

Interprofessional Education Program for Medical and Nursing Students: Interprofessional vs Uniprofessional

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Research article

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Abstract

Background: This study aimed to determine the effects of interprofessional education (IPE) on healthcare students.

Methods: An experimental interprofessional (IP) group consisting of 49 medical students (MSs) and 62 nursing students (NSs) was selected, alongside a uniprofessional (UP) control group with 48 MSs. The groups participated in a class titled 'Team Communication and Interprofessional Collaboration.' A sub-analysis of the two groups' professions was also conducted. The groups participated in the same lesson separately, with a week's interval. The Interprofessional Attitudes Scale (IPAS) and the Self-Efficacy Perception for Interprofessional Experiential Learning (SEIEL) scale were used before and after the class to compare changes in reports of self-efficacy and attitudes in both groups. Students' responses to learning experiences and satisfaction were also evaluated.

Results: The IPAS and SEIEL values increased in both groups and there were no differences between the groups or between the MSs and NSs. In the IP group, the change in attitude in NSs was larger than that of MSs. Satisfaction scores exceeded 3.70 in both groups.

Conclusion: Although the UP group was also shown to have experienced the effects of IPE, the results indicate that students need to interact with other students of different professions to achieve better results.

Background

Teamwork has always been essential in clinical environments; therefore, interprofessional education (IPE) has become an important factor of medical education in recent years. This is also because medical practice has become more complex and specialized than ever before; disease patterns have changed from, for example, a simple communicable disease to complex multi-morbidity chronic diseases. Moreover, the working hours of medical staff are limited to ensure a safe medical environment. The World Health Organization (WHO) has proclaimed the importance of IPE since 1988 for these exact reasons [1].

All healthcare professionals have their own expertise and skills and communicate and collaborate among themselves continuously, with the common goal of patient care. This is the main reason that teamwork is important in healthcare. Furthermore, no medical practice can be performed by one healthcare professional alone. During their treatment, a single patient meets doctors, nurses, medical technologists, and even administrators in different sections of the healthcare system. The more specialized a healthcare system is, the more steps a patient experience.

When healthcare-associated students become practitioners, they become acculturated into their own professional identity, which could lead to barriers in collaboration in a clinical environment [2]. Therefore, teamwork and interprofessionalism should be taught to healthcare students as part of their undergraduate education.

Most undergraduate IPE classes are aimed at medical students (MS) and nursing students (NS), and there are many different types of classes and lessons. The effects of IPE on MSs and NSs are well-known, and to date, similar results have been achieved, regardless of the method used. IPE contributes to students identifying their own shortcomings and recognizing the value of their colleague's approach and to diminishing stereotypes and hierarchies. An existing study showed that in the service-learning setting of a student-run free clinic, interprofessional (IP) group students showed improvements in IP perception and clinical reasoning skills [3]. In a German study, medical and nursing students took part in problem-based learning and were able to expand their knowledge of the roles of the other profession; further, the IPE course had a positive effect on students' mutual appreciation [4]. In simulation-based training, IP students gained enhanced understanding other professionals' work, communication, teamwork and leadership, and self-efficacy as better team leaders [5–7]. IPE has also been shown to enhance the development of interprofessional thinking and patient-centered care, acquiring shared knowledge, and promoting mutual understanding [8–10].

There are several difficulties to consider when aiming for successful IPE, the most prominent being coordinating and harmonizing the curricula of the two professions [11]. Recent studies compared an IP group and a uniprofessional (UP) group, in the belief that evidence of IPE's effectiveness was still lacking. In Račić's study, the IP group consisted of medical, dental, and nursing students and three UP groups consisted of their profession students. All groups showed higher follow-up scores on diabetes knowledge than baseline scores; however, the IP group's posttest score was higher than those of the UP groups. Additionally, the IP group had a more positive self-assessment of communication and teamwork skills [12]. In a Taiwanese study, the IP group (medical and nursing students) gained higher interprofessional communication and collaboration than the UP (MS) group in problem-based learning on clinical ethics [13]. Berger et al. [14] used an IP seminar to compare an IP group of undergraduate medical and other healthcare students and a UP group (undergraduate MSs) in German medical education. The IP group showed a more positive reaction and higher mean scores on self-reported knowledge gains in the area of group dynamics. However, scores for communication and teamwork and IP learning increased in both groups. The UP group showed improvement in medical knowledge but only some improvement in communication and teamwork skills.

