

# Large-Scale Blended Learning Design in an Undergraduate Interprofessional Course in Norway: Students' Perspectives from an Exploratory Study

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## Abstract

*Background:* The purpose of this study was to assess learning outcomes and student satisfaction after participating in a large-scale interprofessional (IPL) blended learning course.

*Methods and findings:* In this cross-sectional study, students from health, social care, and teacher education programs completed two questionnaires. The majority were satisfied with the blended learning approach. The IPL group discussions resulted in learning outcomes that were two times higher than those from traditional instruction, including lectures and assignments. Health and social care students reported lower learning outcomes and satisfaction than teacher education and child welfare students ( $p < 0.05$ ).

*Conclusions:* The study demonstrated the feasibility of the blended learning approach. However, IPL activities that are explicitly inclusive for all students should be created for future courses.

*Keywords:* Blended learning; Interprofessional learning; Health studies; Social studies; Teacher education

## Introduction

An interprofessional collaborative (IPC) team environment minimizes undesirable events, improves teamwork and communication, and most importantly, improves welfare service outcomes [1-3]. Interprofessional learning (IPL) is considered an important pedagogical approach that aims to prepare students for providing services and care in an IPC team environment [4]. IPL is defined as “two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes” [1, p. 13]. In 2020–2021, Norway introduced national requirements on shared learning outcomes via IPL to all health and social care programs [5].

There is considerable use of health and social care services addressing children, young people, and their families in Norway, and the new national requirements also have shared learning outcomes for issues related to children [5]. Challenges relating to modern childhood include obesity, fractured families, internet-related issues,

sickness, and more. Teachers are often the first professionals to encounter challenges that should be dealt with interprofessionally, such as mental and physical health issues [6-8]. Therefore, IPL among students in teacher education, health, and social care programs is important for addressing teamwork, communication, and an understanding of professional roles, especially in pre-service training for early intervention and school-based practice where collaboration is essential [9]. However, the educational trajectories of health, social care, and teacher education harbour different professional identities, cultures, traditions, and syllabuses [10]. The knowledge of potential barriers for shared learning in complex IPL courses is limited, since no prior large-scaled study has published data involving bachelor students from health, social care, and teacher education programs.

Overall, the transformation of a traditional IPL course with plenary lectures for 350 students from health, social care, and teacher education programs [11] at Oslo Metropolitan University (OsloMet) in Norway into an approach using the blended learning format for 1,401 students was well implemented, according to the course supervisors [12]. The purpose of this study was to assess learning outcomes and satisfaction with the same IPL course from the students' perspective. The research questions were:

- What are the students' self-reported learning outcomes from IPL group work on seminar days, individual reading of syllabus, supervision, and the submission of a group assignment?
- What is the students' satisfaction with the blended learning approach?
- What are the differences in students' self-reported learning outcomes according to assignment format, age, and study program?

## Material and methods

### Setting

This study is part of an educational initiative at OsloMet called the Interprofessional Interaction with Children and Youth (INTERACT) project [13]. The project is designed for students from the educational trajectories of health, social care, and teacher education. Through INTERACT, students acquire research-based knowledge about the everyday lives of children and young people, as well as practice cooperating with students from different programs. In this way, the project aims to form the basis for the improved coordination of social services directed at children and young people and their parents and guardians. OsloMet seized the opportunity to make INTERACT a part of the response to the new shared requirements for health and social care education [5].

### Students

In total, 1,401 bachelor students successfully completed the mandatory IPL course in the spring term of 2019 [12]. The students were enrolled in the following study programs: early childhood education and care ( $N = 294$ ), primary and lower sec-

ondary teacher education ( $N = 380$ ), physiotherapy ( $N = 237$ ), Mensendieck physiotherapy ( $N = 57$ ), nursing ( $N = 144$ ), social work ( $N = 123$ ), child welfare ( $N = 100$ ), and occupational therapy ( $N = 66$ ). All of the nursing and 49 percent of the physiotherapy students were second-year students, and the others were first-year students. The nursing students were based at the Kjeller campus, while the others were based at the Pilestredet campus. The enrolled students were divided into 196 pre-defined IPL groups, and each group contained students representing health, social care, and teacher education study programs.

### Blended learning course

The IPL course was integrated as a compulsory requirement in the existing courses in the study program description [12]. In short, the required coursework included participation in two days of seminars, submitting an IPL group work assignment, and self-study. The students worked in IPL groups using a combination of digital learning resources and face-to-face discussions with no plenary activities during the two seminar days. The students reflected on and discussed selected tasks in the IPL groups. It was emphasized that they 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 was a student-centred form of teaching focused on the students’ learning needs [13]. The idea was to build knowledge for the future, and the immediate purpose is to create engagement among the students. Some of the IPL activities included asking groups to discuss a session through, for example, a one-minute paper (a very short, writing activity taking one-minute or less to complete) in response to a question, which prompted students to reflect on their learning activities [15]. The blended learning design was deliberately structured to direct the students to complete learning activities and achieve the learning objectives [16].

At the end of the course, the IPL groups were instructed to submit a group assignment in the form of an academic text (3,000 words), a podcast (10 minutes, mp3 format), or a video (10 minutes, mp4 format). The aim of the group assignment was to link the seminar days, coursework tasks, and the syllabus and increase the learning outcome by actively engaging the students. The assignment instructions to the students were: “Choose one of the four relevant video clips. Briefly describe what you observe in the clip. Choose and discuss a minimum of three academic concepts and use these to analyze and discuss your observations from the video clip. Describe the similarities and/or differences between what the members of the various study programs in your group find interesting in the video clip.” Students had learned about observation during the IPL course and had also solved tasks that resembled the assignment. There were no training sessions or templates for students on how to produce podcasts or videos. Students recorded the podcasts and videos on private phones or university computers.

To run the IPL course [12], 122 rooms had to be made available in nine buildings at the Pilestredet campus. Due to the geographical distance between campuses,

transportation by bus was provided for the students from the Kjeller campus. Staff were posted at all entrances on the first day of the seminars in order to help the students with practical issues. Approximately 100 people (staff, hosts, facilitators, supervisors, and others) were involved with different aspects of the seminar days.

