

Article

Breakout Rooms Serve as a Suitable Tool for Interprofessional Pre-Service Online Training among Students within Health, Social, and Education Study Programs

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Abstract: Higher education institutions must prepare students from health, social, and teacher education programs for interprofessional collaboration (IPC) among children and young people with challenging childhood experiences. We wanted to explore if digital small group rooms, breakout rooms, are feasible for students to learn about, from, and with each other in an interprofessional learning (IPL) initiative, in order to practice IPC. This study is a repeated cross-sectional study from the academic years 2020/21 and 2021/22 with 5412 students. The students worked in student-led IPL groups with a case-based learning approach and limited interaction with supervisors. The youngest students agreed to a larger extent that they learned more about, from, and with other students. The teacher students were more positive towards discussing sensitive issues in breakout rooms than the health students. The health students agreed to a larger extent than the teacher students that breakout rooms were suited for pre-service IPC training. The results from this study indicate that breakout rooms provide a potential arena to practice generic skills. If properly organized and structured, breakout rooms can be an excellent learning resource. Breakout rooms provide a safe online environment for learning and practicing IPC, and for training on talking about sensitive issues.

Keywords: breakout room; group work; children; interprofessional collaboration (IPC); interprofessional learning (IPL); simulation; gamification; nursing; active learning



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1. Introduction

1.1. Breakout Rooms—A Tool for Collaborative Small Group Learning

There are several benefits in using technology in the welfare sector, such as video consultations or remote health monitoring [1]; the professionals, the users and their next-of-kin save time and cost that they would otherwise have spent on traveling and waiting [2]. According to the Norwegian government [2], use of video consultations can also help users feel safer and more in control when in their meeting with services [2]. In 2022, a governmental requirement in Norway was that the proportion of outpatient consultations carried out via video and telephone must be between, at least, 15 and 30 per cent in 2022, dependent on geographical region [3]. According to the European Commission [4], the educational sector must enhance digital skills and competencies for the digital transformation of society. Professional students need to train for online communication and collaboration in a safe pre-service training arena with safe online settings, to learn about, from, and with each other [5,6].

The commonly available videoconference platforms with a breakout room function have low costs, and their implementation in higher education and society elsewhere rapidly

increased due to the closure of campuses due to the COVID-19-pandemic in 2020. The breakout room function is explained as: “Breakout rooms are sessions that are split off from the main Zoom meeting. They allow the participants to meet in smaller groups and are completely isolated in terms of audio and video from the main session. Breakout rooms can be used for collaboration and discussion of the meeting [7]”. The host (educator) may create the breakout rooms manually (predefined groups) or electronically, or the host can allow students to choose their breakout rooms. The host can send messages or visit the breakout rooms to give instructions and feedback, chat with students in groups or individually, share audio and files, etc. The functions available in a breakout room include raising hands, sharing audio and files, chatting, and recording. The advantages of breakout rooms include easy and flexible attendance, tools available for peer-to-peer support, and the technical simplicity in facilitating collaborative learning [8–12]. As for face-to-face group work on campus, challenges in breakout rooms include peers not contributing, unfamiliar peers, peers being late, or peers dominating the group. The additional challenges of breakout rooms include persons who do not turn on their camera (“black screens”), technical issues, and a lack of technical skills among users.

Our objective was to assess professional students’ agreement to statements concerning the suitability of breakout rooms as an interprofessional learning (IPL) tool, and to explore the impacts of educational background, age, and year of study.

Literature Review

Leadbeater et al. [13] conducted a study among final-year biomedical science and second-year medical students ($n = 70$) using the Blackboard Collaborate Platform in December 2020. A three-hour workshop included a series of breakout sessions, where students worked in small, mixed discipline groups (six students per group) for 20 min to complete three activities. The students were able to interact with their supervisors throughout the entire workshop using the chat function. A mixed methodology approach was adopted, which included open- and close-ended questions; however, the study only included two different study programs and no freshmen students.

Wong et al. [14] published a study on the transformation of a face-to-face IPL disaster simulation to an online format in response to COVID-19 campus closures among 63 nursing students, master and doctorate degree public health students, and master degree social work students [14]. The breakout rooms were used for team exercises related to disaster triage, disease outbreak investigation, and disaster response. The authors concluded that the IP skills were higher for online students when compared with in-person simulations and that the online disaster simulation provided an effective, innovative IP educational opportunity.

Brown et al. [15] aimed to increase students’ self-perceptions of their confidence in leadership ability, patient advocacy skills, understanding the role of other professions, and interprofessional communication skills through an interprofessional leadership and patient advocacy program focused on simulation activities among 36 second-year pharmacy students and 37 senior nursing students. The authors concluded that virtual simulation provides an engaging and effective method to teach students these vital skills within an interprofessional team.

Pirani et al. [16] performed a study on 46 students from athletic training, nursing, and teacher preparation programs participating in a Sports Concussion Injury Management Interprofessional Education simulation. Students were pre-assigned to small learning groups for breakout room activities and worked with an 18-year-old case. Each breakout room had a total of two facilitators—one from athletic training and the other from nursing. In addition, the education facilitator served as a resource between rooms. Zoom breakout rooms using the gallery view served as telehealth meeting rooms for the IP teams to collaborate.

Although the design, terminology, and measurement tools differ among these studies, they are mainly supportive of breakout rooms as a learning arena. However, the included

studies among professional students using breakout rooms specifically, are mainly limited to health study programs, and with no repeated measurements.

1.2. IPL Relevant for IPC Teams Targeting Children, Young People, and Their Families

Caring for children with challenging childhood experiences is a social and public health challenge [17–25]. If a child is sick or needs helps for some reason, professionals across a range of professional fields, such as health personnel, social workers, and teachers, may be involved [26–30]. The different professions have different jurisdictions, taxonomies, traditions, and core tasks, which may create silo-like divisions of professional responsibilities and influence the delivery of welfare services [31,32]. A lack of pre-service training and child-related education may contribute to why professionals who are legally mandated to report various forms of child maltreatment often fail to do so [30,33,34]. Professional students are currently required to learn to work collaboratively in education [35–37] for the benefit of pupils/clients/patients to provide the highest possible standard of service [38]. Simultaneously, students must still be trained uni-professionally to be able to perform their own future professional roles and to carry out profession-specific tasks in line with the requirements [6,38].