IPE requires active learner participation, interaction, and active exchanges between learners from different health professions to improve IP collaboration [15]. Although students from more than one healthcare profession must interact and learn together for education to be defined as IPE, interaction in a single profession group seems effective to some extent. IPE sometimes involves a single profession, because of the difficulties in adjusting the curriculum.

This study aims to examine the effects of IPE on self-efficacy and attitude by comparing the UP group of MSs and the IP group of medical and nursing students. Additionally, we conducted sub-analyses on MSs vs NSs in the IP group and on the IP group MSs vs UP the group MSs. The concept of IPE is still underdeveloped in the context of undergraduate medical education in Korea, which is why we examined the effectiveness of IPE in Korean undergraduate medical education.

Methods

Study population and IPE lesson

This quasi-experimental before and after comparison study recruited 159 participants from among fifth year MSs and fourth year NSs at Wonju College of Medicine, Yonsei University in Korea in May, 2019.

The medical school has a six-year program consisting of a two-year premedical phase, a two-year pre-clinical medical phase, and a two-year clinical clerkship phase. The fifth year MSs are in the first-year clinical clerkship phase. They were semi-randomly divided into two groups; IP or UP. NSs were in the fourth year of their four-year bachelor program. The IP group consisted of 49 MSs and 62 NSs as the experimental group and the UP group consisted of 48 MSs as the control group. As this IPE was part of the formal curriculum, all fifth year MSs and fourth year NSs participated. IP group was divided to small group consisting of 3 medical students and 3–4 nursing students, in contrast, UP group was divided to small group consisting of only 6 medical students. The schedule was discussed with a nursing department professor to get the students together at the same time

Finally, medical students took IPE as part of the 'Patient Safety' course on the regular curriculum and the nursing as part of the 'Health Communication' course. The IP group had the lesson first and the UP group had the same lesson after one week. "Team Communication and Interprofessional Collaboration" was chosen as the IPE topic. Lesson outcomes were as follows:

- I can express understanding and respect for the various roles and responsibilities of my colleagues.
- I can actively listen to colleagues' opinions and express courtesy and consideration.
- I can maintain partnerships with colleagues or healthcare professionals, provide professional feedback, and collaborate effectively (interprofessional collaboration).
- I can use communication techniques to promote patient safety (all-out, check-back, SBAR, IPASS the BATON, debriefing, two challenge rule, CUS, and DESC script).

IPE was conducted as flipped learning. Before the in-class activity, a thirty-minute online lecture was provided to all students using the learning management system platform, Yonsei Creative Education Community (YSCEC, <https://yscec.yonsei.ac.kr>). This lecture was created by the researcher and was based on "being an effective team player" from the WHO Patient Safety Curriculum Guide for Medical Schools [16]. The in-class activity consisted of interactive theater and a group discussion. Interactive theater is a useful educational strategy to encourage behavior change in the area of medical communication and conflict resolution [17].

The role-play scenario was developed by the researcher (emergency department physician), and reviewed by one emergency department head nurse and one emergency department resident to improve accuracy and relatability. The scenario depicts a medical error related to blood transfusion that occurred due to poor communication between medical staff and poor patient identification. After the students read the

scenario, they did role-play in the front of the classroom. The researcher sometimes stopped the role-play if necessary to ask students to express their feelings on the situation and the other students' positions; participants were also allowed to change lines if they wanted. After modifying the given scenario to prevent medical error as group activity, some of them presented their role-play in front of others. All students practiced reporting the situation, information sharing between medical staff, and using communication techniques (Fig. 1).