Supervisors ( $N = 64$ ) were recruited from staff ( $N = 36$ ), master's program students ( $N = 8$ ), and professionals working in the field ( $N = 20$ ). They were offered supervision courses and information meetings ahead of the IPL course. Because some supervisors were unable to attend the seminars, facilitators ( $N = 10$ ) visited their IPL groups. All IPL groups received a visit by a supervisor, and supervisors who could not participate during the second day of seminars were asked to meet with their IPL groups after the seminar days. Interaction between the IPL groups and their supervisors was supplemented by email and telephone. Supervisors either passed or failed the group based on the coursework requirements and provided each group written feedback. Since the IPL course was in an innovative phase and assessment was formative, no exams or grades were given. Fewer than five students dropped out of their study programs and, consequently, from the IPL course. Although some IPL groups were told to resubmit the assignment, all assignments were finally approved. The workload was approximately 40 hours and students earned 1.5 credits.

### Evaluation survey

After they completed the seminar days and handed in the assignment, students were invited to complete evaluation questionnaires. The questionnaires were based on earlier questionnaire-based quantitative research using an anonymous self-administered web survey [17]. *Nettskjema* is a Norwegian tool for designing and conducting online surveys with features customized for research purposes. It is easy to use, and the respondents can submit answers from a browser on a computer, mobile phone, or tablet. University colleagues from OsloMet gave feedback on the questionnaire and it was revised accordingly, thus increasing its face validity. The survey included questions focusing on academic content, the use of the blended learning approach in small groups, and practical aspects of the course. The questionnaire asked participants to "rate how much you agree or disagree with the following statements," and responses were scored on a five-point Likert scale ranging from 0 (*never*) to 5 (*to a great extent*). The first questionnaire was provided as an internet link embedded in the Canvas learning management system at the end of the second seminar day, and the second questionnaire was sent to the students by email after the submission deadline in March. Two reminders were sent.

### Analysis

The data were presented as frequencies and percentages. Groups of participants were compared using a  $\chi^2$ -test. All tests were two-sided. Results with  $p$  values of  $< 0.05$  were considered statistically significant. No adjustment was made for multiple hypothesis testing due to the exploratory nature of the study. The statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) v25. For the analyses, the students were stratified by age (using 25 years as the cut-off between groups) and study program. Early childhood education and care, primary and lower sec-

ondary teacher education, and child welfare were grouped together as “teacher education and child welfare,” since they only target children and young people as end users, and physiotherapy, Mensendieck physiotherapy, nursing, social work, and occupational therapy were grouped together as “health and social care,” as they target all ages as end users.

**Ethics**

All participants gave their informed consent. Participation in the study was voluntary and anonymous. The questionnaire did not include questions about personal health information or sensitive data. Gender was not included due to the low number of male students. The Norwegian Centre for Research Data (NSD) approved this project [12].

**Results**

Students from all of the different study programs answered the questionnaires; 36 percent responded to the first questionnaire and 25 percent responded to the second questionnaire (see Table 1). More than two-thirds of the respondents were under the age of 25.

**Table 1. Distribution of age and study programme affiliation during and after a large-scale interprofessional blending learning course, N (%)**

Variables		After seminar days <sup>1</sup> (N = 507)	After completing IPL course <sup>2</sup> (N = 347)
Age	21 years or younger	255 (50.3)	141 (40.6)
	22-24 years	134 (26.4)	125 (36.0)
	25-27 years	63 (12.4)	40 (11.5)
	28 years or older	55 (10.8)	41 (11.8)
Study programme	Nursing	50 (9.9)	35 (10.1)
	Physiotherapy	104 (20.5)	59 (17.0)
	Mensendieck Physiotherapy	16 (3.2)	5 (1.4)
	Teacher Education <sup>3</sup>	133 (26.2)	134 (38.6)
	Early Childhood Education	95 (18.7)	45 (13.0)
	Occupational Therapy	26 (5.1)	12 (3.5)
	Child Welfare	34 (6.7)	27 (7.8)
	Social Work	47 (9.3)	30 (8.6)
Other	2 (0.4)	0	
Age	<25 years	389 (76.7)	266 (76.7)
	25 years or older	118 (23.3)	81 (23.3)
Study programmes	Health and social care <sup>4</sup>	245 (48.3)	141 (40.6)
	Teaching and child welfare <sup>5</sup>	262 (51.7)	206 (59.4)

Notes: <sup>1</sup> Seminar days: two days of IPL discussions on campus structured as a combination of face-to-face IPL small group interaction (January 2019), online instructions and the use of digital learning material; <sup>2</sup> Total IPL course: after submission of a group assignment in the form of an academic text, film or podcast (March 2019), and the two seminar days <sup>1</sup>; <sup>3</sup> Primary and Lower Secondary Teacher Education; <sup>4</sup> Physiotherapy, Mensendieck Physiotherapy, Nursing, Social Work and Occupational Therapy; <sup>5</sup> Early Childhood Education and Care, Primary and Lower Secondary Teacher Education and Child Welfare students

### Seminar days

When merging *strongly agree* (score 4) and *completely agree* (score 5) into one category, 28.1 percent agreed that the seminar days had given them a better academic insight into their own professional role (see Table 2). In contrast, 30.6 percent chose *completely disagree* or *strongly disagree*. Correspondingly, 42.3 percent agreed (strongly or completely) that they had been given a better academic insight into other professional roles, whereas 13.9 percent strongly or completely disagreed. Regarding better academic insight into IPC in working life, 36.9 percent agreed (strongly or completely) that they had been given a better academic insight, whereas 17.9 percent (strongly or completely) disagreed.

The majority responded that they had gained a better academic insight in relation to all the different items concerning children and young people. The highest scores were observed for “children’s and young peoples rights” and “children and young people as relatives,” with 59.2 percent and 45.4 percent agreeing strongly or completely. Less than 21.0 percent responded that they strongly or completely disagreed that they had gained a better academic insight into observation as a method, social and cultural diversity, recognition of children and youth, and new research findings into new topics.

