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ORIGINAL RESEARCH

Blending Online and In-Person Seminars to Strengthen Clinical Placement Learning in Physiotherapy Education

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Introduction: Digital technology continues to reshape health professions education, yet little is known about the relative effectiveness of synchronous online versus in-person collaborative learning in strengthening clinical placement experiences for physiotherapy students. This study examined physiotherapy students' expectations, perceptions, and preferences regarding online and in-person small-group seminars.

Methods: A quasi-randomized crossover design was used in two course iterations (I-1, I-2) involving 106 final-semester physiotherapy students. Participants were split into groups of 5–6 to engage in ten seminars discussing complex clinical cases drawn from their prior placements, with half of the groups starting online and later switching to in-person, and vice versa. A third iteration (I-3; n=77) alternated between online and in-person sessions following two initial in-person seminars. Data were gathered through anonymous electronic surveys containing Likert-scale ratings and open-text responses. Quantitative data were analyzed with t-tests and chi-square tests; qualitative comments underwent thematic analysis.

Results: Mid-course evaluations revealed no significant differences in perceived effectiveness when students had experienced only one format. By the course's end, however most students ultimately favored in-person seminars for richer social interaction (I-2: 80%; I-1: 38%; I-3: 54%), although they consistently recognized online sessions as time-efficient and flexible. Notably, students' initial expectations (I-1 and I-2) strongly mirrored their final evaluations. Qualitative feedback highlighted that in-person seminars provided higher-quality social interactions, while online seminars offered greater efficiency and flexibility. Most students indicated a preference for a blended format in future courses.

Conclusion: By blending in-person and online sessions, collaborative seminars can give physiotherapy students the best of both worlds for their clinical placement learning. Meeting in-person fosters richer discussions and deeper social connections, while online sessions offer efficiency, flexibility and help students develop essential digital competence. Together, these formats create a more adaptable, forward-looking learning environment that aligns with the evolving demands of professional practice.

Keywords: collaborative learning, online learning, health professions education, group seminars, physiotherapy education, clinical placement

Introduction

Digital technology is rapidly transforming higher education. According to the European Commission, digital technologies can democratize education services, making quality learning accessible "anywhere by anyone".[1,2] This enhanced flexibility benefits individuals who cannot relocate or attend in-person classes, thereby expanding access to more diverse populations, adult learners, rural or remote communities, and international students.[1] Furthermore, digital platforms can incorporate interactive elements, real-time feedback, and individualized learning pathways, thus making higher education more engaging and tailored to individual student needs.[3]

Today's higher education students are generally well-versed in using digital tools and increasingly expect institutions to capitalize on the opportunities offered by digital platforms. In physiotherapy education, digital technology has been

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employed in various formats, primarily to improve learning outcomes and foster an active learning environment.[4] However, using digital platforms for teaching, including fully online learning, also poses substantial challenges. The platforms are often expensive, require robust technological support, trained users, and demand high level of self-regulation from students.[5,6] Students may also experience a loss of motivation, miss the social aspect of meeting in person,[7] and be distracted from the online learning by other "more interesting" activities.[8] While some evidence suggests that online learning performs similarly or better than traditional approaches for theoretical knowledge, hands-on, interactive training might still be more effective in person.[9–11] Moreover, outcomes can vary significantly depending on factors like technological infrastructure, student motivation, course design, interactivity, and institutional support.[10,11]

Student-active teaching methods that heavily rely on effective social communication, such as in case of collaborative learning[12–14] can be especially challenging to apply in online environment. In health professions education, collaborative learning has been a popular teaching approach to stimulate reflection over complex clinical situations, improve intra- and inter-team communication, and hone clinical skills.[15–18] Yet, facilitating genuine collaboration and in-depth discussions can be more challenging online than in face-to-face setting because of limited nonverbal cues and higher communication barriers.[19,20]

Although collaborative learning is widely used in health professions educations, only a limited number of studies directly compare the applicability and effectiveness of online vs in-person formats. Some research on asynchronous online collaboration indicates that students' test performance may be unaffected by delivery format, though students often prefer in-person discussions.[21,22] A few studies comparing synchronous online collaboration with in-person format similarly find no major differences in learning outcomes but report issues such as lower social engagement and reduced sense of community.[23–25] The diverse methodological approaches and varied participant groups make it difficult to form definitive conclusions about the strengths and weaknesses of online collaborative learning, particularly in physiotherapy or other health professions educations.