Sample Scenario

It is Monday morning and the emergency room (ER) is busy. At virtually the same time, two female patients, named "Young" and "Kyoung" respectively, come into the ER. Young reports vomiting a lot of blood and is hypotensive. Kyoung was diagnosed with appendicitis at a local community hospital and transferred to the ER for surgery. The ER resident orders blood tests, including A/B/O typing and cross matching for a transfusion for Young. They order the same blood tests in preparation for Kyoung's appendectomy. A novice nurse draws blood from the two patients and prepares barcode stickers and sample tubes for the two patients at the same time. She checks each patient's name but the names sound very similar and the barcode stickers are switched. After about an hour, a packed RBC is prepared for Young and an intern comes to ask Young about her blood type. Young answers that her blood is type B; however, the intern has type AB readied for the transfusion and they assume that she is wrong about her blood type. The intern then starts the blood transfusion to Young and the scenario ends.

Data Collection

We used Level 1 and Level 2 of Kirkpatrick's outcomes typology to evaluate the IPE program [18]. Students' satisfaction and their reaction to the learning experiences were immediately evaluated after class as the Kirkpatrick Level 1 outcome. Students were requested to describe their satisfaction with the class on a 5-point Likert scale, what they liked, and what they think could improve the class. To appraise potential changes in attitude, the interprofessional attitudes scale (IPAS) and the self-efficacy perception for interprofessional experiential learning (SEIEL) scale were used before and after the class as the Kirkpatrick Level 2 outcome.

IPAS measures attitudes towards other healthcare professions, and this study used the validated Korean version based on the original version developed by Norris et al. [19]. The Korean version of the IPAS consists of 20 items scored from 1–5 with good reliability (Cronbach's $\alpha = 0.929$) [20]. The higher the total score is, the better the participant's attitude toward other healthcare professions are.

SEIEL measures the self-efficacy of interprofessional learning. This study used the validated Korean version based on the original version developed by [21]. The Korean version of SEIEL scale consists of 11 items with good reliability (Cronbach's $\alpha = 0.932$). The higher the total score, the higher the participant's self-efficacy [22].

The scale questionnaires were distributed online via a survey link one week before the class. When the class was finished, both groups' students completed the IPAS and SEIEL questionnaires again and also satisfaction questionnaire was done (Fig. 1).

Data analysis

All data were collected using the online survey system SurveyMonkey® (<https://ko.surveymonkey.com>). Cronbach's alpha was used to verify the internal consistency of the reliability of the IPAS and SEIEL scale. A paired *t*-test was used to compare IPAS and SEIEL before and after class. A *t*-test was used to compare IPAS, SEIEL, score gap of IPAS and SEIEL, and satisfaction score between the groups. IBM SPSS ver. 23.0 (IBM Corp., Armonk, USA) software was used for the analyses and significance was set at $p < 0.05$. Narrative type reactions were classified with a content analysis.

Ethical Considerations

This study was approved by the Institutional Review Board of Yonsei University Wonju Christian Severance Hospital (CR318144). All participants were informed of the purpose of this study and that the data would be collected anonymously and treated confidentially. Only profession (medical/nurse) and telephone numbers were collected for corresponding before and after class. Written informed consent were obtained from all students.

Results

Ninety-seven MSs and 62 NSs participated in the class. The IP group included 49 MSs and all of the NSs, while the UP group included 48 MSs. Of the original 159 students, 158 students completed the IPAS and SEIEL before the class and 143 students responded after the class. Finally, 136 students were included in the analysis (Table 1).

Table 1
Demographic data of participants

Groups	All groups (N= 136)	IP group (n= 92)	UP group (n= 44)
Sex (Male:Female)	64:72	35:57	29:15
Age (mean [SD])	23.34 (± 2.04)	23.13 (± 2.11)	23.80 (± 1.83)
Sub-groups (IP group)		Nursing students (n = 54)	Medical students (n = 38)
Sex (Male:Female)		7:47	28:10
Age (mean [SD])		22.41 (± 1.91)	24.13 (± 1.99)
<i>IP</i> Interprofessional, <i>UP</i> Uniprofessional			

Reliability Of The Measurement Scales

All Cronbach's alphas showed high internal consistency. The Cronbach's alpha before IPAS was 0.927 and after IPAS was 0.955. The Cronbach's alpha before SEIEL was 0.956 and after SEIEL was 0.975.

Comparison Of Ipas And Seiel Scale Between The Groups

The before and after IPAS and SEIEL scores were compared according to the groups; IP vs UP, IP vs UP in MSs, and MSs vs NSs in the IP group. There were no significant differences in any of the comparisons (Table 2).