Regarding the different indicators of the blended learning approach, the majority agreed that the work and teaching methods used in the IPL groups gave better learning outcomes than traditional plenary lectures. In particular, less than 10.0 percent disagreed (strongly or completely) that the learning objectives were clear, that there was a clear relation between the learning objectives and assignments, and that the learning resources and discussions were relevant. For 46.7 percent of students, the seminar days were considered relevant to professional practice (see Table 2).

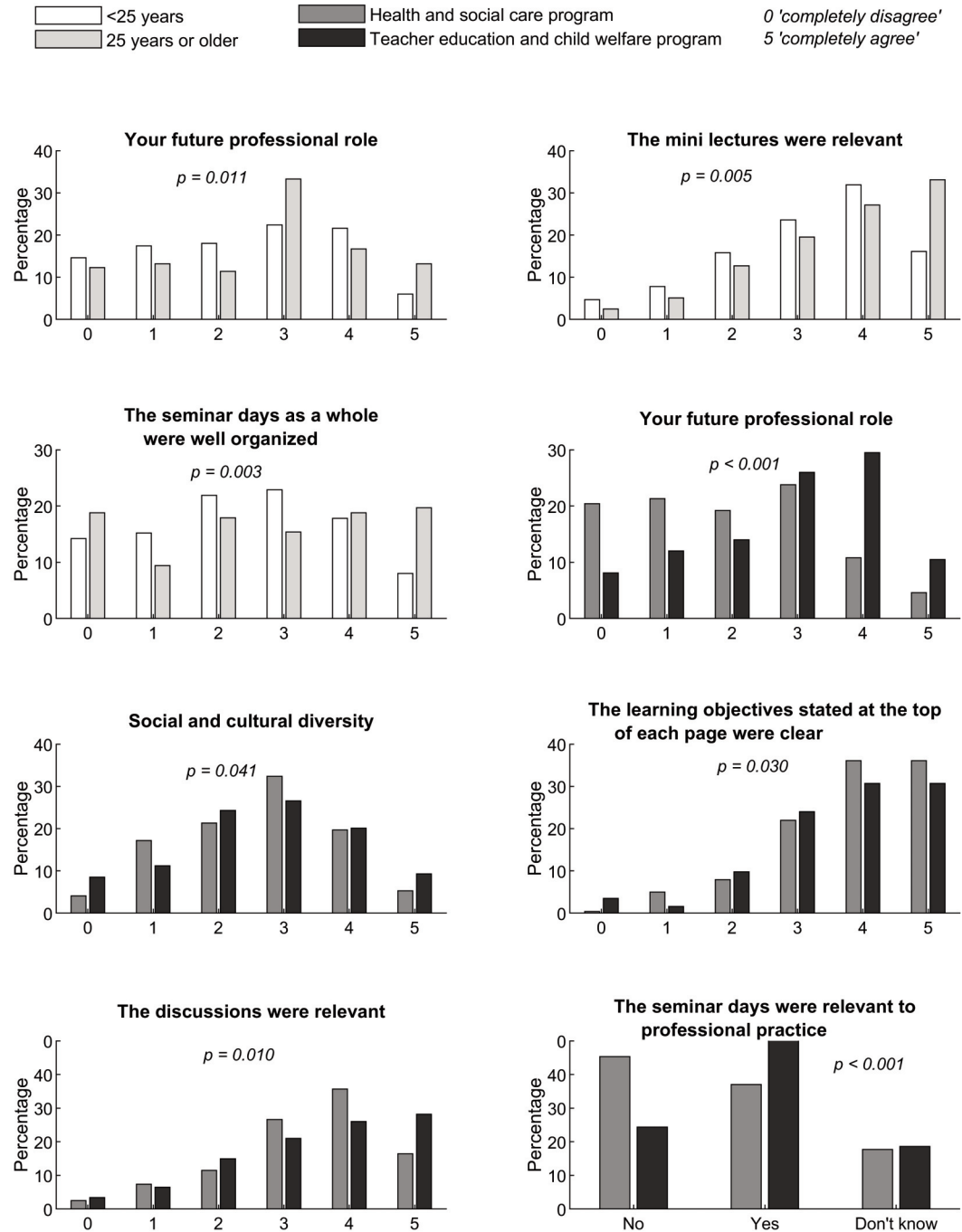
In the analyses stratified by age (76.7% were below 25 years), the younger students were less likely to report that the seminar days gave them a better academic insight into their own future professional role ( $p = 0.011$ ) (see Figure 1). They were also less likely to be satisfied with the relevance of the mini lectures ( $p = 0.005$ ) and the organization of the seminar days ( $p = 0.003$ ). Other items did not differ with respect to age.

The teacher education and child welfare students (51.7%) were more likely than the health and social care students to report that the seminar days gave them a better academic insight into their own future professional role ( $p < 0.001$ ) and that they were relevant to their own professional practice ( $p < 0.001$ ). The health and social care students tended to be more likely to respond that the seminar days had taught them about other professional roles ( $p = 0.084$ ) and about the recognition of children and young people ( $p = 0.051$ ). The health and social care students also responded that they had learned significantly more regarding social and cultural diversity ( $p = 0.041$ ). They were also more likely than other students to respond that the learning goals were clear ( $p = 0.030$ ), but less likely to respond that the discussion tasks were relevant ( $p = 0.01$ ). No differences were found with respect to other items (Figure 1).

**Table 2. Distribution of responses\* to statements for the whole group (n = 507) after two days of seminars during the interprofessional blending learning course**