The present study aims to address this gap in a physiotherapy education context, where clinical placements and collaborative problem-solving are integral to the curriculum.[26] Motivated by experiences with online alternative clinical placements during COVID-19 pandemic,[27] we investigate whether synchronous online group seminars can effectively supplement or replace in-person collaboration when students pursue the same assignments and learning outcomes. By having each participant engage in both formats, this study provides a direct comparison. Specifically, we seek to answer three questions:

1. What are physiotherapy students' expectations about the effectiveness of collaborative learning in an online format?
2. How do they evaluate the learning outcomes or additional benefit of online group seminars?
3. To what extent do the students view the potential of online formats to supplement or replace in-person formats in future iterations of the course?

Materials and Methods

Context of the Study

The six-week course Complexity and Diversity in Physiotherapy Practice (FYB3000) is an obligatory part of bachelor in physiotherapy program at Oslo Metropolitan University. It takes place during the sixth and last semester of physiotherapy studies. During the course, students deliberate with their peers over complex problems, cases, and situations they experienced during previous clinical placements. Discussions occur in small group seminars using collaborative learning principles, where students are expected to create new knowledge and develop the ability to reflect on complex problems that physiotherapists face in their professional lives. In addition to group seminars, students can also attend non-mandatory lectures addressing various topics relevant to FYB3000 learning objectives (see Supplementary Materials). After the course, each student undergoes an individual oral exam, where they give a 10-minute PowerPoint presentation discussing and reflecting on complex clinical cases in light of FYB3000 learning objectives.

Group Seminars

Students are divided into seminar groups of 5–6 participants, ensuring a diverse range of practice experiences in each group. Seminars are conducted twice a week, with students participating in a total of 10 seminars. Although each seminar is allocated three hours, students have the autonomy to manage their time within each session.

Before the seminar, a student within each seminar group is responsible for preparing a case to be discussed. The case is based on specific experiences from clinical placements and needs to align with FYB3000 learning objectives. It encompasses a situation description, discussion topics, and relevant supplementary literature. The case is subjected to approval by a supervisor and is distributed to other students in the seminar group at least one day prior to the scheduled seminar. Overall, every student contributes two cases, each discussed during two separate seminars. While a supervisor does not take part in group seminars, one of the supervisors is always available if students wish to involve them in a discussion. In practice, this opportunity is rarely exercised by the students.

Data Collection

All students enrolled in the FYB3000 course were eligible for the participation in the study. Information about the study was provided both in oral and written form. To take part, students had to follow an internet link which would lead to an online questionnaire. A web-based survey tool developed by the University of Oslo (nettskjema.no) was used for this purpose.

Data for this study were gathered during three iterations of the FYB3000 course: Iteration 1 (I-1) and Iteration 2 (I-2) took place during the spring semester of 2023, while Iteration 3 (I-3) was conducted in 2024. A total of 229 students were enrolled in these course iterations. The 2023 courses followed an identical study design; however, the structure of I-3 was modified based on feedback from the previous year.

Data were anonymously collected using electronic forms, encompassing both quantitative and qualitative open-text responses. Specifically, we used quantitative data (eg, Likert-scale ratings) to identify patterns in student perceptions, allowing for comparisons between online and in-person seminar formats. The qualitative data (ie, open-ended comments) provided deeper insights into why students favored a particular format.

For I-1 and I-2, data collection occurred before the course commencement, post completion of five seminars, and at the course's conclusion. Conversely, students in I-3 were only required to fill out a questionnaire at the end of the course.