Paired comparison of IPAS and SEIEL scale before and after the class

The scores for both the IPAS and SEIEL scales increased after the class in all student groups (Table 3).

Table 3
Paired comparisons of IPAS and SEIEL scores before and after the class

Table 2 Comparisons of IPAS and SEIEL scores between groups				
IP group vs UP groups				
Variables		IP group (<i>n</i> = 92)	UP group (<i>n</i> = 44)	<i>p</i> -value
IPAS	Before	80.32 (± 9.40)	83.14 (± 9.87)	0.119
	After	85.01 (± 11.51)	86.93 (± 10.72)	0.354
SEIEL	Before	73.22 (± 14.93)	78.14 (± 17.93)	0.091
	After	83.97 (± 17.24)	87.63 (± 18.65)	0.265
IP group and UP group in medical students				
Variables		IP group (<i>n</i> = 38)	UP group (<i>n</i> = 44)	<i>p</i> -value
IPAS	Before	82.47 (± 8.80)	83.14 (± 9.87)	0.801
	After	84.18 (± 12.15)	86.93 (± 10.72)	0.280
SEIEL	Before	72.82 (± 18.20)	78.14 (± 17.93)	0.216
	After	84.32 (± 17.88)	87.63 (± 18.65)	0.419
Medical students and nursing students in IP group				
Variables		Medical students (<i>n</i> = 38)	Nursing students (<i>n</i> = 54)	<i>p</i> -value
IPAS	Before	82.47 (± 8.80)	78.80 (± 9.59)	0.052
	After	84.18 (± 12.15)	85.59 (± 11.12)	0.566
SEIEL	Before	72.82 (± 18.20)	73.50 (± 12.31)	0.991
	After	84.32 (± 17.88)	83.72 (± 16.93)	0.872
<i>IPAS</i> Interprofessional Attitudes Scale, <i>SEIEL</i> Self-efficacy Perception for Interprofessional Experiential Learning, <i>IP</i> Interprofessional, <i>UP</i> Uniprofessional				

Comparison of the differences between before and after IPAS and SEIEL scale

Table 3 shows that the increase is slightly different for each group. Therefore, we compared the change in scores for each group and found that NSs' IPAS increased more than that of MSs in the IP group (Table 4). However, there were no significant changes in the SEIEL scores.

Table 4
Comparison of the differences between before and after for IPAS and SEIEL scores

Group	Variables	Before	After	<i>p</i> -value
All groups (<i>n</i> = 136)	IPAS	81.23 (± 9.61)	85.63 (± 11.26)	< 0.001
	SEIEL	74.79 (± 16.05)	85.13 (± 17.71)	< 0.001
IP group (<i>n</i> = 92)	IPAS	80.32 (± 9.40)	85.01 (± 11.51)	< 0.001
	SEIEL	73.22 (± 14.93)	83.97 (± 17.24)	< 0.001
Medical students in IP group (<i>n</i> = 38)	IPAS	82.47 (± 8.80)	84.18 (± 12.15)	0.018
	SEIEL	72.82 (± 18.20)	84.32 (± 17.88)	< 0.001
Nursing students in IP group (<i>n</i> = 54)	IPAS	78.80 (± 9.59)	85.59 (± 11.12)	< 0.001
	SEIEL	73.50 (± 2.31)	83.72 (± 16.93)	0.003
UP group (<i>n</i> = 44)	IPAS	83.14 (± 9.87)	86.93 (± 10.72)	0.001
	SEIEL	78.14 (± 17.93)	87.63 (± 18.65)	< 0.001
<i>IPAS</i> Interprofessional Attitudes Scale, <i>SEIEL</i> Self-efficacy Perception for Interprofessional Experiential Learning, <i>IP</i> Interprofessional, <i>UP</i> Uniprofessional				

Reaction To The Class

The satisfaction mean score of all of the students was 3.84 (± 0.90). There were no differences between IP group and UP group, between MSs in the IP group and UP group, or between MSs and NSs in the IP group, with the score ranging between 3.72–3.91 (Table 5).

