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The QUIPPED Project: Students' Attitudes Toward Integrating Interprofessional Education into the Curriculum

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Abstract

Background: healthcare learners are the future healthcare providers. The preparation they receive in their pre-registration programs will be vital to ensuring that they practice patient-centred care. One approach to this learning model is interprofessional education (IPE).

Methods and Findings: Learner attitudes towards interprofessional education and practice were obtained over a thirty-three month period from the Queen's University Inter-Professional Patient-centred Education Direction (QUIPPED) project. Attitudes were measured by questionnaires based on a 6-point Likert scale. The learners received a number of opportunities to engage in IPE and demonstrated positive attitudes. The degree to which one or more educational initiatives can make a difference in attitude is limited. However, over the course of the project both statistically significant and clinically meaningful differences were found. Different health professional student groups, including medical, medical radiation technology, nursing, occupational therapy, and physical therapy learners varied in their attitudinal responses, demonstrating they have already acquired professional identity.

Conclusions: Recommendations include offering varied opportunities to learners, and providing them with the tools to communicate and collaborate together. Limitations include a lack of empirical evidence as to whether IPE translates into interprofessional practice and better patient-centred care.

Keywords: Interprofessional education; Attitudes; Curriculum reform; Healthcare learners

Background

Health Canada identified interprofessional practice (IPP) as one component of the health human resource strategy that would engage all healthcare providers in delivering effective and efficient care to Canadians. Through a series of invited papers, systematic reviews, and presentations, Health Canada helped develop a group of knowledgeable experts in IPP and interprofessional education (IPE) [1]. The majority of the Health Canada funding, approximately $20 million, was targeted to Canadian universities that had schools of medicine and nursing and at least one other health professional program to integrate IPE into pre- and post-registration (licensure) health education.

The Queen's University Inter-Professional Patient-centred Education Direction (QUIPPED) project was a thirty-three month endeavour to determine the effect of IPE on healthcare learners. Researchers in the Faculty of Health Sciences at Queen's University were awarded CAD $1.2 million in the summer of 2005 to transform the approach to pre-registration education for medicine, nursing, medical radiation

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technology, occupational therapy, and physical therapy from one where there was little interaction across the programs to one where interprofessional competencies are taught, acquired, and practiced in the classroom and clinical settings. Additional specialties including education, theology, law, and psychology were also involved to a lesser degree.

The project took a critical action research approach. A description of the process is published elsewhere [2-4]. In brief, all forms of action research share some common features such as the relationship between theory and practice, the value of participation, and the capacity of research to address practical problems in specific situations [5]. Action research is also cyclical, and we found that we had three cycles of action occurring simultaneously. One action cycle was the development and integration of curricula, the second was faculty engagement, and the third was tackling organizational structure and processes within health science education across the professions.

In addition, critical theory is based on the premise that because all people are socially located, knowledge is influenced by an inquirer's norms, values, and interests [6,7]. As a result, the research process requires a critical examination of the assumptions underlying knowledge that is held to be common sense.

Prior to the start of the project, there were several ad hoc opportunities for students to engage in learning with other professions, but there was little formal IPE. Examples include the Intimate Partner Violence workshop, which was geared toward medical students, with other learners welcome to attend. In addition, some early attempts to combine a communication skills lab across several healthcare professional programs had failed to be integrated permanently into pre-licensure health education programs as there was no organizational process in place to include learners from different professional schools in the same course.

The QUIPPED project aimed to develop new opportunities for interprofessional learning or to restructure existing opportunities, using modalities such as small group learning to encourage interprofessional interaction and learning. Examples include the aforementioned Intimate Partner Violence workshop, which was restructured to include interactive small group IP learning, and an Intellectual Disabilities module, which was developed using a small group IP learning format that included clients with intellectual disabilities. Also, the School of Nursing received a grant to open a high-fidelity simulation laboratory. This was expanded into a faculty-wide health science learning environment [8], which then could foster IP opportunities. We also examined the CanMEDS roles, that is the roles for physicians as defined by the Royal College of Physicians and Surgeons in Canada, and discovered overlap in competencies that informed future interventions [9,10]. Finally, an interprofessional rural professions credit course was developed with an additional grant [11].

The QUIPPED project was a partnership between faculty and learners, with both groups engaged in interprofessional learning and planning activities. Students were involved in activities ranging from writing IP proposals and organizing IPE workshops to carrying out small-scale interprofessional projects and publishing

their findings [12-16]. It was hypothesized that if students responded favourably to IPE, then they would become the early adopters who could convince other faculty to engage in IPE and thereby create a workforce who prefers to practice in this way.