Interprofessional learning (IPL) aims to bring students from two or more study programs together to learn with, from, and about each other with the goal of achieving common learning outcomes and better welfare services through better interprofessional collaboration (IPC) [39]. It can be difficult, for practical reasons, to establish a professional team for physical face-to-face meetings; therefore, it is important to explore digital possibilities.

Literature Review

In a cross-sectoral collaboration between health and social services for vulnerable children and adolescents developed by the Norwegian Health Directorate and eight municipalities, teachers expressed that they do not have common ground with the other services [20]. School nurses were frustrated because they were left with the administrative tasks, while the child welfare agency experienced frustration over not being included [20].

According to Tuominen et al. [40] in their systematic review on ‘Interdisciplinary collaboration among the disciplines of social care, health care and education in higher education’, there is a lack of knowledge regarding education-related interdisciplinary collaboration among the health, social, and teacher learning programs in higher education. They found that only two studies [41,42] on the online delivery mode that had included participants from health, social, and teacher education sectors, but the arranging parties were from health and social care study programs [40]. They highlight the lack of organizational structures between higher education and work life, albeit these would be essential for systematic development and implementation of evidence-based practices to promote the learning and well-being of children [40].

Case-based small group learning using fictive cases and fictive case scenarios is frequently used in professional study programs and interprofessional learning (IPL) [43]. It is an approach during which students discuss challenges and issues related to fictive cases, which does not conflict with the requirements of General Data Protection Regulation (GDPR). Topics relevant to IPC teams targeting children, young people, and their families, such as neglect, sexual abuse, and violence, may be difficult to address for both professionals and those exposed to it [17,44–48]. Lack of knowledge, different emotions leading to being uncomfortable broaching these topics, and uncertainty among professionals can contribute to whether such sensitive topics are discussed [49,50]. In theory, breakout rooms are safe online spaces for students to train in communication and collaboration related to fictive case scenarios, even for topics that are challenging to discuss, such as child maltreatment.

Creating a supportive and safe learning environment for students to discuss sensitive topics relevant for IPC work targeting children is challenging on campus, and there is a knowledge gap regarding the transition to an online learning environment.

2. Materials and Methods

2.1. Study Design

This repeated large-scale, cross-sectional study was conducted using an anonymous online questionnaire tool created in Nettskjema [51] in the academic years of 2020/21 and 2021/22 at Oslo Metropolitan University (OsloMet) in Norway. Data were collected in December of 2020 and 2021 and January of 2021 and 2022 before (pre) and after (post) the deliveries of mandatory large-scaled IPL courses the first week of January 2021 and the first week of January 2022 for students participating in different health, social, and teacher study programs.

2.2. Students

Students from different health, social, and teacher education programs of professional study were included. The only eligibility criterion was being a student with the mandatory IPL course in the curriculum for the academic years of 2020/21 and 2021/22. The two cohorts of first-year students began their bachelor's degree studies in autumn 2020 and autumn 2021. The first cohort of second-year students (2020/21) began their degree studies nine months before the first outbreak of the COVID-19 pandemic in March 2020, whereas the second cohort began their studies six months into the pandemic (autumn 2020). The first cohort of third-year students (2020/21) had begun their degree studies on campus in autumn 2018. The second cohort of third-year students (2021/22) had begun their studies on campus in autumn 2019, nine months prior to the pandemic lockdown of the campus in March 2020. The second cohort had completed the IPL course for second-year students. Because the first-year students had not taken the IPL course before, their responses are based on their experiences from their own study programs. The second- and third-year students had attended IPL courses previously, and their responses may be based on experiences from their own study programs as well as interprofessional courses.

2.3. The Individual Study Programs

Study programs were from health, social, and teacher education programs, and these study programs are some of Norway's oldest, largest, and best-known programs of professional study. The programs have separate curriculum, traditions, and identities, but from the study year 2020/21, IPL and/or multidisciplinary perspectives became a requirement in undergraduate professional study programs [36,37]. From 2022, Norwegian legislation requires all professionals working with children to increase IPC between services [52].

In September of 2021, most preventive COVID-19 measures initially introduced in March of 2020 were removed in Norway [53,54]. For the study year 2020/21, to some extent, the individual study programs at OsloMet could include the delivery mode of lectures if they complied with the disease control measures. Consequently, the students included in this study were offered a mixture of online, hybrid, or blended education for their individual study programs. Online education was offered using traditional pedagogy (screenshare of PowerPoints during plenary sessions in the main room) and active learning methods using digital pedagogy (in breakout rooms) [55–58]. The university had no record on the use of breakout rooms. Consequently, the participating students' learning and social environments at the university differed between the study programs.

2.4. The IPL Course

The IPL initiative has previously been presented in detail [59–67]. In short, the IPL course is part of an educational intervention (Interprofessional Interaction with Children and Youth [INTERACT]) that aims to provide students with knowledge of and experience with interprofessional cooperation as well as interprofessional experience [59,68]. Undergraduate students participate in an annual IPL course integrated into the student curriculum that is structured as a combination of group discussions in synchronous breakout rooms with the use of digital learning materials (used both synchronously and asynchronously) delivered using the learning management system (LMS) Canvas. The curricula

throughout the three years of IPL are comprised of three elements including (1) a shared knowledge platform (first year, two seminar days), (2) explorative communication with children (second year, two seminar days), and (3) interprofessional practice involving children, youth, and their parents (third year, two seminar day) (total six European Credit Transfer System, ECTS) [59]. The number of participating study programs has increased annually from the first pilot delivery in 2018. Third-year students were enrolled last in the educational intervention in the academic year of 2020/21. Due to the high student volume, it was decided that the course would be fully digitalized from the study year of 2020/21 instead of in a blended learning face-to-face format on campus. To overcome challenges due to the scheduling of the IPL seminars within each study program, all seminars are delivered the first week in January (before the individual study programs start in the spring semester). Thus, data were collected ‘pre’ and ‘post’ the IPL course.