Table 5
Comparison of the satisfaction scores

Groups		Delta_IPAS	p-value	Delta_SEIEL	p-value
All students	IP group (<i>n</i> = 92)	4.70 (± 11.22)	0.628	10.75 (± 15.66)	0.641
	UP group (<i>n</i> = 44)	3.80 (± 7.18)		9.49 (± 12.08)	
All medical students	IP group (<i>n</i> = 38)	1.71 (± 11.98)	0.353	11.50 (± 14.57)	0.499
	UP group (<i>n</i> = 44)	3.80 (± 7.18)		9.49 (± 12.08)	
IP group	Medical students (<i>n</i> = 38)	1.71 (± 11.98)	0.032	11.50 (± 14.57)	0.702
	Nursing students (<i>n</i> = 54)	6.80 (± 10.25)		10.22 (± 16.50)	
<i>IP</i> Interprofessional, <i>UP</i> Uniprofessional, <i>IPAS</i> Interprofessional Attitudes Scale, <i>SEIEL</i> Self-efficacy Perception for Interprofessional Experiential Learning, <i>Delta_IPAS</i> the differences between before and after IPAS, <i>Delta_SEIEL</i> the differences between before and after SEIEL					

A content analysis was conducted and categorized according to the groups. Similar content is indicated by frequency (Table 6). In the IP group, most common opinions were “I am interested in a class with nursing/MSs.” Some MSs stated that they had a better understanding of interprofessionalism and that they were amazed at the many fresh opinions from NSs. In UP group, there were no comments about interaction.

Table 6
Summary of narrative data of reaction to the class

Groups		Score	<i>p</i> -value
All (<i>n</i> = 136)		3.84 (± 0.90)	
All students	IP group (<i>n</i> = 92)	3.81 (± 0.95)	0.536
	UP group (<i>n</i> = 44)	3.91 (± 0.80)	
Medical students	IP group (<i>n</i> = 39)	3.72 (± 0.94)	0.322
	UP group (<i>n</i> = 44)	3.91 (± 0.80)	
IP group	Medical students (<i>n</i> = 39)	3.72 (± 0.94)	0.447
	Nursing students (<i>n</i> = 53)	3.87 (± 0.95)	
<i>IP</i> Interprofessional, <i>UP</i> Uniprofessional			
Category	Group	Contents (N)	
What they liked	IP group: Medical students	Interested in class with nursing students (20) Case-based discussion and making the presentation (7) A new way of teaching and learning (7) Role-play (4) Systematic fast-paced class (1) Deep understanding of interprofessionalism (1)	
	IP group: Nursing students	Interested in class with medical students (19) Role-play (15) Case-based discussion and making the presentation (10) Class contents (3)	

Groups		Score	<i>p</i> -value
	UP group	Role-play and revising scenario (21) Case-based discussion and making the presentation (10) Class contents (7) Good to concentrate due to a small number of students (1)	
What they think would improve the class	IP group: Medical students	Lack of teamwork formation time (8) Lack of class time (8) Confused by fast-paced class (4)	
	IP group: Nursing students	Passive in the class (10) Lack of class time (8) Lack of teamwork formation time (7) Need scenarios of various cases (5) Small classroom (2)	
	UP group	Need scenarios of various cases (9) Want to have a class with nursing students (6) Uncomfortable making the presentation (5) Slow paced class (2) Lack of class time (1)	
<i>IP</i> Interprofessional, <i>UP</i> Uniprofessional, N: frequency indicated			

Discussion

This study measured attitude and self-efficacy as well as participants' reaction to IPE in the IP group and UP group before and after IPE. Regardless of profession (medical/nurse) or group, all scores increased after IPE; however, the change in IPAS score for NSs were larger than that of MSs in any group. This improvement is not surprising, considering previous studies showing improved outcomes after IPE, regardless of profession [3–7].