The purpose of this article is to describe the student readiness for and attitudes regarding IPE across the pre-registration programs of medicine, nursing, occupational therapy, and physical therapy. We hypothesized that attitudes would be less positive at the baseline assessments than at subsequent assessments, and that there would be measurable differences between students in different programs.

Methods

This was a prospective evaluation of several consecutive cohorts of students from the programs of medicine, nursing, occupational therapy, and physical therapy. There was also participation from medical radiation technology, psychology, education, law, and theology, but because of the small sample size for these groups, results from the four primary groups are presented here. Qualitative data from focus groups, key informant interviews, and open-ended questionnaires are not the focus of this article; rather, we focus on quantitative data collected using Likert scales, as described below. The QUIPPED project received ethics approval from the Queen's University and Affiliated Hospitals Research Ethics Board.

Questionnaires were developed using some items from the Readiness for Interprofessional Learning Scale (RIPLS) [17], others from the Interdisciplinary Education Scale [18,19], and others that were developed specifically for each IP initiative within this project. Each question used a Likert scale that ranged from 1 to 6, scored from strongly disagree (1) to strongly agree (6). A neutral option was not included, forcing participants to choose a negative or positive statement. After the first year, feedback from students suggested that there were too many questions and some redundancy. A factor analysis was used to reduce the number of questions, and some were reworded. No validity studies were conducted on the final questionnaires. Unique identifiers for questionnaires were not in place in the first year, but were developed for students in the second year, which allowed us to track changes in attitudes before and after an initiative for the subsequent two years. Year 1 data were included in these analyses even though the sample was relatively small, as they provide important baseline data.

As mentioned above, this project took a critical action research approach, which meant that there was a constant loop of planning, implementing change, reviewing results, and planning again. As a result, there were small differences between years as well as differences between the items asked at each of the workshops and courses. Most importantly, completing pre and post tests for every IP activity was time consuming and often repetitive, and in Year 1 the students overwhelmingly asked to fill in only one survey per activity. A less-than-optimal post-test-only design was then used for IP activities to facilitate collection of data from all students at least once, rather than having pre- and post- data from a small subset. This was a pragmatic decision taken in critical action research to respond to the participants to ensure we had maximum participation. In addition, IPE time per topic ranged from a mini-

mum of a one-hour lab experience (Simulation Lab Venipuncture and Airway Management) to a maximum of 12 weeks (Rural Professionals' course).

The combination of results from multiple IPE workshops and courses of differing lengths is not optimal. However, at its most basic, these are assessments of IPE activities, and it was considered the most parsimonious way to present an overview of a large amount of data. Most questionnaires also had a large number of items, ranging from 20 to 30 items. For the purpose of this article, only items that were consistent among activities are presented here. Those that showed statistical significance (or notable absence thereof) are presented in Tables 2–4, while the remaining items are presented in the appendices.

The faculty members in each school identified which of the topics would be most relevant to their students and then offered it as core content or as an elective. Questionnaires were offered to all students in the IPE activities, and a sealed box was provided for their return. Time was provided following each activity to complete the questionnaires. Attitudes before and after the IPE initiatives, differences on readiness for IPE learning, and cohort changes over the three years of the project were tracked.

Data were entered into an SPSS (version 16 for Windows) spreadsheet for statistical analysis. Although the data are ordinal in nature and the use of inferential statistics is not optimal in this situation, they were used for several reasons. First, this was considered preferable to a large volume of chi-square tests. A comparison of medians was also considered, but groups often had similar median values, whereas subtle differences were highlighted when means were used. Finally, the sample size for the majority of the comparisons was sufficiently substantial to allow the use of inferential statistics in this situation [20].

To address the first hypothesis, independent samples *t*-testing was used to compare pre/post data, as unique identifiers to facilitate paired samples *t*-testing were not always available. For the second hypothesis, independent samples *t*-tests (2 groups) and one-way analysis of variance (ANOVA) (more than 2 groups) were used to identify between-specialty differences, with Tukey's post-hoc testing to identify exactly which groups differed. In addition to the standard criteria for statistical significance ($p < .05$), a result was determined to be clinically significant if the comparison showed a difference larger than 0.5 points. This was an *a priori* clinical judgement as we wanted to determine if there were significant differences, and in past research we have used a difference of 0.5 on Likert scales as a clinical threshold.

Results

During the 33 months of the study, the student population available at Queen's University consisted of approximately 100 medical, 110 nursing, 40 occupational therapy (OT), and 40 physical therapy (PT) students annually, with some inter-year variability. At the end of the 33 months, a total of 1613 questionnaires had been collected from 1711 participants. Of these, 302 (18.7%) were pre-workshop only, 747 (46.3%) were post-workshop only, 323 (20.0%) were pre-workshop with identification for pre/post matching, and 241 were post-workshop surveys that could be matched to the 323 pre-workshop surveys. The age of the respondents ranged from

17 to 73 years, with a mean of 25.0 years (SD = 5.5 years). The majority of respondents (72.1%) were female.