Zoom breakout rooms using the gallery view served as online meeting rooms for the collaboration of the IPL groups. In 2021, there were no plenary sessions due to a lack of a webinar technical solution to accommodate large groups. In 2022, the first seminar day began with a plenary session of 15 min. The remaining time was spent on student-led, pre-defined IPL groups in breakout rooms. Each of the pre-defined IPL groups consisted of eight students representing health, social, and teacher education study programs, and the aim was to facilitate students learning with, from, and about each other [59]. The student-led groups followed a time schedule that led them through tasks and discussions (case-based learning) [69], which has been described in detail previously [60]. The annual scheduled programs were designed so that the students could collaboratively work together across study programs and across future professions. A specially prepared fictional complex case involving real-life situations and scenarios in which family members and different professionals were included was embedded in the learning management system (LMS) Canvas together with tasks to be solved amongst the students [69]. The complexity was increased annually [69]. It was presented on a Padlet, which is a commonly available online notice board. Post notes contained links, videos, images, and document files, and allowed the students to collaborate online. The intention was that students who have distinctive knowledge bases, develop a mutual understanding of how to work together in future professional environments. In the case-based IPL discussions, it was emphasized that the students should ‘play their future professional role’ and take note of each other’s perspectives. Such case-based discussions did not have a ‘correct answer’ but were designed to challenge the students to question their own knowledge and motivate them to seek new understanding. This is a student-centered form of teaching, where the students’ learning needs are at the center. The idea is to build knowledge for the future, and the immediate purpose is to create engagement among the students [59,69]. Actions were taken towards the social online learning environment, such as ice-breaker activities and an initial session on how to establish a group, making a group contract, and establishing various roles within a group, regardless of delivery mode. None of the students individually or as groups (i.e., from a particular study program) were given the responsibility for peer-to-peer instruction or learning. Concerning the social online learning environment, a positive atmosphere was stimulated through various online student activities, such as games, to get acquainted. Supervisors logged into the breakout rooms to answer questions and to support group work (approximately one hour of supervision per group). The supervisors were recruited from the staff, master’s degree students, and professionals working in the field. They represented a broad range of age, education, work, and supervision backgrounds.

2.5. Online Questionnaires

Because no suitable national or international questionnaire had been developed and/or validated in Norwegian, the online questions had to be specially prepared. The questionnaires were tested and commented on by university colleges (academic and administrative). The number of questions was deliberately kept short because the response rate is generally

low for student surveys. The questions were constructed to cover all students across study programs and years of study.

Because the present IPL course targeted children, young people, and their families as end users, we explored which topics the students were comfortable discussing in the breakout rooms because challenging childhood experiences, such as child maltreatment, may be difficult to discuss [17,18,21,50]. Regarding “sensitive topics,” there is no formal definition in relation to professional work with children, young people, and their families. The definition varies depending on the context as well as social and cultural norms and values [70], and may also include various issues, such as pornography, sexuality, substance abuse, body image, family violence, parental separation, death, bullying, and mental health. The level of the sensitivity of the topic may vary according to culture, age, gender, or other factors [70]; however, in a compendium by Langballe, whose aim was to develop a practical tool for professionals who talk to children about subjects that are of a sensitive nature, the following definition of sensitive topics is provided:

“Such topics include violence, abuse and neglect that children are subjected to” [48].

Because the individual study programs had different curriculums—and students from three different years of study were asked the same questions—the questions were limited to “particularly sensitive” and “less sensitive” topics. In the following, these terms are referred to as “sensitive” and “neutral” topics. The questions related to IPL/IPC were slightly overlapping because terminology clarity and translation issues are challenging even when IPL studies are restricted to health care [71,72]. Because we wanted to perform repeated measurements, the questions were kept stable due to the repeated cross-sectional design, in a “pseudo-longitudinal” design [73].

The questions developed are based on previous questionnaire-based quantitative research using an anonymous self-administrated web tool, “Nettskjema” (Nettskjema, 2020) [51], and the results from the first IPL course delivery [60]. Nettskjema is a tool for designing and conducting online surveys with customized features for research. It is easy to use, and the respondents can submit answers from a browser on a computer, mobile phone, or tablet. The students were asked the following identical non-mandatory, closed-ended questions using a 6-point scale (from 0 = “completely disagree” to 5 = “completely agree”): Digital group work with students from other educations is well-suited to “Practice talking about neutral topics related to children/young people in an interprofessional group” (abbreviated as “discuss neutral topics”); “Practice talking about particularly sensitive topics related to children/young people in an interprofessional group” (abbreviated as “discuss sensitive topics”); “Learn with, from, and about other students”; “Get to know students from other education fields”; “Training on digital collaboration”; “Simulating IPC with other professions”; “Succeed in future interprofessional collaboration”. In addition, we asked them about challenges with online education relevant to digital group work in the autumn of 2020 and 2021. The answer choices were “Online teamwork is inferior to face-to-face teamwork”; “Lack of student active learning methods”; “Many students have not turned on their camera”; “Reduced learning outcome”. Finally, they were asked about their demographic data (age group and educational background). Access to the questionnaire was provided using an internet link embedded in the students’ learning and management system (LMS). Reminders were sent to increase the response rate.

2.6. Data Analysis

Descriptive statistics were used to present the demographic data and the mean, standard deviation (SD), and 95% confidence interval (CI) of the outcome variables (calculated from the scales). The analyses were stratified by study programs dichotomized to teacher education programs (“Education”), social care education programs (“Social”), and health care education programs (“Health”) as well as by age and year of study. A further analysis was performed using the analysis of variance (ANOVA). To investigate whether there was any association between age, year of study, education and the outcome variables, Pearson’s correlation was conducted. Due to the exploratory nature of the study, no adjustment was

made for multiple hypothesis testing. The actual p value was expressed, and a p -value less than <0.01 was regarded as statistically significant and <0.05 as borderline significant. Statistical analyses were performed using Microsoft Excel and the Statistical Package for the Social Sciences (SPSS), version 27.