Question	Scores					
	0	1	2	3	4	5
After completing two days of seminars, to what extent do you feel that the seminar days have given you a better academic insight into:						
<ul style="list-style-type: none"> <li>• your future professional role?</li> <li>• other professional roles/programmes?<sup>2</sup></li> <li>• interprofessional collaboration as it takes place in working life?</li> <li>• children and young people in general?</li> <li>• children and young people at risk in particular?</li> <li>• children and young people's rights?</li> <li>• children as relatives?</li> <li>• observation as a method?</li> <li>• social and cultural diversity?</li> <li>• recognition of children and young people?</li> <li>• new research findings from Ungdata?<sup>3</sup></li> <li>• new aspects of the topic that you were not familiar with?</li> </ul>	70 (14.1)	82 (16.5)	82 (16.5)	124 (24.9)	102 (20.5)	38 (7.6)
	22 (4.4)	48 (9.5)	77 (15.3)	143 (28.4)	145 (28.8)	68 (13.5)
	36 (7.2)	54 (10.7)	92 (18.3)	135 (26.8)	130 (25.8)	56 (11.1)
	19 (3.8)	59 (11.7)	71 (14.1)	127 (25.1)	140 (27.7)	89 (17.6)
	32 (6.4)	54 (10.7)	78 (15.5)	128 (25.4)	143 (28.4)	68 (13.5)
	13 (2.6)	28 (5.6)	65 (13.0)	98 (19.6)	162 (32.3)	135 (26.9)
	15 (3.0)	45 (8.9)	91 (18.0)	125 (24.7)	152 (30.0)	78 (15.4)
	40 (8.0)	64 (12.8)	80 (16.0)	135 (27.1)	128 (25.7)	52 (10.4)
	32 (6.4)	71 (14.1)	115 (22.9)	148 (29.4)	100 (19.9)	37 (7.4)
	23 (4.6)	53 (10.5)	55 (10.9)	125 (24.9)	152 (30.2)	95 (18.9)
	30 (6.0)	61 (12.3)	86 (17.3)	120 (24.1)	134 (27.0)	66 (13.3)
	36 (7.2)	63 (12.6)	88 (17.6)	113 (22.6)	119 (23.8)	81 (16.2)
After completing two days of seminars, to what extent do you feel that:						
<ul style="list-style-type: none"> <li>• the learning objectives stated at the top of each page were clear?</li> <li>• there was a clear relation between the learning objectives and assignments?</li> <li>• the mini-lectures were relevant?</li> <li>• the learning resources (e.g. the 10 wishes poster used in prisons etc.) were relevant?</li> <li>• the discussions were relevant?</li> <li>• there was too little time for discussion in the group?</li> <li>• you benefited academically from discussion with students from other degree programmes?</li> <li>• the seminar days as a whole were well organised?</li> <li>• the work and teaching methods in the interprofessional groups provided better academic benefits than ordinary lectures?</li> </ul>	10 (2.0)	16 (3.2)	44 (8.9)	114 (23.0)	165 (33.3)	146 (29.5)
	16 (3.2)	25 (5.0)	57 (11.5)	139 (28.0)	170 (34.2)	90 (18.1)
	21 (4.2)	36 (7.2)	76 (15.1)	114 (22.7)	155 (30.8)	101 (20.1)
	18 (3.6)	24 (4.8)	65 (12.9)	107 (21.3)	154 (30.7)	134 (26.7)
	15 (3.0)	35 (6.9)	67 (13.2)	120 (23.7)	155 (30.6)	114 (22.5)
	294 (59.0)	95 (19.1)	45 (9.0)	33 (6.6)	22 (4.4)	9 (1.8)
	44 (8.7)	59 (11.7)	96 (19.0)	122 (24.2)	103 (20.4)	81 (16.0)
	77 (15.2)	70 (13.9)	106 (21.0)	107 (21.2)	91 (18.0)	54 (10.7)
	98 (19.8)	86 (17.4)	83 (16.8)	96 (19.4)	80 (16.2)	52 (10.5)
	No	Yes	Unsure	Yes + Unsure		
The seminar days were relevant to professional practice	173 (34.1)	237 (46.7)	91 (17.9)	6 (1.2)		

Notes: \* On a scale from 0 to 5, state how much you agree or disagree with the following statements, where 0 means "completely disagree" and 5 means "completely agree", N (%). <sup>1</sup> These are not included in the calculation of percentages; <sup>2</sup> Limited to the teacher education, social care and health study programmes; <sup>3</sup> Ungdata: is a cross-national data collection scheme, designed to conduct youth surveys at the municipal level in Norway, <http://www.ungdata.no/English>



**Figure 1. Distribution of selected items within different categories**

**The total IPL course**

In descending order, students were least satisfied (*completely disagree* or *strongly disagree*) with the learning outcomes from the additional group meeting after the seminar days (71.5%), the submission assignment (72.2%), seminar days (58.0%), the course as a whole (56.1%), the syllabus (47.5%), and group discussions during the seminar days (36.3%) (see Table 3).



**Table 3. Distribution of responses\* to statements for the whole group (n = 347) after submission of assignments in the large-scale interprofessional blending learning course, N (%)**

Question	Scores						
	0	1	2	3	4	5	Unsure <sup>1</sup>
All in all, how satisfied are you with your learning outcomes from:							
the seminar days?	110 (32.4)	87 (25.6)	52 (15.3)	53 (15.6)	31 (9.1)	7 (2.1)	7
the syllabus?	96 (28.0)	67 (19.5)	70 (20.4)	63 (18.4)	38 (11.1)	9 (2.6)	4
the group discussions during the seminars?	65 (18.7)	61 (17.6)	69 (19.9)	63 (18.2)	58 (16.7)	31 (8.9)	0
the group meeting after the seminar days?	167 (52.4)	61 (19.1)	30 (9.4)	28 (8.8)	18 (5.6)	15 (4.7)	28
the submission assignment?	125 (36.1)	94 (36.1)	44 (12.7)	42 (12.1)	28 (8.1)	13 (3.8)	1
the combination of everything?	93 (26.9)	101 (29.2)	70 (20.2)	51 (14.7)	24 (6.9)	7 (2.0)	1
All in all, how satisfied are you with:							
the timetable management via Canvas? I.e. the schedule with times?	78 (22.9)	52 (15.3)	55 (16.2)	74 (21.8)	56 (16.5)	25 (7.4)	7
that hosts were stationed by the entrances?	75 (25.3)	26 (8.8)	33 (11.1)	56 (18.9)	52 (17.5)	55 (18.5)	50
that motivational facilitators visited the groups?	131 (42.3)	55 (17.7)	52 (16.8)	40 (12.9)	22 (7.1)	10 (3.2)	10
• the academic contribution from the supervisor?	127 (36.6)	54 (16.5)	56 (17.1)	50 (15.2)	27 (8.2)	14 (4.3)	19
• the contact with the supervisor?	99 (29.9)	67 (20.2)	61 (18.4)	47 (14.2)	40 (12.1)	17 (5.1)	16
• the assignment text for the submission?	73 (21.4)	58 (17.0)	66 (19.4)	77 (22.6)	47 (13.8)	20 (5.9)	6
• the four different video clips that were used for the assignment for submission?	60 (17.4)	62 (18.0)	59 (17.2)	78 (22.7)	60 (17.4)	25 (7.3)	3
• the cooperation in the group regarding the assignment for submission?	69 (20.1)	51 (14.8)	40 (11.6)	52 (15.1)	78 (22.7)	54 (15.7)	3
• the assessment criteria for the submission?	69 (20.5)	57 (16.9)	49 (14.5)	77 (22.8)	60 (17.8)	25 (7.4)	10
• the individual feedback on the submission?	87 (26.9)	40 (12.3)	54 (16.7)	54 (16.7)	54 (16.7)	35 (10.8)	23
• the course's level of difficulty?	80 (24.2)	47 (14.2)	54 (16.3)	80 (24.2)	48 (14.5)	22 (14.5)	16
• the workload in the course?	101 (29.7)	59 (17.4)	44 (12.9)	73 (21.5)	38 (11.2)	25 (7.4)	7
• the number of breaks over the course of the seminar days?	74 (23.0)	35 (10.9)	40 (12.4)	70 (21.7)	61 (18.9)	42 (13.0)	25
• that a long deadline was set for submitting the group assignment?	83 (25.1)	34 (10.3)	24 (7.3)	40 (12.1)	63 (19.0)	87 (26.3)	16