Table 1

Interprofessional education modules, number of participants, and professional school of participants

Module/course (# respondents)	Professional affiliation (% by discipline)	Mandatory or elective	Length
Rural Professionals' course (98)	Medicine (10.2) Nursing (26.5) OT (13.3) PT (7.1) Education (21.4) Theology (19.4) Law (2.0)	Elective	Twelve weeks
Intimate Partner Violence workshop (398)	Medicine (42.7) Nursing (47.2) OT (3.5) PT (0.5) Medical radiation (6.0)	Mandatory for medicine, elective for all others	One day
Simulation lab - venipuncture and airway management (244)	Medicine (50.8) Nursing (39.3) Medical radiation (9.8)	Mandatory for medicine and nursing, elective for medical radiation	One hour
Simulation lab - resuscitation skills (72)	Medicine (37.5) Nursing (62.5)	Mandatory	Two hours
Health Together workshop (73)	Medicine (54.8) Nursing (8.2) OT (17.8) PT (15.1) Medical radiation (4.1)	Elective	Three hours
Communication/ Competency session (347)	Medicine (56.5) Nursing (1.2) OT (22.2) PT (19.3) Pharmacy (0.9)	Elective	Two hours
Wellness (Interprofessional teaching staff) (37)	Medicine (100.0)	Elective	Three hours
Intellectual Disabilities workshop (252)	Medicine (44.1) Nursing (21.0) OT (11.5) PT (12.7) Medical radiation (2.4) Pharmacy (0.8) Psychology (7.5)	Mandatory for medicine and occupational therapy	Half day

Number of respondents totals 1521 rather than 1613 as not all indicated their profession.

Table 1 contains the number of participants and the health professional groups represented in each of the teaching modules or courses included in this report. Each of the analyses presented in the subsequent tables differed in terms of sample size, as every session had a different number of students; some results are pre/post while others are not; and some courses and workshops were elective while others were compulsory. As a result, Table 2 is based on pre/post assessments for medicine, nursing, OT, and PT (independent samples *t*-tests), Table 3 is based on a cross-sectional comparison of the four primary disciplines (one-way ANOVA), and Table 4 is based on a comparison of available data for three years (one-way ANOVA).

Table 2

Change in attitudes within professions before and after participating in an IPE activity (*N* = 448)*

Item		Medicine (*N* = 215)	Nursing (*N* = 142)	OT (*N* = 54)	PT (*N* = 37)
Communication skills should be learned with other healthcare learners.	Pre	**4.48**	5.21	5.02	5.08
	Post	**4.76**	5.35	5.28	5.38
Shared learning will help me to think positively about other professionals.	Pre	4.67	**5.12**	4.93	5.00
	Post	4.87	**5.36**	5.13	5.35
Team-working skills are essential for all healthcare learners.	Pre	5.33	**5.44**	5.41	5.73
	Post	5.45	**5.56**	5.62	5.53
Clinical problem-solving skills can only be learned with learners from my own profession.	Pre	2.64	**2.64**	1.95	2.19
	Post	2.48	**2.06**	1.93	1.79
Shared learning with other healthcare learners will help me to communicate better with patients and other professionals.	Pre	4.51	**5.03**	**4.90**	5.08
	Post	4.63	**5.25**	**5.26**	5.12
I would welcome the opportunity to work on small-group projects with other healthcare learners.	Pre	4.28	**4.81**	**4.78**	4.84
	Post	4.39	**5.19**	**5.17**	5.09
Shared learning will help to clarify the nature of patient problems.	Pre	4.43	**4.91**	5.02	4.95
	Post	4.54	**5.29**	5.20	5.12
Shared learning will help me become a better team worker.	Pre	4.60	**4.99**	5.10	5.11
	Post	4.71	**5.38**	5.28	5.24

*Mean response values range from 1 to 6, with higher values indicating stronger agreement.
Bold = $p < .05$ statistically significant; **Underscore** = clinically significant difference of > 0.5

Changes in Attitude Within Professions Taken Immediately Before and After an IPE Initiative

Pre and post data were available for 448 participants, including 215, 142, 54, and 37 from medicine, nursing, OT, and PT respectively. Mean differences before and after IPE activities are presented in Table 2 for each of the four professions, while the remaining items are presented in the appendices. For medicine, 7/8 items had an

increase in score, with one attaining statistical significance. The remaining item showed a drop but had reversed coding such that a better attitude would be presented by a lower score ("*Clinical problem solving skills can only be learned with learners from my own profession*"). So, within medicine, all questions presented in Table 2 showed an improvement. The same was true for nursing, where 6/8 attained statistical significance and a seventh was both statistically and clinically significant (clinical significance defined earlier as a difference larger than 0.5 points). OT showed improvements across the board as well, although only 2 attained statistical significance. For PT, 7/8 showed improvement, but none were statistically significantly different; one item ("*Team-working skills are essential for all healthcare learners*"), showed a small decline of 0.2 points overall.