2.7. Ethical Considerations

The Ethical Guidelines for Research at OsloMet were followed [74]. These guidelines are based on the Act related 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. The study does not include information about the health of respondents or others, and it was, therefore, not necessary to apply to the Regional Committees for Medical and Health Research Ethics (REC). It was also deemed unnecessary to inform the Norwegian Centre for Research Data (NSD) [75] as the study did not involve collecting personally identifiable information. However, we did send a request to NSD (NSD reference number 741649) and was given confirmation that the study was not subject to reporting requirements. Information was provided at the start of the questionnaire about the purpose of the study and what the student's participation entailed, and it was stated that all data collected would remain anonymous. The data were collected from an anonymous online tool using Nettskjema [51] in line with ethical guidelines [74]. All participants were over 18 years old and received written information about the study beforehand on LMS Canvas. Gender was not included due to the low number of male students in some study programs. 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 publication of anonymized responses. Answering the questionnaire was considered informed consent to participate. The study complies with the Declaration of Helsinki.

3. Results

3.1. Response Rates

The questionnaire was answered by students from all the study programs included with response rates of 49.6% (autumn 2020), 39.7% (January 2021), 46.0% (autumn 2021), and 11.4% (January 2022). The original headcount for all questionnaires was 13,604 students. Because the questions were non-mandatory, the number of responding students varied for the different variables, but the total number of responding students exceeded 5000 when the 2021 and 2022 cohorts were combined.

3.2. Demographic Characteristics

The characteristics of the responding students are presented in Table 1. Approximately two-thirds of the students were 25 years or younger. Among the students, between 40% and 44% were enrolled in teacher education study programs, whereas between 38% and 43% were taking health study programs. In all cohorts, the proportion of first year-, second year-, and third-year students, are in descending order.

3.3. Before the IPL Course: Autumn 2020 and Autumn 2021

The students were asked to rate their responses to several statements on a scale from 0–5. Most mean scores with reference to breakout rooms as a learning tool were from 3.4–3.7, whereas the mean scores with reference to challenges with online education relevant to digital group work were slightly lower (Table 2).

Table 1. Characteristics of students.

Variable	Academic Year 2020/21		Academic Year 2021/22	
	Autumn 2020 <i>n</i> (%)	January 2021 <i>n</i> (%)	Autumn 2021 <i>n</i> (%)	January 2022 <i>n</i> (%)
Age (y)				
>21	415 (40)	639 (41)	883 (39.5)	200 (35)
22–24	291 (28)	456 (29)	633 (28.3)	132 (23)
25–27	136 (13)	199 (13)	284 (12.7)	69 (12)
≥28	195 (19)	271 (17)	435 (19.4)	172 (30)
Study program				
Early Childhood Education and Care	147 (14)	201 (13)	400 (17.9)	82 (14.3)
Teacher Education ¹	261 (25)	411 (26)	485 (21.7)	112 (19.5)
Supplementary Teacher Education	-	-	10 (0.4)	6 (1.0)
Teacher in Design, Arts, and Crafts ²	39 (4)	55 (4)	82 (3.7)	26 (4.5)
Social Work	105 (10)	170 (11)	205 (9.2)	58 (10.1)
Child Welfare	80 (7)	133 (9)	201 (9.0)	44 (7.7)
Occupational Therapy	50 (5)	47 (3)	67 (3.0)	14 (2.4)
Physiotherapy	65 (6)	80 (5)	131 (5.9)	38 (6.6)
Prosthetics and Orthotics	-	-	12 (0.5)	3 (0.5)
Paramedics	-	-	32 (1.4)	13 (2.3)
Nursing	250 (24)	409 (26)	470 (21.0)	140 (24.4)
Social Education	42 (4)	57 (4)	140 (6.3)	36 (6.3)
Education category				
Teaching ³	448 (43)	672 (43)	977 (44)	226 (40)
Social care ⁴	185 (18)	303 (19)	406 (18)	102 (18)
Health care ⁵	407 (39)	593 (38)	852 (38)	244 (43)
Year of study				
First	615 (59)	919 (59)	1052 (47.0)	272 (48)
Second	225 (22)	327 (21)	818 (36.6)	182 (32)
Third	200 (19)	319 (20)	368 (16.4)	119 (21)

¹ Primary and Lower Secondary Teacher Education; ² Specialized Teacher Training in Design, Arts, and Crafts; ³ Early Childhood Education, Primary, and Lower Secondary Teacher Education, Supplementary Teacher Education, Specialized Teacher Training in Design, Arts, and Crafts; ⁴ Social Work and Child Welfare; ⁵ Occupational Therapy, Physiotherapy, Prosthetics and Orthotics, Paramedics, and Social Educator (health education programs that lead to a license or authorization).

The mean scores were significantly lower in autumn 2022 compared to autumn 2021 for the variables “discuss sensitive topics” (95% CI = 0.25 to 0.45, $p < 0.001$), “simulate IPC with other professions” (95% CI = 0.27 to 0.46, $p < 0.001$), and “succeed in future IPC” (95% CI = 0.10 to 0.31, $p < 0.001$) (Table 2). Furthermore, regarding challenges with online education relevant to online group work, the mean score for “lack of students’ active learning methods” was lower in 2022 (95% CI = 0.89 to 1.11, $p < 0.001$), whereas “many students have not turned on their camera” (95% CI = −0.68 to −0.44, $p < 0.001$) and “reduced learning outcome” (95% CI = −0.35 to −0.11, $p < 0.001$) were higher in 2022. The responses were stable for “discuss neutral topics,” “learn with, from, and about other students,” “get to know students from other education fields,” “training on digital collaboration,” and “online teamwork is inferior to face-to-face teamwork”.

Table 2. Experiences from autumn 2020 and autumn 2021 ^{a, b}.

	Year	<i>n</i>	Mean	SD	95% CI	<i>p</i> Value
Digital group work with students from other education fields in preservice training is well suited to:						
- discuss neutral topics	2021	979	3.18	1.30	−0.04 to 0.16	0.229
	2022	2190	3.12	1.30		
- discuss sensitive topics	2021	992	3.49	1.32	0.25 to 0.46	0.000
	2022	2189	3.14	1.36		
- learn with, from, and about other students	2021	991	3.71	1.23	−0.04 to 0.15	0.243
	2022	2189	3.65	1.27		
- get to know students from other education fields	2021	974	3.09	1.58	−0.08 to 0.16	0.523
	2022	2187	3.05	1.57		
- training on digital collaboration	2021	988	3.62	1.33	−0.03 to 0.17	0.146
	2022	2183	3.54	1.30		
- simulate IPC with other professions	2021	985	3.69	1.22	0.27 to 0.46	0.000
	2022	2186	3.33	1.31		
- succeed in future IPC	2021	965	3.54	1.34	0.10 to 0.31	0.000
	2022	2189	3.34	1.34		
Challenges with online education relevant for digital teamwork:						
- online teamwork is inferior to face-to-face teamwork	2021	983	3.56	1.54	−0.04 to 0.20	0.19
	2022	2172	3.48	1.58		
- lack of student active learning methods	2021	960	3.38	1.49	0.89 to 1.11	<0.0001
	2022	2108	2.38	1.41		
- many students have not turned on their camera	2021	982	2.75	1.73	−0.68 to −0.44	<0.0001
	2022	2161	3.31	1.60		
- reduced learning outcome	2021	980	2.75	1.69	−0.35 to −0.11	<0.001
	2022	2163	2.98	1.51		