We observed noticeable changes in the IPAS scores of NSs after IPE, but not in MSs' scores. Previous studies confirm that MSs do not change their bias about other occupations much after IPE. For MSs, there was no change from pretest to posttest in positive stereotypes of nurses. However, nurses' positive

stereotypes about doctors increased from pretest to posttest [8]. In another study, only NSs' SEIEL scores showed a significant increase in the interprofessional learning curriculum for medical, nursing, and physician assistant students in the United States [23]. This study used SEIEL, but not IPAS. Another possible reason for smaller IPAS score changes in MSs is that they are already fifth year. This means that they are actually the fifth year in medical college and have therefore been exposed to a "hidden curriculum" one year longer than NSs. Furthermore, there is definite difference in curricula between medical and nursing students, formal as well as hidden. Khalili et al. reported that if IPE is conducted with UP identity already formed, IP identity is developed as (1) breaking down barriers; (2) interprofessional role learning and interprofessional collaboration; and (3) dual identity development. Finally, professional and interprofessional favoritism and willingness and confidence in an interprofessional collaborative person-centered practice are formed [24]. If students from more than one profession learn together often, they can attain stage three (dual identity development). However, if uniprofessional students learn interprofessional communication, they can partially break down barriers and experience interprofessional role learning. Another possible reason for the small change is that the IP group MSs' baseline IPAS score seems higher than that of the NSs. However, considering that there was no statistical difference in the baseline IPAS, it cannot be a factor for this difference. Lastly, MSs are older than NSs because of the grade difference and there are more male MSs. As the mean age or sex ratio were not our study objectives, these factors were not investigated.

Considering only MSs, there is no difference between IP and UP groups in the before and after IPAS and SEIEL scores. This means that MS could get coterminous IPE effects, even though they were in the UP group, when there are some obstacles hard to overcome such as failure of curricula coordination or absence of other healthcare-associated students at a close distance. Previous studies comparing IP and UP groups reported some positive effects in the UP group when the same program is used [12, 14]. In short, presenting IPE to an IP group is better than to a UP group, but presenting it to a UP group is better than nothing.

Regarding the satisfaction score, there were no differences between groups or between professions (medical/nurse). IP group students found it interesting to learn with their counterpart students and stated that the lack of teamwork building time was a shame. Some said that it was their first time to talking to someone of the other profession. This was surprising because they study at the same campus and do clinical clerkship in the same hospital. Some MSs and some NSs in our college even share the same dormitory or participate together in some club activities. Students also liked the learning methods, such as role-play and case-based discussion. As UP group students did not meet NSs, they said it would be more interesting and that they would understand the topic better if they interacted with NSs during IPE.

Although IPE should comprise active participation and interaction among students from more than one health profession [15], interaction in a single profession group seems to have some effect. Similar to our study, an existing study on only MSs found that there was a competency increase in interpersonal communication measured by the Global Interpersonal Communication Competence Scale [25].

Limitations

This study has several limitations. The study is limited by short duration of the intervention and by only cross-sectional information. Some students also mentioned the lack of team building time. Repeating IPE over time is necessary to consolidate competence acquisition and to encourage teambuilding. As there was no UP NSs group in this study, it was impossible to compare the IP NSs group with UP NSs group. The entrance quota of MSs is almost twice that of NSs in this study. Social desirability bias might be an issue in the survey of attitudes and self-efficacy; however, the narrative reactions collected anonymously seems to be straightforward.

Conclusion

In our study, the UP group experienced similar IPE effects as the IP group, based on the SEIEL and IPAS scores. When IPE is presented, there would be the similar team communication effects in the MSs UP group. However, it would be desirable for the students to interact with students of other professions, contingent upon curriculum coordination and support from the school system. NSs' attitudes toward interprofessionalism showed a more positive change than that of MSs. However, factors such as different sex ratio and age should be investigated further.

Abbreviations

IPAS

the Interprofessional Attitudes Scale

SEIEL

the Self-Efficacy perception for Interprofessional Experiential Learning scale

Declarations

Ethics approval and consent to participate

This study was approved by the Institutional Review Board of Yonsei University Wonju Christian Severance Hospital (CR318144).

Consent for publish

Not applicable

Availability of data and materials

Readers can contact corresponding authors (KHP) for further information and access to the quantitative data.

Competing interests

The authors declare that they have no competing interests.

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This study was approved by the Institutional Review Board of Yonsei University Wonju Christian Severance Hospital (CR318144).