Notes: \*On a scale from 0 to 5, state how much you agree or disagree with the following statements, where 0 means "completely disagree" and 5 means "completely agree", N (%). <sup>1</sup>These are not included in the calculation of percentages

Students under 25 years of age reported lower learning outcomes from the syllabus ( $p = 0.001$ ) and from the course as a whole ( $p = 0.001$ ) more often than the older students. They also seemed less satisfied with the timetable management in Canvas ( $p = 0.035$ ), the facilitators ( $p = 0.001$ ), the contact with the supervisors ( $p = 0.002$ ), the video clips used for the assignment ( $p = 0.009$ ), and the evaluation criteria for the assessment ( $p = 0.032$ ). Moreover, they also tended to be less satisfied with the academic contribution from the supervisor ( $p = 0.082$ ), the feedback from the supervisor ( $p = 0.080$ ), and the course's level of difficulty ( $p = 0.089$ ) (data not shown).

**Table 4. What has the relationship been like between the supervisor and you and your group (you can tick several boxes)?**

Questions	N (%)
<input type="checkbox"/> I/the group met the supervisor on the seminar day(s)	230 (66.3)
<input type="checkbox"/> I/the group met the supervisor after the seminar day(s)	25 (7.2)
<input type="checkbox"/> I/the group have been in contact on Skype, by phone etc.	14 (4.0)
<input type="checkbox"/> I/the group have been in contact via email and/or Canvas	140 (40.3)
<input type="checkbox"/> I/the group have not had contact with the supervisor	39 (11.2)
<input type="checkbox"/> I have taken part in compensatory activities and have not been offered supervision <sup>1</sup>	17 (4.2)

Note: <sup>1</sup> No differences were found between these students and the other students

The teacher education and child welfare students (59.4%) reported a higher satisfaction with the learning outcomes from the course as a whole ( $p = 0.048$ ) and with the long deadline for submission of assignments ( $p = 0.049$ ) than the health and

**Table 5. Distribution of responses to “Achieved academic learning outcomes from submission assignment”\***

Questions	0	1	2	3	4	5	p-value <sup>1</sup>
Text <sup>2</sup>	55 (38.5)	40 (28.0)	21 (14.7)	16 (11.2)	7 (4.9)	4 (2.8)	0.401
Podcast <sup>2</sup>	69 (34.2)	54 (26.7)	23 (11.4)	26 (12.9)	21 (10.4)	9 (4.5)	
According to age category	0	1	2	3	4	5	
Academic text							0.583
<25 years	43 (40.2)	28 (26.2)	15 (14.0)	15 (14.0)	4 (3.7)	2 (1.9)	
25 years or older	12 (33.3)	12 (33.3)	6 (16.7)	1 (2.8)	3 (8.3)	2 (5.6)	
Podcast							0.546
<25 years	56 (35.7)	39 (24.8)	20 (12.7)	22 (14.0)	14 (8.9)	6 (3.8)	
25 years or older	13 (28.9)	15 (33.3)	3 (6.7)	4 (8.9)	7 (15.6)	3 (6.7)	
According to educational background	0	1	2	3	4	5	
Academic text							0.388
Health and social care <sup>3</sup>	26 (41.3)	18 (28.6)	9 (14.3)	5 (7.9)	3 (4.8)	2 (3.2)	
Teaching and child welfare <sup>4</sup>	29 (36.3)	22 (27.5)	12 (15.0)	11 (13.8)	4 (5.0)	2 (2.5)	
Podcast							0.760
Health and social care <sup>3</sup>	24 (30.8)	23 (29.5)	8 (10.3)	11 (14.1)	10 (12.8)	2 (2.6)	
Teaching and child welfare <sup>4</sup>	45 (36.3)	31 (25.0)	15 (12.1)	15 (12.1)	11 (8.9)	7 (5.6)	

Notes: \* Within different categories of “How did your group submit the assignment?” where 0 means “completely disagree” and 5 means “completely agree”, N (%) <sup>1</sup>  $\chi^2$ -test; <sup>2</sup> A total of 41% submitted an academic text and 59% submitted a podcast (no one submitted a film as the assignment format); <sup>3</sup> Health and social care: Physiotherapy, Mensendieck Physiotherapy, Nursing, Social Work, and Occupational Therapy students; <sup>4</sup> Teaching and child welfare: Early Childhood Education and Care, Primary and Lower Secondary Teacher Education and Child Welfare students

social care students. Moreover, they tended to be more satisfied with the relevance of the video clips ( $p = 0.078$ ) and less satisfied with the number of breaks ( $p = 0.073$ ). There were no differences in how other items were answered (data not shown).

A total of 66.3 percent of the students had met their supervisors, 7.2 percent had met them after the seminar days, and 11.2 percent did not have any contact at all with their supervisor (see Table 4).