^a The participants could respond on a scale ranging from 0 to 5 (where 0 means “Completely Disagree” and 5 means “Completely Agree”). ^b The questions were non-mandatory, and the number of responding students varied for the different variables. Abbreviations: IPC = interprofessional collaboration, CI = Confidence interval, SD = Standard deviation.

3.4. After IPL Course Consisting of Two Seminar Days in January 2021 and January 2022

Compared to 2021, lower mean scores were found in 2022 for “discuss sensitive topics” (95% CI = 0.10 to 0.37, $p = 0.001$), “get to know other students from other education fields” (95% CI = 0.12 to 0.43, $p < 0.001$), and “simulate IPC with other professions” (95% CI = 0.07 to 0.34, $p = 0.003$) (Table 3). Moreover, in 2022, lower means were found for “lack of student active learning methods,” “many students have not turned on their camera,” and “reduced learning outcome” (all $p < 0.001$).

Table 3. Experiences after an interprofessional learning course delivered in January 2021 and January 2022 (1–2 days of seminars) ^{a, b}.

	Year	<i>n</i>	Mean	SD	95% CI	<i>p</i> Value
Digital group work with students from other education fields in preservice training is well suited to:						
- discuss neutral topics	2021	1519	3.15	1.314	−0.02 to 0.25	0.084
	2022	559	3.03	1.48		
- discuss sensitive topics	2021	1537	3.15	1.36	0.10 to 0.37	0.001
	2022	559	2.91	1.47		
- learn with, from, and about other students	2021	1542	3.49	1.40	−0.07 to 0.21	0.309
	2022	558	3.42	1.46		
- get to know students from other education fields	2021	1542	3.40	1.53	0.12 to 0.43	0.000
	2022	556	3.13	1.69		
- training on digital collaboration	2021	1538	3.59	1.35	−0.05 to 0.21	0.236
	2022	558	3.51	1.42		
- simulate working life-relevant IPC	2021	1550	3.34	1.35	0.07 to 0.34	0.003
	2022	558	3.13	1.55		
- succeed in future IPC	2021	-	.	.		
	2022	557	3.14	1.55		
Challenges in online education relevant to digital group work:						
- online teamwork is inferior to face-to-face teamwork	2021	1528	3.00	1.67	−0.32 to 0.01	0.06
	2022	544	3.15	1.69		
- lack of student active learning methods	2021	1512	2.79	1.49	0.43 to 0.73	<0.0001
	2022	541	2.21	1.63		
- many students have not turned on their camera	2021	1467	2.32	1.77	0.21 to 0.63	<0.001
	2022	548	1.86	1.84		
- reduced learning outcome	2021	1538	2.74	1.59	0.13 to 0.45	<0.001
	2022	543	2.45	1.66		

^a The participants could respond on a scale ranging from 0 to 5 (where 0 means “Completely Disagree” and 5 means “Completely Agree”). ^b The questions were non-mandatory, and the number of responding students varied for the different variables. Abbreviations: IPC = interprofessional collaboration, CI = Confidence interval, SD = Standard deviation.

3.5. Comparison Pre-Post

We compared the responses from autumn 2020 and 2021 to the responses after the IPL courses in a pre–post design. Although most mean post-scores were lower than the pre-scores, all mean scores related to breakout rooms as a learning tool were higher than score 3, even in 2022 when these students had experienced nearly two years of pandemic education (Table 4). The variables that did not vary pre–post were “discuss neutral topics” ($p = 0.63$), “training on digital collaboration” ($p = 0.95$), and “lack of student active learning methods” ($p = 0.25$).

Table 4. Differences between the students' responses in autumn 2020 and 2021 (pre) and January 2021 and 2022 (post) in Proportion of Agreeing Students ^{a, b}.

	Pre/ Post	<i>n</i>	Mean	SD	95% CI	<i>p</i> Value
Digital group work with students from other education fields in preservice training is well suited to:						
- discuss neutral topics	Pre	3169	3.14	1.30	−0.06 to 0.09	0.63
	Post	2078	3.12	1.37		
- discuss sensitive topics	Pre	3181	3.25	1.35	0.09 to 0.24	<0.0001
	Post	2096	3.09	1.40		
- learn with, from, and about other students	Pre	3180	3.67	1.26	0.13 to 0.28	<0.0001
	Post	2100	3.47	1.41		
- get to know students from other education fields	Pre	3161	3.06	1.58	−0.35 to −0.18	<0.0001
	Post	2098	3.33	1.58		
- training on digital collaboration	Pre	3171	3.57	1.31	−0.07 to 0.07	0.95
	Post	2096	3.57	1.37		
- simulate IPC	Pre	3171	3.4	1.29	0.08 to 0.23	<0.0001
	Post	2108	3.28	1.41		
- succeed in future IPC	Pre	3154	3.40	1.34	0.14 to 0.39	<0.0001
	Post	557	3.14	1.53		
Challenges with online education relevant for digital teamwork						
- online teamwork is inferior to face-to-face teamwork	Pre	3155	3.51	1.57	0.38 to 0.56	<0.0001
	Post	2072	3.04	1.67		
- lack of student active learning methods	Pre	3068	2.69	1.51	−0.04 to 0.14	0.25
	Post	2053	2.64	1.55		
- many students have not turned on their camera	Pre	3143	3.14	1.67	0.85 to 1.04	<0.0001
	Post	2015	2.19	1.80		
- reduced learning outcome	Pre	3143	2.91	1.58	0.16 to 0.34	<0.0001
	Post	2081	2.66	1.61		

^a The participants could respond on a scale ranging from 0 to 5 (where 0 means “Completely Disagree” and 5 means “Completely Agree”). ^b The questions were non-mandatory, and the number of responding students varied for the different variables. Abbreviations: IPC = interprofessional collaboration; pre = before mandatory participation in an interprofessional learning course; post = after mandatory participation in an interprofessional learning course, CI = Confidence interval, SD = Standard deviation.