Iteration 1 and 2

In the spring semester of 2023, a total of 106 physiotherapy students from Oslo Metropolitan University enrolled in the FYB3000 courses and were thus eligible for participation in the study. Sixty students took part in Iteration 1 (I-1) and 46 in Iteration 2 (I-2) of the course. The study adopted a quasi-randomized cross-over trial design as depicted in Figure 1. Initially, students were arranged into seminar groups comprising 5–6 participants each, according to their past clinical placements. Subsequently, half of these groups embarked on online seminars, while the other half commenced with in-person seminars. After the completion of five seminars, the groups transitioned to the alternate seminar format.

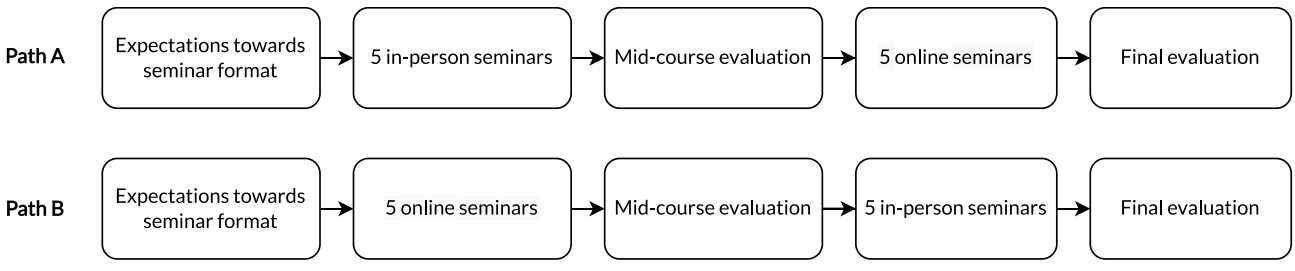

Figure 1 Two alternative study paths during Iterations 1 and 2 of the course Complexity and Diversity in Physiotherapy Practice. In Path A, students completed five in-person seminars, followed by a mid-course evaluation, then transitioned to five online seminars before the final evaluation. Path B reversed the order, beginning with five online seminars and switching to five in-person seminars after the mid-course evaluation. In each path, all participants completed self-report questionnaires at three time points: before the first seminar, after the fifth seminar, and upon course completion.

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Data were collected at three time-points. Prior to the commencement of the course, students received information about learning objectives and activities including online and in-person seminar formats. Using electronic forms they were to indicate: "Which seminar format will you learn the most from?". They could choose between in-person seminars, online seminars, or express that both formats would be equally effective.

After the completion of five seminars (mid-course evaluation), students were asked to rate the seminar format they attended by answering: "Overall, how well did this particular seminar format function as a learning arena in relation to the Fyb3000 learning outcomes?". An 11-point Likert scale was used, where 0 stood for "very badly", 5 for "moderately well", and 10 for "very good".

At the end of the course, having experienced both seminar formats, students were asked to choose which format they found most effective as a learning arena responding to following statement: "When I evaluate the learning process and the learning outcomes throughout the entire course, I find that:" a) the in-person group seminars have provided the greatest benefit; b) the online group seminars have provided the greatest benefit; c) both seminar formats have provided about the same benefit". They were also to answer: "If I could choose the seminar format in a similar course, I would prefer that: a) all the seminars were conducted in person; b) all the seminars were conducted online; c) a blend of online and in-person seminars". Finally, students had also a choice of giving open-ended free text comments about seminar formats.

Iteration 3

The third iteration of the course was conducted during the spring semester of 2024, involving 77 students. Iteration 3 (I-3) retained the same content and learning objectives as Iterations 1 and 2. However, in response to student feedback from the previous year, the first two group seminars were conducted in-person to facilitate the establishment of working routines within the seminar groups. Subsequently, online and in-person seminars were alternated. In total, students participated in six in-person and four online seminars. The seminar content, time frame, and learning objectives remained unchanged.