None of the students used video as a submission format; 41.3 percent of the respondents submitted a written academic text and 58.7 percent submitted a podcast. The academic learning outcomes achieved through both podcasts and academic texts were reported to be low, with no difference between the submission formats. Age and educational background did not affect this finding (see Table 5).

### Discussion

The aims of this study were to assess students' learning outcomes from different components of the blended learning course, their course satisfaction, and any differences according to assignment format, age, and study program. The main findings were that the face-to-face IPL group discussions resulted in learning outcome two times higher than those reported from the syllabus, supervision, and submission of assignments. Most of the students were satisfied with the blended learning approach, the IPL groups, and the digital content of the seminars. Also, no difference in learning outcomes was identified between the submission formats. However, health and social care students reported a lower learning outcome and lower course satisfaction than teacher education and child welfare students, and students below 25 years were generally less satisfied than older students.

#### Students' self-reported learning outcomes

Both students and supervisors [12] clearly favoured the face-to-face IPL discussions when compared to other components of the blended learning course. More than 60 percent of the supervisors found that the IPL group discussions resulted in the best learning outcomes [12]. In general, it is difficult to generalize IPL outcomes from courses [18-20]. Simulation is perceived as a useful strategy to teach interprofessional groups about teamwork and professional roles [1]. However, less than one-third of these students reported gaining better insight into their own professional role, and less than half reported that they had been given better insight into other professional roles. Moreover, less than half of the students agreed that they had gained better insight into IPC in working life. Health and social care students were the least satisfied, possibly because the concrete tasks given might not have been perceived as relevant for IPC in their professions. For example, when students learned about observation, the corresponding tasks and the group assignment were not targeting sick children, children as relatives, or any complicated situation explicitly involving all the professional groups. In general, universities struggle to create authentic learning activities that enable students to experience the dynamic interprofessional interactions common in healthcare [21]. The present innovative study extended IPL beyond healthcare to include both social care and teacher education students, with an increased course complexity. Other explanations might be a lack of preparation

ahead of IPL or dysfunctional group dynamics. Although ice-breaking and other get-to-know-you activities were included at the beginning of the course, they might have been insufficient as most students were in their first year and did not know each other.

The low learning outcome that students reported from contact with supervisors was unexpected. There is no obvious explanation for this finding. The supervisors were expected to bring a real-world understanding of IPC issues to the IPL groups, and all supervisors had been trained ahead of the course [12]. Teachers and health and social care professionals harbour different professional identities and definitions [12], and it is unclear whether the support provided by supervisors varied according to their own professional background and experiences. In line with these findings, low scores for tutoring and assessment were also reported in a national student survey [16].

### Students' satisfaction with the blended learning approach

The students were positive about the blended learning approach. Their individual study programs were mainly comprised of plenary lectures and plenary activities, and therefore they had limited prior experience with digital learning and teaching methods. In accordance with these students, the supervisors also showed high acceptance of the blended learning approach [12]. Three-quarters of the supervisors were satisfied with the IPL course's use of active learning methods rather than lectures. These results [12] support the idea of focusing on student-active small-group IPL instead of plenary activities. The finding that the face-to-face blended learning approach resulted in higher learning outcomes than traditional lectures is in accordance with a recent systematic review [15].

### Differences in students' self-reported learning outcomes according to assignment format, age, and study program

None of the respondents submitted their assignment in the film format, and no difference was found in the learning outcomes reported between a podcast and an academic text. Interestingly, the responses of the older students were similar to those of the younger students in this respect. Although IPL courses often include communication skills as a component of course learning outcomes, students are rarely provided with opportunities to express their understanding of the IPL course outside of the traditional academic text or face-to-face presentation. Student-produced podcasting has been suggested as a useful method for supporting students in developing their communication skills [22]. Results from a Norwegian student health and well-being survey showed a significant increase in the reported fear of verbal presentations, from 40 percent in 2010 to 49 percent in 2018 [23]. Multimedia assignment formats may be particularly crucial for such students. The fact that so many IPL groups produced a podcast, although they received no training or extra tools, is interesting. The intention of the course was a formative assessment, and all the students passed. Formative assessment has been found to play a vital role in the development and delivery of IPL [20,24,25]. Assessment approaches for IPL are varied, and best practices have not been identified [20]. No firm conclusions can be made concerning the use of the podcast and video as submission formats on the basis of

this study. It has, however, piloted the use of a student-produced podcast within a blended learning large-scale educational initiative, and it turned out to be a feasible approach.

This data is supportive of previous studies showing that increasing age is associated with better preparedness for IPL [26,27]. The present data is also supportive of an early introduction to IPL because successful IPC requires knowledge and understanding of professional roles and responsibilities, which takes time to develop.

The teacher education and child welfare students were more likely to report gaining better insight into their own future professional role than the health and social care students. Successful IPL has been found to include students' awareness of both their own professional identity and professional roles and those of others [28]. It might be that the health students had expected the course to target IPC teamwork in relation to sick and dying children in a hospital setting. Interestingly, no difference was found between the two different student groups in gaining new insights about the different issues on children and young people. This may suggest that the education and child welfare students learned something new about children as relatives (for example children with sick relatives and relatives in prison) vulnerable children, and children's rights. Teacher education does not, for example, adequately address the topic of sexual abuse and violence, although countering child sexual abuse is a political priority for the Norwegian government [29,30]. Some of the healthcare students may not work with children and young people in their future jobs; however, health professionals in Norway are required by law to help safeguard information and follow-up with children whose parents have a mental or physical illness or substance abuse problems [31]. Although an unknown number of children live with parents or siblings affected by a serious physical or mental illness [32], such issues have not been included in curriculums. In contrast to the students, the vast majority of the supervisors responded that the course was relevant to professional practice [12].

There is considerable use of health and social care services that address children, young people, and their families [8,33-37]. It is not clear how professionals from different backgrounds develop specialized knowledge and skills to work together in different scenarios involving children and young people, or how this collaboration might vary according to experience, roles, and remits [8,33]. OsloMet is a large urban university housing some of Norway's oldest and best-known programs of professional study [38]. The professional curricula are similar across institutions, thus the present results will be useful also to other institutions.