Stratified by Education and Year of Study: Pre–Post Comparisons

To explore any differences between the means from the three educational groups and the year of study (data from all four datasets combined), we performed an ANOVA test (Table 5). For teacher education, statistical differences were found for three variables ($p < 0.001$) and borderline differences for two variables ($p < 0.05$). For these five variables, we thereafter performed an independent t-test to compare the difference between the means of the two educational groups separately. The observed results showed that most of the differences were attributable to differences between teacher education students and health students. For example, the teacher education students agreed to a larger extent with the statements “discuss sensitive topics” ($p = 0.0001$), “many students have not turned on their camera” ($p < 0.0001$), and “reduced learning outcome” ($p = 0.002$). Regarding the differences according to year of study, overall, inverse associations were found for third-year students.

Table 5. Differences between teacher ($n = 2320$), social ($n = 996$), and health ($n = 2096$) students and between first- ($n = 2855$), second- ($n = 1551$), and third- ($n = 1006$) year students ^{a, b}.

ANOVA		Independent <i>t</i> -Test		
		Education vs. Social	Education vs. Health	Social vs. Health
Digital group work with students from other education fields in preservice training is well suited to:				
discuss sensitive topics	<i>p</i> < 0.001	<i>p</i> < 0.0001 (Teacher higher)	<i>p</i> = 0.001 (Teacher higher)	
get to know students from other education fields	<i>p</i> = 0.02		<i>p</i> = 0.001 (Health higher)	
succeed in future IPC	<i>p</i> = 0.02		<i>p</i> = 0.013 (Health higher)	<i>p</i> = 0.02 (Health higher)
Challenges with online education relevant to digital teamwork				
many students have not turned on their camera	<i>p</i> < 0.0001	<i>p</i> < 0.0001 (Teacher higher)	<i>p</i> < 0.0001 (Teacher higher)	<i>p</i> = 0.02 (Health higher)
reduced learning outcome	<i>p</i> = 0.007		<i>p</i> = 0.002 (Teacher higher)	
ANOVA		First vs. second year students	First vs. third years student	Second vs. third year students
Digital group work with students from other education fields in preservice training is well suited to:				
discuss neutral topics	<i>p</i> < 0.0001	<i>p</i> < 0.001 (first higher)	<i>p</i> < 0.001 (first higher)	<i>p</i> = 0.05 (second higher)
discuss sensitive topics	<i>p</i> < 0.001	<i>p</i> < 0.001 (first higher)	<i>p</i> < 0.001 (first higher)	<i>p</i> = 0.04 (second higher)
learn with, from, and about other students	<i>p</i> < 0.001	<i>p</i> < 0.001 (first higher)	<i>p</i> < 0.001 (first higher)	<i>p</i> < 0.001 (second higher)
get to know students from other education fields	<i>p</i> < 0.001	<i>p</i> < 0.001 (first higher)	<i>p</i> < 0.001 (first higher)	<i>p</i> = 0.003 (second higher)
training on digital collaboration	<i>p</i> < 0.001	<i>p</i> < 0.001 (first higher)	<i>p</i> < 0.001 (first higher)	<i>p</i> = 0.002 (second higher)
simulate IPC	<i>p</i> < 0.001	<i>p</i> < 0.001 (first higher)	<i>p</i> < 0.001 (first higher)	<i>p</i> = 0.03 (second higher)
succeed in future IPC	<i>p</i> < 0.001	<i>p</i> < 0.001 (first higher)	<i>p</i> < 0.001 (first higher)	<i>p</i> = 0.01 (second higher)
Challenges with online education relevant to digital teamwork				
lack of student active learning methods	<i>p</i> < 0.001	<i>p</i> < 0.001 (first higher)	<i>p</i> = 0.02 (third higher)	<i>p</i> = 0.05 (second higher)
many students have not turned on their camera	<i>p</i> = 0.03	Ns	<i>p</i> = 0.009 (first higher)	Ns

^a The participants could respond on a scale ranging from 0 to 5 (where 0 means “Completely Disagree” and 5 means “Completely Agree”). ^b First = first-year student; second = second-year student; Third = third-year student. Abbreviations: ANOVA= Analysis of variance; IPC = interprofessional collaboration; pre = before mandatory participation in an interprofessional learning course; post= after mandatory participation in an interprofessional learning course.

4. Discussion

The major finding of this study based on responses from more than 5000 Norwegian professional students in higher education is that the study is supportive of breakout rooms

as a useful learning resource. Overall, these students agreed that they “learned with, from, and about other students”. Novel findings include different responses from teacher education and health students, as teacher students agreed to a larger extent that a breakout room is a suitable platform for team-based discussions of sensitive topics, whereas health students agreed to a larger extent that such pre-service training would lead to better future IPC. Collectively, this study suggests that digital group work may be a valuable arena for training in generic skills as well.

4.1. Discussion of Sensitive and Neutral Topics

The students were more divided and reluctant regarding training on discussing sensitive topics than neutral topics in the breakout rooms. Interestingly, teacher education students had higher mean scores for sensitive topics than health students. A novel finding of this study is that teacher education students agreed that breakout rooms serve as a suitable platform for training on discussing sensitive topics. These findings are in agreement with studies that have shown that teachers claim they lack competence and confidence and that they experience uncertainty about their role concerning pupils with experiences of domestic violence [17,18,76,77]. Teacher education study programs lack a curriculum developed for vulnerable children and children at risk [20,21,28,64,65,78–92]. Teachers are mandated to report child maltreatment, yet some teachers are reluctant to make such a report [93]. The teachers observe children and young people daily. Our study may, thus, be interpreted as teacher education students signaling that they need training on discussing sensitive topics targeting children, young people, and their families; however, the third-year students were the least positive towards discussing sensitive topics in breakout rooms. Due to the gradual enrollment in study programs, the teacher education students dominated in the IPL groups among the third-year students, which may have affected our results. Reluctance may also be due to being uncomfortable in general training to discuss sensitive topics related to children rather than being uncomfortable training to discuss sensitive topics in the online mode compared to face-to-face. The finding that increasing age is associated with higher scores may reflect increased self-confidence with increasing age.

