording took place. The proportion of students who reported being very active (scores 4 and 5) was small, even during unrecorded sessions. Despite low student engagement in recorded as well as unrecorded sessions, we found lower mean scores in the recorded sessions in 2021 than in 2020. This might be explained by higher GDPR awareness among students. Student engagement in the unrecorded sessions was slightly higher in 2021 than in 2020.

Passive students are also a known challenge for campus education, with no recording [18]. Recording can also occur on campus, meaning that difficulties speaking up in plenary sessions or in group work are not restricted to online education. As expected, the students reported being more active during group work than during plenary lectures. Group work in the breakout room is a more constructivist approach to learning than plenary lectures. Successful student engagement in education requires a learning design with carefully aligned activities [39].

We cannot exclude the fact that educators who successfully include students in face-to-face educational settings are uncomfortable doing so online, which may have a negative impact on the digital learning environment. Our results could be a result of educators not being able to facilitate active participation throughout digital lessons and even after months of digital education, demonstrating their lack of competence in this field. In comparison, a talk show host on TV can communicate both with the audience and the camera (i.e., this is a recording in a hybrid setting). Wang et al. [40] emphasized that certain design principles, such as redesigning activities for easy online participation, must be implemented to ensure successful hybrid and online teaching. Nevertheless, our results are in accordance with the results from a national student survey performed in 2021 [25], in which the students reported that the teachers were good at engaging the students in active discussions in online education to a lesser extent.

There are, if not directly, traces of loneliness among the students in our material. When the meeting places were only digital, and the digital meeting did not work optimally (e.g., when black screens were a normal condition), the students did not "meet" anyone else during the school day for a long time. When they did not dare talk into the microphone, they did not participate either and may not have heard their own voice all day. Even worse, when only the teacher delivers monologues, no one else is able to speak. Low online participation nearly 2 years after the first pandemic outbreak is a major concern.

The core competencies for interprofessional collaborative practice relevant to H, E, and S students include interprofessional communication, roles and responsibilities, values and ethics, and teams and teamwork [41]. If professional candidates are to make another person, such as a vulnerable child who has been exposed to abnormal childhood experiences, feel included in a conversation, they cannot, for example, meet that child with a black screen.

4.2. Students Want Recording

The data indicated that students wanted recordings of live lectures, which is in line with other studies [16,42]. In a study of academic educators in Norway during the first COVID-19 lockdown (spring 2020), only 13% recorded lectures and seminars from earlier semesters, and 7% recorded a podcast of a lecture or seminar in advance [30]. Since the data in the present study were collected in the autumn of 2020 and 2021, we initially expected that recordings of live lectures would be more frequent at our university than what the students in the present study reported. There could be several explanations for the limited number of live recordings. The fear of fewer students attending lectures could be one reason. Another reason is the fear of not complying with the GDPR when recording lectures.

4.3. Privacy Issues

Students expressed that the internal routines with respect to digital education and recordings were inconsequently practiced between the different study programs. This aligns with institutional policy [32], which gives the individual study programs autonomy, provided that the educational practices comply with the GDPR.

In some courses, student participation is compulsory, and educators may face dilemmas concerning their own obligations, students' rights, and GDPR. Obtaining consent to record can be time-consuming and, thus, something lecturers do not want to spend time on, despite the potential benefits for the students. Therefore, our study is not comparable to the study by Morris et al. [20] because that university introduced lecture capturing as routine in 2014. In that study, it was expected that introductory lectures for first-year students would be recorded, whereas recording in our study seemed to be the exception and not the rule.

Students are commonly encouraged to have their cameras on during digital lectures. Our findings showed that many students were uncomfortable keeping their cameras on during lectures. Recording might further increase uncomfortableness and thus reduce the number of students with active cameras. Several studies from the first phases of the pandemic reported that students do not activate their cameras ('black screens'), either in the main room (during plenary activities led by an educator) or in breakout rooms [43–45], although the educators activated their own camera [43]. The fear of exposing oneself [45], and students who did not find the camera useful for themselves [43], was one explanation. It has been speculated that teachers are more affected by black screens than students because the students are primarily focused on a single person (the teacher), whereas the teacher has lost their audience [43]. In our previous study, immediately before the pandemic, students preferred podcasts over videos as the assignment format [46]. This might imply that students are more comfortable sharing audio recordings than video recordings.

Privacy rules must be followed. Obtaining informed consent is necessary, especially to save recordings in an approved system. Although educators may remind students that their recordings are not allowed to be spread to other students or educators without their permission, students may turn off their cameras or be passive during recording because they are afraid that peers will film or photograph them and then spread this on social media. However, live recording has been used for a long time in language [1] and music [2] education as a tool to help students reflect on their performance and improve their accuracy.

Digital relational skills are essential for creating a safe place for users, such as vulnerable children, but also for other professionals. We suggest some basic rules for creating

a social meeting place in pre-service training. In this respect, recording can be seen as a possibility in which the regulations and legislation are not yet quite in place.

4.4. Impact of Educational Background and Increasing Age

The students from the E programs seemed to participate to a larger extent than the H and S students. Teachers mainly work alone in their classrooms with pupils, whereas health professionals, such as nurses, work together with other professionals, multi- or interprofessionally. E students are trained during their degree to speak in front of pupils, and we may also speculate that people aspiring to be teachers have higher confidence in their own oral communication skills in front of an audience.