### Strengths and limitations

The present study has some limitations and several strengths. The cross-sectional study design does not help to determine cause and effect and cannot be used to analyze behaviour over a period of time. This blended learning course was a mandatory course for the different study programs, and thus there is no control group for comparison. The response rate was low—in line with the fact that the response rate to surveys in general is declining—which threatens the validity and generalizability of

findings [39,40]. A high response rate, however, is no guarantee of sample quality. Self-selection bias may threaten internal validity, but the diversity in this sample enhances the robustness of the findings. Students who have strong views about children and young people may have been more inclined to respond. However, the number of respondents is high, and includes students from all of the different study programs in the IPL course. Future studies could use validated instruments or scales to measure IPL preparedness that allow comparison across courses. However, such an instrument was not available in Norwegian for the current study. The validated Norwegian version of ICCAS (Interprofessional Collaborative Competencies Attainment Surveys) (measuring students' self-reported IPC competencies) was published after the present course was completed [41] and was therefore not available for this study. The study's major strengths include its large sample size and diversity, and anonymous data collected from two different occasions. Moreover, an experienced statistician conducted the statistical analysis. Other possible limitations include the fact that the survey was shared as a link in the LMS, which may have influenced as well as limited the number of responses. Moreover, the results from this study may not be representative for other IPC courses, and data are collected from one single university.

### Conclusion

The blended learning approach was positively evaluated, although the students' perceived learning outcomes from the IPL face-to-face group discussions were higher compared to other components of the blended learning course. The health and social care students reported a lower learning outcome and satisfaction than the education and child welfare students. One possible explanation might be that the IPL tasks were considered most relevant for future teachers. Interestingly, the students reported that a podcast submission format resulted in the same learning outcomes as an academic text. The study is supportive of previous studies showing that increasing age is associated with better preparedness for IPL and that it is important to introduce IPL early in education programs. To the best of our knowledge, there are no other studies that both evaluate aspects of digitalization and IPL and include students from both teacher education and health and social care study programs.

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### Abbreviations

IPL: Interprofessional learning

IPC: Interprofessional collaboration

### References

1. World Health Organization. (2010). *Framework for action on interprofessional education & collaborative practice*. Geneva, CH: WHO Press.
2. Dobbs-Oates, J., & Wachter Morris, C. (2016). The case for interprofessional education in teacher education and beyond. *Journal of Education for Teaching*, 42(1), 50–65.

3. Ministry of Health and Care Services. (2009). *The coordination reform — proper treatment — at the right place and right time*. Oslo, NO: Ministry of Health and Care Services.
4. Barr, H., Ford, J., Gray, R., Helme, M., Hutchings, M., Low, H., Machin, A., & Reeves, S. (2017). *Interprofessional educational guidelines*. Fareham, UK: Centre for the Advancement of Interprofessional Education. URL: <https://www.abeffarmacia.com.br/wp-content/uploads/sites/777/2017/12/CAIPE-2017-Interprofessional-Education-Guidelines-2.pdf> [September 9, 2019].
5. Ministry of Education and Research. (2017). National regulations relating to a common curriculum for health and social care education. Oslo, NO: Ministry of Education and Research. URL: <https://www.regjeringen.no/contentassets/389bf8229a3244f0bc1c7835f842ab60/national-regulations-relating-to-a-common-curriculum-for-health-and-social-care-education.pdf> [September 9, 2019].
6. Granrud, M.D., Anderzen-Carlsson, A., Bisholt, B., & Steffenak, A.K.M. (2019). Public health nurses' perceptions of interprofessional collaboration related to adolescents' mental health problems in secondary schools: A phenomenographic study. *Journal of Clinical Nursing*, 28(15-16), 2899–2910.
7. The Ombudsmann for Children i Norway. (2017). *NHRI report to Norway's fifth and sixth periodic report to the UN Committee on the Rights of the Child*. URL: <http://barneombudet.no/wp-content/uploads/2017/10/The-Ombudsman-for-Children-in-Norway-Supplementary-Report-to-UN-2017.pdf> [October 10, 2019].
8. Hood, R., Price, J., Sartori, D., Maisey, D., Johnson, J., & Clark, Z. (2017). Collaborating across the threshold: The development of interprofessional expertise in child safeguarding. *Journal of Interprofessional Care*, 31(6), 705–713.
9. Myers, C.T., & O'Brien S.P. (2015). Teaching interprofessional collaboration: Using online education across institutions. *Occupational Therapy In Health Care*, 29(2), 178–185.
10. Borg, E., & Drange, I. (2019). Interprofessional collaboration in school: Effects on teaching and learning. *Improving Schools*, 22(3), 251–266.
11. Foss, C., Guldbrandsen, L.M., Løndal, K., Ulleberg, I., Ødegaard, N.B., & Øien, I. (2018). *Constructing interprofessional education: The case of INTERACT (Interprofessional Interaction with Children and Youth)*. Its21: 4th Conference on Interdisciplinary Teamwork Skills for the 21st Century: NTNU.
12. Almendingen, K., Saltyte-Benth, J., & Molin, M. (2020). *Large-scale blended learning design in an interprofessional undergraduate course in Norway: Context description and supervisors' perspective*. Manuscript accepted for publication in MedEdPublish.
13. INTERACT: Interprofessional Interaction with Children and Youth. (2017). Oslo, NO: Oslo Metropolitan University. URL: <https://uni.oslomet.no/interact/> [September 9, 2019].
14. Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes*. London, UK: Harvard University Press.
15. Lillejord, S., & Børte, K. (2018). *Learning and teaching with technology in higher education: A systematic review*. Oslo, NO: Knowledge Centre for Education. URL: <https://www.forskningsradet.no/siteassets/publikasjoner/1254035532334.pdf> [September 9, 2019].
16. Ministry of Education and Research. (2017). *Quality culture in higher education*. Oslo, NO: Ministry of Education and Research.
17. University of Oslo. (2020). Nettskjema. Oslo, NO: University of Oslo. URL: <https://www.uio.no/english/services/it/adm-services/nettskjema/> [October 10, 2019].
18. Lindqvist, S., Vasset, F., Iversen, H.P., Hofseth, Almas S., Willumsen, E., & Odegard, A. (2019). University teachers' views of interprofessional learning and their role in achieving outcomes: A qualitative study. *Journal of Interprofessional Care*, 33(2), 190–199.
19. Shrader, S., Farland, M.Z., Danielson, J., Sicut, B., & Umland, E.M. (2017). A systematic review of assessment tools measuring interprofessional education outcomes relevant to pharmacy education. *American Journal of Pharmaceutical Education*, 81(6), 1–20.
20. Barr, H., Gray, R., Helme, M., Low, H., & Reeves, S. (2016). Steering the development of interprofessional education. *Journal of Interprofessional Care*, 30(5), 549–552.
21. Jorm, C., Nisbet, G., Roberts, C., Gordon, C., Gentilcore, S., & Chen, T.F. (2016). Using complexity theory to develop a student-directed interprofessional learning activity for 1220 healthcare students. *BMC Medical Education*, 16(1), 199, 1–15.
22. Kapoor, S., Catton, R., & Khalil, H. (2018). An evaluation of medical student-led podcasts: What are the lessons learnt? *Advances in Medical Education and Practice*, 9, 133–138.
23. Sivertsen, B., Råkil, H., Munkvik, E., & Lønning, K.J. (2019). Cohort profile: The SHoT-study, a national health and well-being survey of Norwegian university students. *BMJ Open*, 9(1), e025200, 1–5.