Table 3

Differences between professional students on readiness for interprofessional learning (*N* = 445)*

Item	Medicine (*N* = 215)	Nursing (*N* = 142)	OT (*N* = 54)	PT (*N* = 34)
Learning with other healthcare learners will help me become a more effective member of a healthcare team.	**4.95[a]**	**5.44[b]**	**5.43[c]**	5.32
Patients would ultimately benefit if healthcare learners worked together to solve patient problems.	**5.44[d]**	**5.70[b]**	5.63	5.62
Shared learning with other healthcare learners will increase my ability to understand clinical problems.	**4.73[e]**	**5.44[b]**	**5.52[c]**	**5.35[f]**
Communication skills should be learned with other healthcare learners.	**4.76[e]**	**5.35[b]**	**5.28[c]**	**5.38[f]**
Shared learning will help me to think positively about other professionals.	**4.87[g]**	**5.36[b]**	5.13	**5.35[f]**
For small group learning to work, learners need to trust and respect each other.	5.24	5.38	5.33	5.47
Team-working skills are essential for all healthcare learners.	5.45	5.56	5.62	5.53
I would welcome the opportunity to work on small-group projects with other healthcare learners.	**4.39[e]**	**5.19[b]**	**5.17[c]**	**5.09[f]**
Shared learning will help me become a better team worker.	**4.71[e]**	**5.38[b]**	**5.28[c]**	**5.24[f]**

*Mean response values range from 1 to 6, with higher values indicating stronger agreement.

Bold = $p < .05$ statistically significant; **Underscore** = clinically significant difference of > 0.5

a. Medicine is significantly different than nursing and OT
b. Nursing is significantly different than medicine
c. OT is significantly different than medicine
d. Medicine is significantly different than nursing
e. Medicine is significantly different than nursing, OT, and PT
f. PT is significantly different than medicine
g. Medicine is significantly different than nursing and PT

Differences Between Professional Students on Readiness for Interprofessional Learning

Table 3 outlines the differences in readiness for IPE for 445 participants, with the same representation as above from medicine, nursing, and OT, but 34 instead of 37 from PT. The medical students were the least positive about interprofessional learning on all 9 of the items presented, as compared to the other professional groups. Nursing had the highest mean score on 6/9, OT had the highest on 1/9, and PT had the highest on 2/9. Despite these differences, all four groups were very close on two items ("For small group learning to work, learners need to trust and respect each other" and "Team-working skills are essential for all healthcare learners"), with none of the differences attaining statistical significance.

Three responses showed both statistically and clinically significant differences between those in medicine and those in the other three health professional programs. Medical students had less support for shared learning as a way to increase their ability to understand clinical problems; they were less favourable toward working on small group projects with others; and they had less support for the statement that shared learning would help them become better team workers.

Table 4

Changes in attitudes of healthcare learners over three years*

Item	Year 1 ($N = 86$)	Year 2 ($N = 695$)	Year 3 ($N = 195$)
Individuals in my profession make every effort to understand the capabilities and contributions of other professions.	**4.66**	**4.33**	**4.48**
Individuals in my profession are knowledgeable about the roles and responsibilities of other health professionals.	**4.98**	**4.39**	**4.27**
Individuals in my profession respect the work done by other professions.	**5.10**	**4.82**	**5.06**
Individuals in my profession must depend on the work done by people in other professions.	5.11	5.37	5.23
Individuals in my profession think highly of other related professions.	4.92	4.71	4.72
Individuals in other professions are knowledgeable about my profession's roles and responsibilities.	4.25	4.23	4.37
Individuals in other professions respect the work done by my profession.	**4.22**	**4.67**	**4.80**
Individuals in other professions think highly of my profession.	**4.05**	**4.40**	**4.74**

*Mean response values range from 1 to 6, with higher values indicating stronger agreement.
Bold = $p < .05$ statistically significant; **Underscore** = clinically significant difference of > 0.5

Changes in Attitudes over the Three Years of the QUIPPED Project

Table 4 presents the data for three different cohorts of students across the three years of the QUIPPED study. While the sample from Year 1 is relatively small ($N = 86$), it provides a useful baseline assessment. For 5 of the 7 statements, there is an initial drop between Year 1 and Year 2 regarding the perception of the knowledge of, and respect for, other disciplines. Of these, 4 rebounded by year 3, whereas one ("Individuals in my profession are knowledgeable about the roles and responsibilities of health professionals") continued to decline. The last two statements presented in Table 4 became more positive over the course of the three years, with the changes attaining both statistical and clinical significance.