The pandemic increased the risk of child abuse [24]. Internationally, digital education initiatives involving interconnected sectors of professionals working with children and families have been launched to prevent and to address child maltreatment, such as ERICA (Stopping Child Maltreatment through Pan-European Multiprofessional Training Program) training [30]. Pre-service training in a safe online environment with peers is, therefore, in agreement with the needs of society, both nationally [21,22,94,95] and internationally [24,30].

4.2. “To Learn with, from, and about Other Students”

Overall, across age, year of academic study, and education, these students responded that they “learned with, from, and about other students”. This is highly supportive of IPL [39,96] and is in agreement with the smaller-sized and lesser complex IPL studies in breakout rooms [13,14,97]. We suggest that the lower mean score in 2022 merely reflects “Zoom fatigue” after nearly two years of online education due to the pandemic.

The oldest students (both in terms of age in years and years of study) reported that they learned the least “with, from, and about” other students. We suggest that mature students have a higher readiness for IPL than younger students, but they may also be more focused, more secure in themselves, and more independent. Although the COVID-19 pandemic interrupted their education, the third-year students had received practical training in welfare services. During practical training, they may have experienced IPC targeting older end users and with different challenges. One explanation may also be that the students who took the IPL course in their third year of study did not receive as much practical training in interprofessional interactions as they experienced from the first to the second years of study.

Due to the study programs being a mixture of small and large programs, some IPL groups may have been perceived as professionally unbalanced, or perhaps too many professions were included. Some studies involving IPL activities across five or more healthcare disciplines reported that the results were hindered by too many disciplines working on a single activity [98]. Reducing the number of disciplines within each IPL team could increase student engagement and improve the interprofessional experience [13,98]. In IPC, rarely all professionals are included, therefore, IPL must mirror this to be credible [98]. IPL is difficult even within only health education study programs [31]. Thus, the success of IPL is also dependent on the relevance of the topics being included to the program involved. Some students may have given negative responses because the tasks appeared unrealistic or because there was an imbalanced group composition.

4.3. *“Get to Know Students from Other Educational Fields”*

The similar pre-responses in 2020 and 2021 were expected, because even in small study programs, it may have been difficult to get to know other students during this period, which is due to the pandemic measures. The students are educated in educational silos, and bringing them together in online IPL groups for seminars lasting two days obviously implies that they meet students from other study programs. Thus, it was to be expected that they had higher scores after the IPL course. The decreased means in 2022 may be explained by the timing; in 2021, lockdown measures were still active, whereas they were removed in 2022.

4.4. *Relevance for Future IPC*

The health students agreed to a larger extent than the teacher education students that breakout rooms are well-suited for pre-service IPC training. Digital training in IPL is more widespread in the health subjects at our university, and we suggest that this explains why the health students had greater confidence that digital training would result in better IPC. Health, social, and teacher education students may have different associations with the basic terms used in IPL/IPC [72], which may also have influenced the results. These results suggest that regardless of IPL group work being digital or face-to-face, students from different study programs may have different preparedness for IPL and, thereby, different attitudes, learning outcomes, etc.

4.5. *Challenges with Online Education Relevant to Online Group Work*

These professional students reported challenges to online education and digital group work, which have also been reported from students attaining other study programs, such as language and science, technology, engineering, and mathematics (STEM) study programs [9,10,56,57,99–102]. Among all students combined, there was a slightly higher preference for face-to-face teamwork instead of online group work, but the older students seemed to prefer online group work. This may be due factors such as eliminating the need for travel, lower costs, a reduced carbon footprint, and reduced stress. Interestingly, the mean scores did not differ between 2021 and 2022, ranging between 3.0 and 3.5. The proportion who scored zero was very low. These results may indicate that the pedagogical benefit of breakout rooms is not used to its full potential.

Between the academic years 2020/21 and 2021/22, interesting changes were observed. Monotonous education due to a lack of the use of student active learning methods seemed to be a smaller challenge in 2022 than in 2021. We realize that some students may have scored zero because they had returned to in-person teaching on campus, leading to an underestimation in 2022; however, the educators most likely had increased their digital skills nearly two years after the first lockdown and, thus, the frequency of the use of online student active learning methods was likely increased.

The group work was student-led with a student active approach. The active learning approach places a greater responsibility on the learner, and studies have shown that students prefer low-effort learning strategies, such as listening to lectures [103,104]. Al-

though all participants should have their cameras on, some students may have turned their cameras off due to shyness or other reasons. A recognized barrier to digital group work is the “black screen” [105]. Students want to be placed into Zoom breakout rooms with familiar peers [10,106,107]. The breakout rooms in the present study consisted of eight pre-fixed students who worked together from 1–2 days. A smaller group size, such as four students, is recommended to provide a better opportunity for inclusive group discussions [10,101,107–110]. During the IPL course, actions were taken concerning the social online learning environment to stimulate a positive atmosphere through various student activities, such as games to get acquainted, an initial session on how to establish a group, making a group contract, and establishing various roles within a group. A supervisor assigned to each IPL group would visit the group at a pre-determined time and could be contacted on demand, which also contributed to a positive social online learning environment. Although they had the opportunity to raise their digital hand for help, they might have been too shy to actively ask for it from the supervisors. Group dynamics is fundamental for learning outcomes in group work [101], and these students might not have been adequately trained on group processes or those involving persons they did not previously know. Although the social component and the learning outcome may be higher when working with familiar peers, these students are trained for future collaboration with unfamiliar colleagues and professionals, vulnerable users, and their next-of-kin.

4.6. Possibilities with Game-Based Learning and Serious Games in Online Group Work

Game-based training is primarily an effective way to train many people at the same time [111,112]. Possibilities related to “serious games” systems, such as Massively Multi-player Online Role-Playing Games (MMORPG) includes an increased learning outcome when students experience satisfaction with the gamified application. Educational escape rooms are team-based games where participants solve puzzles, discover clues, and accomplish tasks, and a way to stimulate and collaboration and team learning [113]. The idea of educational games is that those who do the right things in the games also do the right things in the real world. Gamification is suggested to enhance the core learning activities, but also to help communication, teamwork and knowledge in IPL/IPC settings [114–121].