24. Ba, S., Frcpch, M., Morison, S., & Stewart, M. (2005). Developing interprofessional assessment. *Learning in Health and Social Care*, 4(4), 192–202.
25. Wagner, S.J., & Reeves, S. (2015). Milestones and entrustable professional activities: The key to practically translating competencies for interprofessional education? *Journal of Interprofessional Care*, 29(5), 507–508.
26. Slater, C.E., Cusick, A., & Louie, J.C.Y. (2017). Explaining variance in self-directed learning readiness of first year students in health professional programs. *BMC Medical Education*, 17(1), 1–10.
27. Zeeni, N., Zeenny, R., Hasbini-Danawi, T., Asmar, N., Bassil, M., Nasser, S., Milane, A., Farra, A., Habre, M., Khazen, G., & Hoffart, N. (2016). Student perceptions towards interprofessional education: Findings from a longitudinal study based in a Middle Eastern university. *Journal of Interprofessional Care*, 30(2), 165–174.
28. Suter, E., Arndt, J., Arthur, N., Parboosingh, J., Taylor, E., & Deutschlander, S. (2009). Role understanding and effective communication as core competencies for collaborative practice. *Journal of Interprofessional Care*, 23(1), 41–51.
29. Norwegian Ministry of Children and Equality. (2017). *The rights of the child in Norway: Norway's fifth and sixth periodic reports to the UN Committee on the Rights of the Child – 2016*. Oslo, NO: Norwegian Ministry of Children and Equality. URL: <https://www.regjeringen.no/contentassets/0ada3bee46b54f498707f51bbc7d4b2c/barnekonvensjonen-engelsk-versjon-uu.pdf> [September 1, 2019].
30. Goldschmidt-Gjerløw, B. (2019). Children's rights and teachers' responsibilities: Reproducing or transforming the cultural taboo on child sexual abuse? *Human Rights Education Review*, 2(1), 25–46.
31. Skogøy, B.E., Ogden, T., Weimand, B., Ruud, T., Sørsgaard, K., & Maybery, D. (2019). Predictors of family focused practice: Organisation, profession, or the role as child responsible personnel? *BMC Health Services Research*, 19(1), 1–13.
32. Knutsson, S., Enskär, K., Andersson-Gäre, B., & Golsäter, M. (2016). Children as relatives to a sick parent: Healthcare professionals' approaches. *Nordic Journal of Nursing Research*, 37(2), 61–69.
33. Fukkink, R.G., & van Verseveld, M. (2019). Inclusive early childhood education and care: A longitudinal study into the growth of interprofessional collaboration. *Journal of Interprofessional Care*, 34(3), 362–372.
34. Anderson, E.M. (2013). Preparing the next generation of early childhood teachers: The emerging role of interprofessional education and collaboration in teacher education. *Journal of Early Childhood Teacher Education*, 34(1), 23–35.
35. GBD 2017 SDG Collaborators. (2018). Measuring progress from 1990 to 2017 and projecting attainment to 2030 of the health-related Sustainable Development Goals for 195 countries and territories: A systematic analysis for the Global Burden of Disease Study 2017. *Lancet*, 392(10159), 2091–2138.
36. Martinussen, M., Kaiser, S., Adolfsen, F., Patras, J., & Richardsen, A.M. (2017). Reorganisation of healthcare services for children and families: Improving collaboration, service quality, and worker well-being. *Journal of Interprofessional Care*, 31(4), 487–496.
37. Power, T.J., Blum, N.J., Guevara, J.P., Jones, H.A., & Leslie, L.K. (2013). Coordinating mental health care across primary care and schools: ADHD as a case example. *Advances in School Mental Health Promotion*, 6(1), 68–80.
38. Oslo Metropolitan University. (2018). *The digital university of the future: Strategy for digital transformation 2018–2024*. Oslo, NO: Oslo Metropolitan University. URL: <https://ansatt.oslomet.no/documents/585743/77463421/Strategy+for+digital+transformation.pdf> [September 9, 2019].
39. Norwegian Agency for Quality Assurance in Education. (2018). *The students' judgement*. Lysaker, NO: Norwegian Agency for Quality Assurance in Education. URL: <https://www.nokut.no/en/news/the-students-judgement/> [October 10, 2019].
40. Morton, S.M.B, Bandara, D.K., Robinson, E.M., & Carr, P.E.A. (2012). In the 21st century, what is an acceptable response rate? *Australian and New Zealand Journal of Public Health*, 36(2), 106–108.
41. Lunde, L., Bærheim, A., Johannessen, A., Aase, I., Almendingen, K., Andersen, I.A., Bengtsson, R, Brenna, S.J., Hauksdottir, N., Steinsbekk, A., & Rosvold, E.O. (2020). Evidence of validity for the Norwegian version of the interprofessional collaborative competency attainment survey (ICCAS). *Journal of Interprofessional Care*, 10, 1–8.