Discussion

The number of learners who participated in the QUIPPED project and provided data on their attitudes toward IPE learning provides a robust data set for the disciplines of medicine, nursing, OT, and PT. The discipline of medicine tended to have the lowest scores when compared with the other three, but all disciplines showed considerable improvements in their attitudes toward IPE after participating in the workshops. Learners initially had a high perceived understanding of both their own profession and others, but this declined slightly over the course of the project. It appears that as they learned more about other disciplines, they realized that that they did not know as much as they initially thought they did.

Despite the large cohort of participants, a limitation of this study is that the methods changed across the years, making it difficult to analyze data from the entire cohort at once. During year 1, pre- and post- tests were dropped in favour of a post-test-only approach at the request of the participants, as participation in multiple initiatives meant burdensome, time-consuming, and often repetitive completion of questionnaires. This was a pragmatic decision taken in critical action research to respond to the participants to ensure we had maximum participation, allowing us to obtain data from all students at least once, rather than pre and post data for a subset. An additional limitation was that the limited use of unique identifiers, which meant that paired samples or repeated measures testing could not be done for the majority of the sample, and that the instruments used were not validated in advance.

Based on a subset of 880 learners, we were able to determine that attitudes toward interprofessional learning differed across the professions. It is important to understand that if there are differences that are specific to a particular type of healthcare student group, we may need to tailor interprofessional learning activities to account for those differences. Over the short term we hoped to have affected attitudes toward learning together. Some of the attitudes became more positive, but as the data were already skewed to the positive side, the differences were often not clinically meaningful. We did not find that any one professional group was negative, just that some, particularly the medical students, were less positive than the others. The question on changes in attitudes over different cohorts about understanding each other's knowledge of roles and responsibilities became slightly more negative, but the result was still in the "agree" category.

Change over time has been studied by others longitudinally [21,22]. Both of these studies similarly reported enthusiasm for IPE, with a drop over time. We believe that the slight decline in our study came about as students realized that interprofessional practice, while essential, was not necessarily going to be easier. The results presented in Table 3 support the belief that student groups differ on many different domains, and so one approach to education will not be acceptable to all, as students learn differently [23]. A study of learners' perceptions on "interprofessional collaboration," which showed that different student groups have different ideas on what collaboration means, supports this idea that real-time collaboration between professions may be more difficult than students expected [24].

As the students learn more about themselves, they appreciate more fully the complexity of healthcare and working collaboratively. Coster and colleagues [21] emphasize how important it is to have a series of IPE activities over the course of a program, rather than a single isolated activity. The authors also outlined the importance of designing courses that do "enthuse students" (p. 1679), as negative experiences could put them off interprofessional practice completely. At Queen's we recognize that students should have choice over IPE activities if the overall goal is to prepare them enthusiastically for practice. We are attempting to have a menu of options so that students can choose those workshops/courses/modules that they feel are most relevant.

Engaging students who are optimistic about the differences they can make in future practice, as identified by Hoffman and colleagues [25], was supported by the students in our study. That is the students who identified optimism also believed they could practice inter-professionally in the future. While the Hoffman study was qualitative with small numbers of students, some of them in all likelihood participated in Queen's activities. The Hoffman study included students from Queen's as well as other students involved in the Health Canada funded IPE studies. There has been a sustained student engagement and enthusiasm for IPE and IPP in Canada, so perhaps some of the responses were also socially desirable, in that they believe IPE is how they should be educated.

Conclusion

Student attitudes toward other health professionals can be altered by engaging them in interprofessional activities. Their enthusiasm for collaborative learning helps them to work together, but educators need to ensure that the outcomes of the learning activity do not produce negative attitudes and feelings toward others. The QUIPPED project allowed the researchers to study attitudes during and after a number of activities, as well as over the course of the three-year study. We recognized overall that some attitudes were more positive than others. We would suggest that an IPE curriculum should give students choice about the activities they engage in to ensure that each IPE activity is positive for a given student. Finding differences in attitudinal scores is difficult when they engage initially with a lot of enthusiasm, so we would suggest that other outcomes are worth studying. Student attitudes during the QUIPPED project provided the motivation for the research team to con-

tinue developing an IPE curriculum, especially at times when scheduling and running activities were logistically difficult and time consuming. Our students are the future healthcare professionals who will hopefully demand to work more collaboratively, with the patient front and centre in healthcare.