Data in I-3 were collected only at the end of the course. Students evaluated on an 11-point Likert scale seminar formats by answering the question: "Overall, how well did the in-person seminar format function as a learning arena in relation to the Fyb3000 learning objectives?", where 0 stood for "very badly", 5 for "moderately well", and 10 for "very good". The same question was asked about an online format. Similarly to I-1 and I-2 they were also asked which seminar format they would choose if they were to attend a similar course in the future. Students also had an option of giving open-ended free text comments about seminar formats.

Data Analysis and Ethics

All data were anonymously gathered using electronic forms. After checking for key assumptions, an independent-sample *t*-test was used to compare rating scores of in-person and online seminars during the mid-course evaluation (I-1 and I-2) when half of the students had experienced only online seminars and the other half only in-person seminars. A paired sample *t*-test was used to compare ratings of in-person and online seminars given by I-3 students who evaluated both formats independently at the end of the course. A chi-square test was used to evaluate differences in proportions. However, if the number of expected cell counts was fewer than 5, the Fisher exact test was chosen as the primary statistic. Thereafter, a Z-test of proportion was applied if there were more than two categories (eg, in-person, online, and mixed format) to explore which proportions differed significantly from each other. SPSS version 28 statistical software package was used for quantitative analysis. The significance level was set to $p < 0.05$. Due to variations in response patterns and differences in the design among the course iterations, findings are presented independently for each iteration.

The analysis of open ended free-text answers was conducted according to a stepwise thematic analysis, as presented by Braun and Clarke.[28,29] The open-ended responses were carefully read to gain an understanding of the general patterns. Thereafter initial codes were identified, which were later organized into broader themes.

The study received approval from the Norwegian Agency for Shared Services in Education and Research for the management of personal data (Approval Number: 662693). Study was evaluated and approved by Institute of Rehabilitation Science and Health Technology, Department of Physiotherapy at Oslo Metropolitan University, ensuring

compliance with national[30] and institutional ethical research standards (https://ansatt.oslomet.no/en/research-ethics). In accordance with these standards, as a non-interventional, non-medical study, it did not require evaluation by an external ethics committee. All participants provided their informed consent including permission to publish anonymized quotes and responses before the study commencement.

Results

Students' Expectations

Out of the 60 students participating in I-1, 47 (78%) completed the questionnaire. Of these, 25 students (53%) expected in-person seminars to be most effective, 19 students (41%) anticipated both seminar formats to be equally effective, while a minority of three students (6%) expected online seminars to be the most effective.

Similarly, 41 out of 46 students (89%) in I-2 completed the questionnaire. Thirty-two students (78%) expected in-person seminars to be most effective, eight students (20%) expected both seminar formats to be equally effective, and only one student (2%) expected online seminars to be the most effective.

A Fisher exact test was conducted to examine whether I-1 and I-2 differed in their expectations towards effectiveness of seminar formats. Students in I-2 had higher expectations towards the effectiveness of in-person seminars versus those in I-1, whereas higher proportion of students in I-2 expected both formats to be equally effective ($p = 0.043$).

Midcourse Evaluation

In Iteration 1, students attending online seminars rated them at 6.35 (SD 1.83), while those participating in in-person seminars rated them at 6.74 (SD 1.58). The mean difference of 0.39 was not statistically significant ($p=0.46$), as determined by an independent sample *t*-test.

In Iteration 2, students attending online seminars rated them at 6.89 (SD 1.63) and those participating in in-person seminars rated them at 7.74 (SD 1.19). The mean difference of 0.85 was not statistically significant ($p=0.08$).

Final Evaluation in Relation to Expectations

At the end of the course, having experienced both seminar formats, students were asked to choose which format they found most effective as a learning arena. A total of 45 students (75%) in I-1 and 35 students (76%) in I-2 completed the questionnaires. A Fisher exact test was conducted to examine whether I-1 and I-2 differed in their opinions. Students in I-2 evaluated in-person seminars as the most effective alternative significantly more frequently than those in I-2 ($p < 0.001$). Students' final evaluations seemed to mirror their pre-course expectations. Figure 2 shows a graphical representation of these findings.