Authors' contributions

Park YC and Park KH participated in the conception and design of the study, analyzed and interpreted the data. Park YC collected the data for the study and drafted the manuscript. Park KH critically reviewed the manuscript. Both authors have read and approved the final manuscript. We certify that we have each made a substantial contribution so as to qualify for authorship.

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Figures

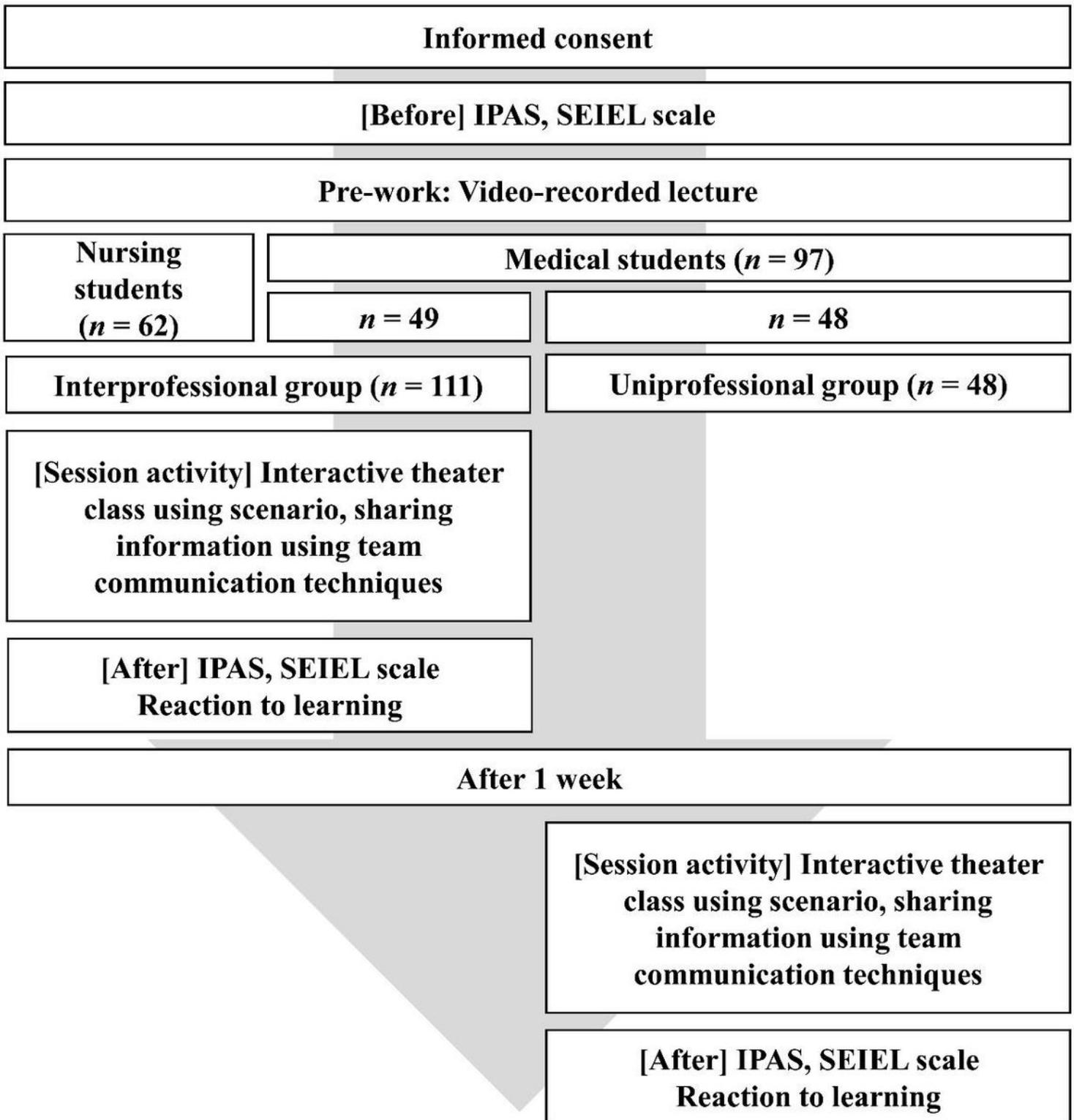


Figure 1

Study process