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Appendix 1

Additional changes in attitudes within professions before and after participating in an IPE activity (Table 2 Expansion)

	Group	Medicine	Nursing	OT	PT
Individuals in my profession make every effort to understand the capabilities and contributions of other professions	Pre	4.04	4.58	4.73	4.46
	Post	4.11	4.62	4.99	4.77
Individuals in my profession are knowledgeable about the roles and responsibilities of other health professionals	Pre	4.18	4.76	4.71	4.51
	Post	4.15	4.62	4.84	4.76
Individuals in my profession must depend upon the work done by people in other professions	Pre	5.54	5.02	5.15	4.86
	Post	5.56	5.14	4.94	5.02
Individuals in my profession respect the work done by other professions	Pre	4.71	4.96	5.27	5.04
	Post	4.66	5.06	5.30	5.23
Individuals in my profession think highly of other related professions	Pre	4.53	4.80	5.16	4.76
	Post	4.55	4.85	5.02	4.97
Individuals in other professions are knowledgeable about my profession's roles and responsibilities	Pre	4.67	3.95	2.64	3.48
	Post	4.72	4.11	2.82	3.52
Individuals in other professions are willing to collaborate with individuals in my profession	Pre	4.91	4.49	4.00	4.36
	Post	5.00	4.64	4.31	4.57
Individuals in other professions respect the work done by my profession	Pre	5.04	4.04	3.77	4.44
	Post	5.01	4.28	4.13	4.60
Individuals in other professions must depend upon the work done by my profession	Pre	5.41	5.26	4.32	4.59
	Post	5.35	5.16	4.46	4.65
Individuals in other professions think highly of my profession	Pre	4.93	3.98	3.43	4.10
	Post	4.90	4.05	3.75	4.35
Learning with other healthcare learners will help me become a more effective member of a health team	Pre	4.93	5.17	5.22	5.50
	Post	4.95	5.44	5.43	5.32
Patients would ultimately benefit if healthcare learners worked together to solve patient problems	Pre	5.42	5.61	5.59	5.76
	Post	5.44	5.70	5.63	5.62
Shared learning with other healthcare learners will increase my ability to understand clinical problems	Pre	4.62	5.27	5.39	5.35
	Post	4.73	5.44	5.52	5.35
Learning with healthcare learners would improve relationships in the practice setting	Pre	4.86	5.30	5.24	5.35
	Post	4.95	5.40	5.33	5.44
For small group learning to work, learners need to trust and respect each other	Pre	5.15	5.30	5.32	5.57
	Post	5.24	5.38	5.33	5.47
Shared learning will help me to understand my own limitations	Pre	4.50	4.80	4.78	4.97
	Post	4.72	5.21	5.09	4.97

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	Group	Medicine	Nursing	OT	PT
I don't want to waste my time learning with other healthcare learners	Pre	2.40	2.04	1.92	1.81
	Post	2.28	1.62	1.62	1.76
It is not necessary for pre-post licensure for health care learners to learn together	Pre	2.47	2.18	2.17	2.03
	Post	2.43	1.87	1.93	1.76
The function of nurses and physical/occupational therapists is mainly to provide support for doctors	Pre	2.60	1.95	1.80	1.51
	Post	2.51	2.00	1.93	1.56
I'm not sure what my professional role will be	Pre	2.09	2.32	2.68	2.51
	Post	2.21	2.20	2.30	2.12
I have to acquire much more knowledge and skills than other healthcare learners	Pre	3.97	3.05	2.29	2.24
	Post	3.86	2.81	2.35	2.32
Co-operation is important	Pre	2.53	2.50	2.41	2.32
	Post	2.27	2.31	2.21	2.38
Responsibility is important	Pre	3.01	4.50	3.26	2.88
	Post	3.26	3.71	3.38	2.95
Autonomy is important	Pre	4.94	5.00	5.31	5.21
	Post	5.02	5.24	5.23	5.31
Communication is important	Pre	1.63	1.50	1.79	1.56
	Post	1.67	1.60	1.88	1.57
Coordination is important	Pre	3.32	3.50	4.05	4.06
	Post	3.09	3.44	3.70	3.81
Assertiveness is important	Pre	5.09	4.00	4.59	4.74
	Post	5.04	4.36	4.79	4.83
Individuals in my profession make every effort to understand the capabilities and contributions of other professions	Pre	4.18	4.51	4.68	4.38
	Post	4.00	4.61	5.08	4.86
Individuals in my profession are knowledgeable about the roles and responsibilities of other health professionals	Pre	4.28	4.78	4.59	4.30
	Post	4.10	4.57	4.75	4.77
Individuals in my profession must depend upon the work done by people in other professions	Pre	5.45	5.10	5.20	4.78
	Post	5.55	5.02	5.17	5.02
Individuals in my profession respect the work done by other professions	Pre	4.83	4.97	5.34	5.16
	Post	4.63	5.08	5.31	5.26
Individuals in other professions are knowledgeable about my profession's roles and responsibilities	Pre	4.64	4.08	2.66	3.30
	Post	4.67	4.07	2.94	3.63