An original finding in this study is that the youngest students were more affected by recording than the older ones. Although young people are active users of digital media and recording (SnapChat, TikTok, Facetime, etc.) in their private lives, they may not be comfortable being recorded in the education arena. Older students might be more confident in their role as students and thus more likely to actively participate in the recorded activities.

4.5. Strong and Weak Students

The proportion of students who were very active in their participation was similar across the variables. Some of the text responses may suggest that stronger students are more active in situations involving recordings. Nabbout et al. [19] concluded that attendance was important for all students, but more significantly so among strong and weak students. A mass movement of students back to campus and traditional passive teaching and learning methods will not improve students' digital skills and readiness for modern work life. Online work is likely to become a permanent feature of welfare settings, and all students need to take advantage of technology to develop the skills they need in their future professional lives.

4.6. Differences between 2020 and 2021

The proportion of students actively participating both in plenary and group work during recording was lower overall in 2021 compared to 2020. The higher mean values for student activity in 2020 may be due to fewer recordings taking place during autumn 2020 due to prolonged strict pandemic measures. Overall, the SDs were closer to the means of the dataset in 2021 than in 2020, which implies a larger variation among respondents in 2020. This may reflect a new and more stable situation with better-trained educators in 2021 compared to the previous year and that digital education was less prevalent in 2021. The second wave of infection dominated the autumn of 2020 [31], and although the first phases of emergency teaching were over, the teaching situation was still ad hoc.

4.7. Strengths and Limitations

This is the first study investigating E, H, and S students' responses to recording in Norwegian higher education. A major strength is the high number of students from various educations, representing both large- and small-sized educations. Thus, the coverage was high.

To overcome limitations due to selection bias, self-reported data, response rate, and cross-section design, we used data from two consecutive years (2020 and 2021), which is a "pseudo-longitudinal" design [33]. The same information was asked of an independent sample in each academic year, and stable responses for two consecutive years implied stability along the time axis.

The response rates were higher than those of our cross-sectional studies before the pandemic [47–49] and higher than the response rates in the national student survey in Norway (Studiebarometeret) among 74,000 Norwegian students, which was 44% in 2020 and 41% in 2021 [25]. The response rate for the content analysis of the open-ended question was appropriate, as the analysis did not reveal new sub-categories. The open question was non-leading and neutral, and many provided long answers.

The time lag between exposure (experiences from autumn 2020 and 2021) and survey (December 2020 and 2021) was small, i.e., reduced change for recall bias, which may be of particular importance during unpredictable situations.

No previously validated recording questionnaire is available in Norwegian. Since the institutional policy allowed for local variation concerning the delivery mode of education and ad hoc emergency teaching was offered in the autumn of 2020, the specially prepared questionnaire had to be general. Consequently, the questionnaire may have fit some programs better than others. Our intention was to disclose major trends regarding recording, and future studies need to explore student opinions in more detail. Some students may have used a score of zero because they had not experienced any recording, which means that the zero score might have been overestimated. In retrospect, we could have added a question on recording lecture frequency. However, it is unlikely that the students who used a score of 4 or 5 would have responded differently. Thus, the number of students who were active was probably not affected. Moreover, the low mean scores for participation during the non-recorded sessions are in accordance with other studies. The higher means in connection with student activity during group work lend further credibility to our data. As there are currently no validated questionnaires to measure students' perspectives on recording in online education, our repeated mixed-methods cross-sectional study approach provides novel and valuable insights for future research.

This study did not separate the recordings obtained from face-to-face education and digital education, which can be interpreted as both a limitation and a strength. This is a strength because none of the students made relevant comments, and a limitation because there is a need to obtain more knowledge about recording, both in face-to-face and online education.

Self-selection bias may not be excluded, as responders with strong opinions in either direction may be present; however, the diversity in our sample enhances the robustness of the findings. Thus, if students with strong opinions responded (both directions), then the average was not affected. This was an anonymous survey, and it was not possible for the researchers of the responses to see who answered what.

5. Conclusions

The main findings from our study were that student participation was reduced during recordings, that student participation was low regardless of recording practice, and that recordings were not frequently used as an active learning resource. A novel finding is the difference between students from different programs and that E students and older students were the most active and, at the same time, the least affected by simultaneous recording. Active participation was reduced in 2021 compared to 2020. This could be a result of students being tired of digital teaching and, thus, being less likely to actively participate. This could also be a result of educators not being able to facilitate active participation throughout digital lessons and even after months of using digital education, demonstrating their lack of competence in this field. Students expressed perspectives on varied practices among the different study programs and privacy issues and that they wanted recordings. H, E, and S candidates must be prepared to communicate and collaborate online with each other and with vulnerable users; thus, this study raises concerns. In their professional lives, it is not an option to not participate or turn off their camera function when their professional duty requires good digital relational skills and competencies.

The current study addresses a knowledge gap in the recording of live-streamed education. To the best of our knowledge, this is the first study exploring H, S, and E students and synchronous recording. This study may contribute to deeper implications for practice through the novel findings that educational background and increasing age are determinants of student participation during recording. Moreover, the proportion of very active students was similar across variables, which may support the idea that strong students are less affected by recording procedures. Thus, this study contributes to enhanced preparedness for a post-pandemic situation, in which candidates must prepare

for future online communication and collaboration and situations in which they may be recorded. Further studies should explore student readiness and familiarity with recordings in different settings, whether recordings are more beneficial to some study programs than others, and privacy issues.

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