Iteration 3

Fifty-seven out of 77 students (74%) completed the questionnaires. The in-person seminar format received a mean score of 8.11 (SD 2.20), while the same students gave a mean score of 6.30 (SD 2.41) for the online seminar format. The mean score difference of 1.81 was statistically significant ($p<0.001$) as evidenced by a paired sample *t*-test.

To align the format evaluation from I-3 with the final format evaluations from I-1 and I-2, individual score differences between seminar formats in I-3 were converted into categorical data. If a student evaluated the two seminar formats within a one-point difference, the effectiveness of the seminar formats was regarded as equal. Based on this categorization, none of the students evaluated online seminars as more effective, 26 students (46%) evaluated them as equally effective, while 31 students (54%) chose in-person seminars as the most effective format.

Choosing a Future Seminar Format

At the conclusion of all three course iterations, students were asked to select their preferred seminar format if they were to participate in a similar course in the future. They could choose among in-person, online, or a mix of both formats. A Fisher exact test ($p = 0.005$) showed that I-1 and I-3 students chose mix and online seminar formats significantly more

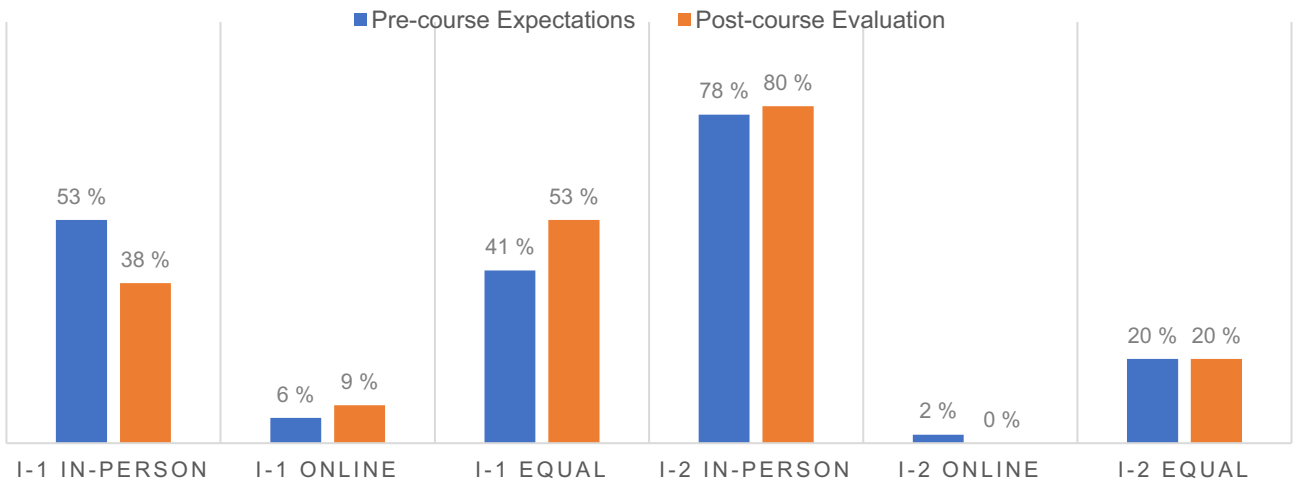

Figure 2 Comparing Students' Pre-Course Expectations and Post-Course Evaluations of Seminar Formats. I-1 and I-2 denote two iterations of the course. The percentages represent the proportions of students in I-1 and I-2 who chose a specific alternative. "In-person", "online", and "equal" illustrate participating students' pre-course expectations towards the effectiveness of a seminar format and their post-course evaluations of it. "Equal" implies that students perceive both formats as equally effective. The findings highlight a close relationship between students' pre-course expectations and their post-course evaluations of the seminar format. Since all answers were collected anonymously the relationships represent group levels.

frequently than those in I-2 (Figure 3). Overall, out of 137 participating students 66 prefer a mix format, 62 an in-person format and 9 would choose an online seminar format.