The benefits of gamification as an educational tool is acknowledged at our university, and in 2022, we piloted the use of a simulation game, RVTS SNAKKEsim [122] which is a simulation of conversations with children. The game is directed at adults working with children and youth in front-line services concerning neglect, violence, and abuse. The game involves the adult carrying out a conversation with different child avatars. By using this simulation, the idea was that the students could step into the role of different adults facing children with challenging childhood experiences, or children who might have been subjected to abuse, violence, or other forms of neglect. The players are trained in different situations, such as how to build trust with the child through conversation, and legislation. The game does not follow a specific method or framework, but is based on a collective knowledge-base about conversations with children, including research-based, experience-based, and user-based [123]. Preliminary evaluations indicate that the game can help adults become safer and take more responsibility by following up on their concerns [122,124]. However, our 2022 pilot showed that this game [122] was not yet suitable in a large scale setting (several thousands of students playing simultaneously at the same time), due to technical problems, in line with Hassan et al. who stated that challenges associated with gamification are mostly related to system performance, complexity, and user testing [125]. Preliminary reports from an ongoing research project “Interview training of child-welfare and law-enforcement professionals interviewing maltreated children supported via artificial avatars” [45,46,125] at our university, have concluded that using realistic child avatars created using a game engine and virtual reality, offers effective training of professionals in law enforcement and child protection service. The aim of that project is to enable the learners to consistently conduct high-quality investigative interviews of children who are alleged victims of sexual or physical violence [45,46,125]. According to the Norwegian

government [2], use of video consultations can help users to feel safer and more in control when in their meeting with the services [2]. The result from the present study is highly supportive of using child avatars in pre-service training among professional students, as the students were, overall, positive to train on talking about both neutral and sensitive topics in the breakout rooms.

4.7. A Learning Resource for Training on Generic Skills

In working life, candidates cannot participate in IPC teams with their cameras off, avoiding contribution, logging on too late, etc. Based on what emerged in the present data, breakout rooms provide a potential arena to practice generic skills, such as communication, collaboration, and inclusion (which is problematized via the “black screens,” among other factors). Generic skills, which cut across all subject-specific skills and core competencies, are required for all students when they graduate [126]. Generic skills cannot be measured, and there is no formal exam. Provided that there is a structure with some basic rules for the group process (such having the camera function on) [10,110], it is possible that breakout rooms are an unused resource for practicing basic generic skills to provide high-quality welfare services.

4.8. Limitations and Strengths

Strengths and limitations of this repeated cross-sectional study have been outlined in detail previously [60–66,127]. In short, our study’s major strengths include the large cohort size, the repeated cross-sectional design, the different educational backgrounds of the participants, the inclusion of students from three different years of study, and the anonymous data collection method.

The response rates were higher than the response rates to the national student survey in Norway (Studiebarometeret) among 74,000 Norwegian students, which was 44% in 2020 and 41% in 2021 [128], and they were higher than those of our cross-sectional studies before the pandemic [60–62], except a low response rate of 11.1% after the IPL intervention in 2022. Greater concerns are a biased response and, in particular, a self-selection bias. Participants with strong opinions in either direction could have responded, but the diversity of our cohort enhances the robustness of our findings. For this study, if students with strong opinions responded (both directions), the average is not affected. Due to gradual enrollment in study programs, the number of third-year students was lower than the number of first-year students; however, even the number of third-year students was close to 1000 students. The situation during data collection was still influenced by the pandemic, and the 2021 cohort responded while under preventive lockdown measures due to the upcoming third wave of infection. In 2022, the educational delivery modes varied (physical, digital, blended, hybrid) among the study programs [53]. Thus, the students who responded were not a homogenous group but had varied experiences.

No translated or validated pre-existing questionnaire exists for the present purpose. One limitation is that we did not pre-test the questions in the studied population prior to use; however, due to time constraints following the lockdown due to the third wave (2021 cohort), it was not possible to perform pre-testing or validation of the questions. Because we wanted to perform repeated measurements, the questions were kept stable due to the repeated cross-sectional design. The complexity was high, with different curricula and inclusion of three different years of study. Different formulations of these questions may not have been more precise or relevant with respect to all the study programs. Nevertheless, we do not think that this affects our major findings.

4.9. Future Studies

The cross-sectional design is useful for the generation of hypotheses. We suggest an approach using open-ended responses in qualitative interviews to obtain knowledge and understanding about the optimal online learning environment for breakout rooms among professional students. In particular, given that certain sensitive topics are difficult

to discuss [49,76], we suggest exploring the impact of “many students have not turned on their camera” in breakout rooms as well as the different uni-professional perspectives. Additionally, other scales and questionnaires, such as the Likert scale [129] and the TeamSTEPPS® teamwork attitudes questionnaire (T-TAQ) [130], is relevant for doing more in-depth research and analysis. The interprofessional collaborative competency attainment survey (ICCAS) has been translated and validated into Norwegian [131]. However, ICCAS primarily targets health care. Future studies could, therefore, explore the validity of ICCAS in complex IPL settings, such as INTERACT. Torsvik et al. [132] translated into Norwegian and validated the original Readiness for Interprofessional Learning Scale (RIPLS) to measure the efficacy and feasibility of a structured collaborative learning activity. They reported on substantial ceiling effects, and suggested that even previously validated questionnaires such as RIPLS may lose their applicability over time and require revision [132]. Finally, we suggest exploring challenges and opportunities related to game-based learning in breakout rooms.

5. Conclusions

We conclude that a breakout room is a suitable alternative to face-to-face IPL, including training on discussing challenging sensitive issues. Successful IPL training requires sufficient attention to the social learning environment in the breakout rooms. Although the students from different programs did not agree on the suitability of breakout rooms for preservice training on working life-relevant IPC with other professional groups, or that it would lead to success in future interprofessional collaboration, the relatively high mean scores hold promise for pre-service training in digital breakout rooms. Overall, these students agreed that they “learned with, from, and about other students. Collectively, this study suggests that digital group work may be a valuable arena for training in generic skills as well.

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