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	Group	Medicine	Nursing	OT	PT
Individuals in other professions are willing to collaborate with individuals in my profession	Pre	4.92	4.53	4.02	4.35
	Post	4.97	4.58	4.31	4.60
Individuals in other professions respect the work done by my profession	Pre	5.02	4.21	3.76	4.30
	Post	5.08	4.23	4.14	4.63
Individuals in other professions must depend upon the work done by my profession	Pre	5.27	5.22	4.15	4.49
	Post	5.31	5.19	4.46	4.70
Shared learning opportunities with other health professionals would foster more effective inter-professional collaboration	Pre	4.22	5.30	5.24	5.06
	Post	5.11	5.56	5.69	5.64
Inter-professional collaboration in the development of a patient care plan will better meet the needs of the patient	Pre	5.26	5.57	5.62	5.59
	Post	5.56	5.67	5.69	5.82
Interdisciplinary team meetings foster acceptance, consideration and respect for the opinions of other team members	Pre	4.76	5.23	5.18	5.06
	Post	5.21	5.64	5.62	5.64
Inter-professional collaboration will help me to understand my own professional roles and responsibilities	Pre	4.44	5.11	4.83	4.78
	Post	5.01	5.49	5.62	5.64

Appendix 2

Additional differences between professional students on Readiness for Interprofessional Learning (Table 3 Expansion)

Item		*N*	Mean
Individuals in my profession make every effort to understand the capabilities and contributions of other professions	Medicine	474	4.11
	Nursing	279	4.62
	OT	70	4.99
	PT	48	4.77
Individuals in my profession are knowledgeable about the roles and responsibilities of other health professionals	Medicine	436	4.15
	Nursing	271	4.62
	OT	68	4.84
	PT	46	4.76
Individuals in my profession must depend upon the work done by people in other professions	Medicine	471	5.56
	Nursing	279	5.14
	OT	70	4.94
	PT	48	5.02
Individuals in other professions respect the work done by my profession	Medicine	474	4.66
	Nursing	277	5.06
	OT	70	5.30
	PT	48	5.23
Individuals in my profession think highly of other related professions	Medicine	362	4.55
	Nursing	238	4.85
	OT	56	5.02
	PT	37	4.97
Individuals in other professions are knowledgeable about my profession's roles and responsibilities	Medicine	435	4.72
	Nursing	272	4.11
	OT	68	2.82
	PT	46	3.52
Individuals in other professions are willing to collaborate with individuals in my profession	Medicine	300	5.00
	Nursing	201	4.64
	OT	68	4.31
	PT	46	4.57
Individuals in other professions respect the work done by my profession	Medicine	473	5.01
	Nursing	277	4.28
	OT	69	4.13
	PT	48	4.60
Individuals in other professions must depend upon the work done by my profession	Medicine	299	5.35
	Nursing	199	5.16
	OT	68	4.46
	PT	46	4.65
Individuals in other professions think highly of my profession	Medicine	363	4.90
	Nursing	240	4.05
	OT	57	3.75
	PT	37	4.35

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Item		*N*	Mean
Learning with other healthcare learners will help me become a more effective member of a health team (also in Table 3)	Medicine	215	4.95
	Nursing	141	5.44
	OT	54	5.43
	PT	34	5.32
Patients would ultimately benefit if healthcare learners worked together to solve patient problems (also in Table 3)	Medicine	215	5.44
	Nursing	142	5.70
	OT	54	5.63
	PT	34	5.62
Shared learning with other healthcare learners will increase my ability to understand clinical problems (also in Table 3)	Medicine	215	4.73
	Nursing	142	5.44
	OT	54	5.52
	PT	34	5.35
Learning with healthcare learners would improve relationships in the practice setting	Medicine	215	4.95
	Nursing	141	5.40
	OT	54	5.33
	PT	34	5.44
Communication skills should be learned with other healthcare learners (also in Table 3)	Medicine	215	4.76
	Nursing	142	5.35
	OT	54	5.28
	PT	34	5.38
Shared learning will help me to think positively about other professionals (also in Table 3)	Medicine	215	4.87
	Nursing	142	5.36
	OT	53	5.13
	PT	34	5.35
For small group learning to work, learners need to trust and respect each other (also in Table 3)	Medicine	215	5.24
	Nursing	142	5.38
	OT	54	5.33
	PT	34	5.47
Team-working skills are essential for all healthcare learners (also in Table 3)	Medicine	215	5.45
	Nursing	142	5.56
	OT	53	5.62
	PT	34	5.53
Shared learning will help me to understand my own limitations	Medicine	213	4.72
	Nursing	141	5.21
	OT	54	5.09
	PT	34	4.97
I don't want to waste my time learning with other healthcare learners	Medicine	212	2.28
	Nursing	141	1.62
	OT	53	1.62
	PT	33	1.76
It is not necessary for pre-post licensure healthcare learners to learn together	Medicine	213	2.43
	Nursing	141	1.87
	OT	54	1.93
	PT	33	1.76