Open-Ended Free Text Comments

At the conclusion of each course iteration, students had the option to provide free text comments about the seminar formats in their questionnaires. The feedback from all three iterations was collectively analyzed and categorized according to thematic analysis principles. In total, 36 out of the 137 students (26%) who completed the questionnaires chose to comment on the seminar formats. Following thematic analysis, six initial codes were identified: 1) Better discussion flow during in-person seminars; 2) More in-depth discussions during in-person seminars; 3) Challenges in Communication using Zoom, 4) Efficiency of online seminars; 5) Both formats were equally effective; 6) Advantages and disadvantages of both formats. The first three codes were then combined into a broader theme "Higher quality of

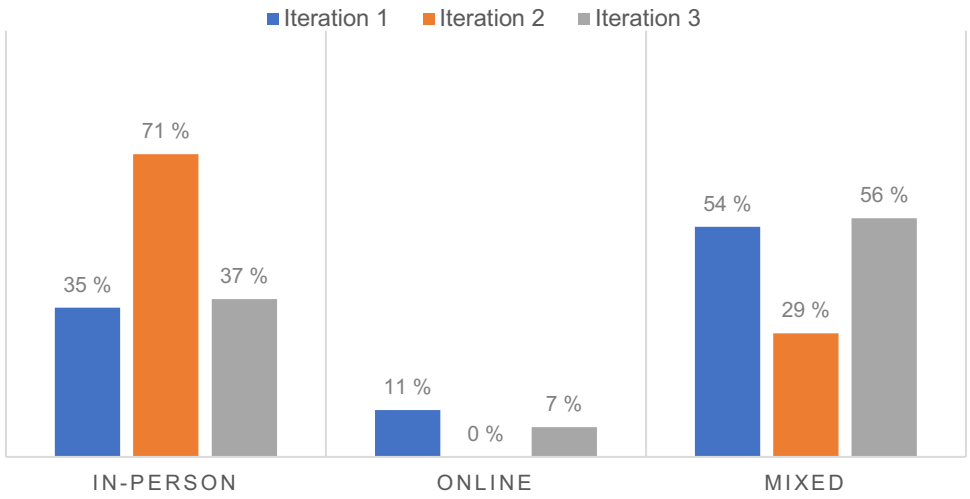

Figure 3 Students' format preferences for future participation in a similar course. Mixed' indicates a preference for a blend of online and in-person seminars. The percentages represent the proportions of students choosing a specific alternative out of the 45 students who completed the forms in Iteration 1, the 35 students in Iteration 2, and the 57 students in Iteration 3.

Table 1 Emergent Themes and Examples of Students' Comments on Group-Seminar Formats

Themes	Example Citations
Higher quality of discussions during in-person seminars (17 comments)	…It is much easier to talk, discuss, and reflect in person…. We can also understand each other better as we can interpret body language and tone more effectively… …Everyone was more talkative and reflective around each other's case studies in the in-person seminars. In the digital setting, it was easier for silence to occur, or for people to avoid talking…
Online seminars are more efficient (4 comments)	…I found that we were more efficient and focused during the online seminars…in-person seminars are more pleasant, but perhaps slightly less efficient… … Digital group seminars offer the advantage of allowing participation from different locations…
Both formats worked equally well (9 comments)	… Both in-person and online approaches worked well… … I gained "approximately" the same amount from both digital and physical seminar formats…
Advantages and disadvantages with both seminar formats (4 comments)	…Both have advantages and disadvantages, and I believe it's important to implement digital options. It saves time, resources and is an important alternative for many both now and in the future. The physical part also has its importance for social interaction and also makes it easier to communicate with body language and directly…

Notes: Students had an opportunity to comment on the seminar format during the final course evaluation. Comments were given in form of written open-ended free text answers.

discussions during in-person seminars". In total four themes representing broader patterns in data were generated (Table 1).

Discussion

The study's objective was to examine the potential of online collaborative learning as compared to its in-person counterpart. The findings suggest that while the majority of students prefer in-person seminars when given a direct choice between the two formats, the online alternative is a viable option with its distinct strengths and weaknesses. Indeed, the majority of students participating in I-1 and I-3 would opt for a blend of both formats if they were to participate in a similar course in the future. Another significant finding from this study implies that students' prior expectations towards a learning activity might influence their subsequent evaluation of it.

In this section we discuss the importance of students' expectation towards a learning activity as well as strength and weaknesses of online and in-person collaborative learning. We argue that incorporating both formats in the same study course might be advantageous to maximize learning outcomes, while simultaneously enhancing students' digital competence.

Importance of Expectations

Students enrolled in I-1 and I-2 anticipated that in-person seminars would be more effective for achieving course objectives compared to online seminars. This belief was notably stronger in I-2, where 78% of students expected in-person seminars to be more effective, compared to 53% in I-1. Conversely, 40% of students in I-1 believed that both formats would be equally effective, compared to 20% in I-2. There are no straightforward explanations for these differences, as all participating students were from the same cohort and study program. Previous experiences with peers and small group activities, among other factors, may influence students' attitudes and participation in collaborative learning activities.[31,32] It is also possible that the differences in students' attitudes between I-1 and I-2 are purely accidental.

However, it is important to acknowledge that students' expectations can significantly shape their experience of an activity. Associations between prior beliefs and the experience of an event have been demonstrated in both leisure activities[33] and the benefits derived from a study course.[34] Interestingly, the experience of an event can be more influenced by prior expectations than by objective factors related to the event itself.[33] In a healthcare context, patients' expectations regarding recovery and return-to-work have been shown to be among the most powerful predictors of actual

return-to-work from sick leave, regardless of the type of illness.[35] It is noteworthy that in our study expectations regarding the effectiveness of seminar formats in I-1 and I-2 closely matched students' post-course evaluations.

Considering that attitudes and expectations towards a learning activity can influence the actual experience of it, addressing students' expectations and beliefs prior to the commencement of the course is beneficial. A good starting point is to ensure congruency between learning objectives, learning activities, and the final assessment of knowledge.[36] For senior students, it is also crucial to correlate learning objectives, working methods, and final assessment with the demands of professional life. In this course, this can be accomplished by explicitly linking the presentation of cases from clinical practice to tasks that physiotherapists perform when discussing clinical cases with colleagues and other professionals. Similarly, emphasizing that working independently in small groups, both online and in-person, mirrors the team-working environments that physiotherapists encounter in their professional lives can also be beneficial. Establishing an understanding of these alignments through written information about the course program, and importantly, directly discussing them with the students during the course introduction, may be an effective method to elicit positive expectations and increase motivation.

Effectiveness of Seminar Formats and Student Preferences

Overall, both quantitative and open free-text answers indicate that when directly comparing in-person and online seminar formats in terms of their effectiveness, most students prefer in-person seminars. In their written comments, students expressed that in-person seminars result in more comprehensive discussions, as the nuances of communication are enriched by body language and facial expressions. In-person seminars are also characterized by fewer interruptions and ensure smoother conversation flow. The added social aspect is also appreciated during in-person meetings. These findings align with other research highlighting challenges with communication in the online space, where gestures, eye contact, and other types of non-verbal information are missing, and smooth transitions regarding turn-taking in speaking are difficult to achieve.[19,20]

However, although an online environment may reduce the quality of social interaction, it does not necessarily significantly impact the effectiveness of the learning process. Notably, in the mid-course evaluation, when students in I-1 and I-2 attended only one type of seminar, they rated both formats similarly in terms of their effectiveness. This outcome is consistent with previous studies that found no significant differences in learning outcomes between online and in-person small-group learning formats, despite reduced social engagement online[23–25.] Moreover, students specifically highlighted the advantages of the online format regarding its efficiency and flexibility, such as less time spent on traveling, more efficient discussion of topics during seminars, and the possibility for remote participation. Although in their final evaluations, students assessed the in-person format as more effective, the majority of those attending I-1 and I-3 would still prefer a blend of the two formats if they were to attend a similar course in the future.