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Item		*N*	Mean
Clinical problem-solving skills can only be learned with learners from my own profession	Medicine	214	2.48
	Nursing	140	2.06
	OT	54	1.93
	PT	34	1.79
Shared learning with other healthcare learners will help me to communicate better with patients and other professionals	Medicine	213	4.63
	Nursing	141	5.25
	OT	54	5.26
	PT	34	5.12
I would welcome the opportunity to work on small-group projects with other healthcare learners (also in Table 3)	Medicine	213	4.39
	Nursing	140	5.19
	OT	54	5.17
	PT	34	5.09
Shared learning will help to clarify the nature of patient problems	Medicine	213	4.54
	Nursing	140	5.29
	OT	54	5.20
	PT	34	5.12
Shared learning will help me become a better team worker (also in Table 3)	Medicine	214	4.71
	Nursing	138	5.38
	OT	53	5.28
	PT	33	5.24
The function of nurses and physical/occupational therapists is mainly to provide support for doctors	Medicine	213	2.51
	Nursing	140	2.00
	OT	54	1.93
	PT	34	1.56
I'm not sure what my professional role will be	Medicine	214	2.21
	Nursing	138	2.20
	OT	54	2.30
	PT	34	2.12
I have to acquire much more knowledge and skill than the other healthcare learners	Medicine	210	3.86
	Nursing	136	2.81
	OT	54	2.35
	PT	34	2.32
Co-operation is important	Medicine	139	2.27
	Nursing	45	2.31
	OT	48	2.21
	PT	42	2.38
Responsibility is important	Medicine	139	3.26
	Nursing	45	3.71
	OT	48	3.38
	PT	42	2.95
Autonomy is important	Medicine	139	5.02
	Nursing	45	5.24
	OT	48	5.23
	PT	42	5.31

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Item		*N*	Mean
Communication is important	Medicine	139	1.67
	Nursing	45	1.60
	OT	48	1.88
	PT	42	1.57
Co-ordination is important	Medicine	139	3.09
	Nursing	45	3.44
	OT	47	3.70
	PT	42	3.81
Assertiveness is important	Medicine	139	5.04
	Nursing	45	4.36
	OT	48	4.79
	PT	42	4.83
Individuals in my profession make every effort to understand the capabilities and contributions of other professions	Medicine	209	4.00
	Nursing	129	4.61
	OT	52	5.08
	PT	43	4.86
Individuals in my profession are knowledgeable about the roles and responsibilities of other health professionals	Medicine	209	4.10
	Nursing	129	4.57
	OT	52	4.75
	PT	43	4.77
Individuals in my profession must depend upon the work done by people in other professions	Medicine	208	5.55
	Nursing	129	5.02
	OT	52	5.17
	PT	43	5.02
Individuals in my profession respect the work done by other professions	Medicine	209	4.63
	Nursing	129	5.08
	OT	52	5.31
	PT	43	5.26
Individuals in other professions are knowledgeable about my profession's roles and responsibilities	Medicine	209	4.67
	Nursing	129	4.07
	OT	52	2.94
	PT	43	3.63
Individuals in other professions are willing to collaborate with individuals in my profession	Medicine	209	4.97
	Nursing	129	4.58
	OT	52	4.31
	PT	43	4.60
Individuals in other professions respect the work done by my profession	Medicine	209	5.08
	Nursing	128	4.23
	OT	51	4.14
	PT	43	4.63
Individuals in other professions must depend upon the work done by my profession	Medicine	208	5.31
	Nursing	128	5.19
	OT	52	4.46
	PT	43	4.70
Shared learning opportunities with other health professionals would foster more effective inter-professional collaboration	Medicine	72	5.11
	Nursing	39	5.56
	OT	13	5.69
	PT	11	5.64