Implications and Further Experiences

The decision to implement a mix of in-person and online seminars was initially made for the purpose of this study. However, following our findings, we have continued with the mixed format in the FYB3000 course. This blended approach allows students to experience the strengths and weaknesses of each format, facilitating the transfer of experiences between the two. For instance, creating social structures based on inclusion, openness, and a constructive discussion environment may be more easily achieved in a physical setting. Several students noted the benefit of having an in-person seminar at the course's commencement to establish working routines and group rules, which facilitates their later transfer to the online format.

Conversely, students found the online format to be superior for sharing presentations and digital materials. Reflecting on this, students began to utilize the same digital tools in a physical setting. While they met in person, they organized an online meeting and shared digital materials on laptops during in-person discussions. The use of online meeting tools in a physical setting also allowed students who were ill or unable to attend the seminar to remotely participate in group activities. This was easily implemented as all students in the group had previous experience with online collaboration.

While today's students are native consumers of digital technology, this does not inherently imply a high level of digital competence that can be readily applied to higher education or professional life. In this regard, online seminars

serve to enhance students' digital competence, responding to the call for increased digitalization in education and professional services. The necessity for students to learn to work collaboratively in both physical and online environments reflects the demands they will encounter in their professional lives. As an added benefit, the online format also offers resource savings, as there is no need to provide group rooms for students, fewer staff members are required to facilitate the seminars, and students save time and costs associated with commuting to the university.

In conclusion, the blended seminar format may not only cater to the diverse needs and preferences of students but also foster a flexible learning environment. It aids students in developing essential skills for their future professional careers, enhances their digital competence, and promotes the efficient use of institutional resources.

Strengths And Limitations

While this study provides valuable insights into students' perceptions of online and in-person learning in a collaborative setting, it has limitations. The use of anonymous questionnaires prevented tracking individual students' changes in attitudes and experiences over time. The anonymous format was chosen to facilitate student participation. At our university, student response rates to evaluation forms typically cap at 30%, reducing the overall validity of such assessments. The study presented here had a relatively higher response rate that exceeded 70%.

The evaluation of the seminar formats was based on participating students' perceptions. Such evaluations lack an objective measure of seminar format effectiveness in terms of achieving learning objectives, such as the impact of seminar format on exam grades. The relationship between students' perceptions of quality teaching and their actual learning has been shown to be complex. For instance, a study by Deslauriers et al revealed that students reported better learning outcomes in a course with passive instruction than those in an active learning course. However, the active learning group achieved higher scores on knowledge tests.[37] Although both seminar formats in our study focused on active learning, we cannot definitively conclude if one of the formats was superior in terms of achieving learning objectives.

Conclusion

This study demonstrates that, while most students initially expected in-person seminars to be superior, mid-course evaluations revealed comparable perceived effectiveness between online and in-person formats. By the end of the course, however, in-person seminars were generally preferred for the depth of discussion and richer social interaction. At the same time, many students acknowledged online seminars' efficiency and flexibility, ultimately favoring a blended approach that harnesses the strengths of each format.

An important takeaway is the role of students' expectations in shaping their learning experience. As demonstrated, initial beliefs about the effectiveness of different seminar formats were closely aligned with students' post-course evaluations. Addressing and managing these expectations early in the course, by clearly linking learning objectives and activities to real-world professional practices, can significantly enhance students' engagement and satisfaction.

While this study offers valuable insights, it is limited by its reliance on subjective student perceptions rather than objective measures of learning outcomes and lack of longitudinal data. Future research could benefit from assessing the impact of different seminar formats on concrete educational achievements, such as exam performance, to better understand their effectiveness in meeting learning goals. Nevertheless, the findings underscore the potential of a blended approach in fostering a flexible, resource-efficient, and future-oriented learning environment that equips students with the skills needed for their professional careers.

Disclosure

The authors report no conflicts of interest in this work.

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