

Measuring student changes of role perceptions - IPE

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Measuring student changes of role perceptions in health professions before and after multiple interprofessional education workshops

Abstract

According to the Centre for Advancement of Interprofessional Education (CAIPE), interprofessional education (IPE) involves at least two health care professions working together. IPE frameworks typically focus on teamwork, shared decision-making, and role clarification as crucial competency areas. In many health care educational programs, IPE is considered a core curricular concept. However, providing IPE as defined by the WHO is often difficult due to scheduling issues between the educational programs of the professions.

Measuring changes in perceptions arising from IPE interventions becomes more complex when other health professions are unrepresented. In this study, we tried to measure students' perceptions of other health care professions after planned IPE initiatives. Four two-day weekend workshops were scheduled for our student learners. The workshops used games and health care scenarios that provided opportunities for students to work together in low- and medium-stake activities. We used surveys before and after the workshop to measure participants' attitudes and perceptions of both IPE and the other participating professions. Our results suggest that most students are ready to engage in teamwork and have a good sense of

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professional identity. The most pronounced positive change was in the perception of other professions, particularly concerning competence, training, and collaboration.

Keywords

Communication, perception, professionalism, teamwork, interprofessional education (IPE)

Introduction

The Centre for the Advancement of Interprofessional Education's (CAIPE) (2010) definition of interprofessional education (IPE) is: "Occasions when two or more professions learn with, from and about each other to improve collaboration and the quality of care." Barr (1998) expanded the definition to include "training with two or more disciplines." The Canadian Interprofessional Health Collaborative (CIHC) (2010) introduced the term Interprofessional Collaboration (IPC), stating that: "IPC occurs when learners/practitioners, patients/clients/families, and communities develop and maintain interprofessional working relationships that enable optimal health outcomes."

In practice, there are likely logical groupings of interprofessional undergraduate students expected to work together in post-licensure settings (Buring et al., 2009). Nursing and medical professionals will work together in practice regularly as a team, while pharmacists may not work traditionally with the same groups. Clark (2011) examined the interface between interprofessional practice (IPP) and IPE by bridging the IPP-IPE gap and identifying the "resources needed for teamwork." The diversity of health care professionals that work together

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depends on their area of specialization. The post-secondary educational model in Qatar, at least in terms of health care education, is such that each profession is taught in separate universities. From the outset, the government aimed for the country to have a balanced selection of best-fit, globally established, health-orientated universities, on a program-by-program basis. However, in terms of patient care and from a patient's perspective, all these professions work together, albeit at different stages of a patient's experience with the health care system (World Health Organization, 1988). Thistlethwaite et al. (2014) explored the terms "*competency*" and "*framework*." While some competencies may be profession-specific, others may be generic or achieved by IPE only. Carraccio and Englander (2013) also studied the shifting emphasis on competency-based medical education (CBME) in the past decade, looking at an integrated approach to assessing competence. Tashiro et al. (2011) studied competencies within interprofessional health care and their use in developing programs.

IPE is an explicit thread in many health care curricula to ensure it is included whenever possible in the program (World Health Organization, 2010). However, the CAIPE definition suggested that at least two disciplines are necessary to engage in IPE, which is problematic given differing program schedules and demands. Most, if not all, health care education programs include a practice element (e.g., clinical placement) intended to expose students to the practice settings in which they will be working. However, it is not always possible to calculate the time spent working with students from other professions either in clinical placement or during regular training (e.g., in the classroom, through collaborations). We need to provide training in team processes and opportunities to work with potential team members from other health care

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professions to prepare health care students for a team-based approach to practice. The combination of training and opportunities poses many challenges to health educators.

Working effectively in teams requires an agreed process for working together and for decision-making (CAIPE, 2010). Communication is a critical component of effective teamwork but is often a skill that needs to be learned and developed. Decision making depends on excellent communication, positive interaction between all health members involved, and their agreement on a course of action that will follow. Effective teamwork also means that each team member knows their role and that of their teammates. A positive attitude towards cooperation and other professions is, of course, another critical element. Although team members do not need to like each other, they need to be positively disposed to working collaboratively in teams. Cohen (2009) alludes to the dimensions of the culture studied in diverse cohorts, who need to know and respect their teammates' roles and skillsets. Barr (1998), Buring et al. (2009); and Thistlethwaite, Moran, & World Health Organization Study Group on Interprofessional Education and Collaborative Practice (2010) support Cohen's findings when considering teamwork in health care settings.

The goals of IPE are to provide: (1) the opportunity to learn and practice teamwork principles such as communication and decision making with other health care colleagues, (2) to build and ensure a positive attitude towards teamwork and other health care colleagues, and (3) to understand the roles and skillsets of other health care colleagues (Gebbie et al., 2008; Gum et al., 2013).

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Methodology

In the following sections, we describe a series of two-day workshops run between February and August 2015. This series was designed to provide students from different health care professions, with the opportunity to work together to learn team processes. Also, learning about their colleagues' skills featured through a structured series of activities that included games and health care scenarios. The changes and successes recorded pre- and post-workshop used a bank of surveys to measure attitudes to teamwork, other professions, perceptions of individuals, and other health care professionals. Johnson et al. (2011) initiated an IPE forum to develop further interest in this field in the Middle East.

Health care students were recruited from four leading institutions teaching health care programs across Qatar and included six fields: medicine, nursing, pharmacy, pharmacy technicians, respiratory therapists, and emergency medical services (EMS). The workshops were held on one campus in Qatar, requiring participants from the other universities to travel to the designated venue. Competing weekly schedules and programs did not practically facilitate a two-day workshop during weekdays, as was initially planned. However, rescheduling improved by meeting for two days on weekends with better student availability. Revised workshop timings minimized scheduling conflicts and provided more seamless delivery of programs.

The research project planned a target sample size of 64 students, with 16 teams consisting of four students, each representing a diverse spread of seven health professions. Four two-day workshops (with up to 16 participants in each) were to take place over four weekends, each with four groups. Fixing weekends when participants from each profession could attend was a

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challenge, as intimated earlier. However, this arrangement proved logistically manageable and allowed productive team interaction in small and large group sessions.

Specific workshops were developed to provide participants with opportunities for interprofessional team building and practice. A total of eight scenarios were run for all participants over four weekends. Adedunye (2011) found that collaborative games and simulations, or scenario-based activities, were effective strategies for interprofessional learning. Given that the workshops were conducted over weekends, there was ample time to include and integrate both these elements into the workshop curriculum. Games were developed for thirty minutes twice a day that promoted teambuilding through consensus decision-making for all. Examples included choosing items to survive on an island and creating a TV commercial promoting IPE. Game experiences and products were also shared and discussed by all in large group sessions for twenty minutes.

On the first day of each workshop, all the participants present were introduced to the program for twenty minutes in a large group, given an outline of the workshop objectives and schedules, then divided into smaller groups. Over six-months (February-August 2015), only 58 students participated, representing medicine (15.5%), nursing (24.1%), pharmacy (29.3%), pharmacy technicians (12.1%), respiratory therapists (12%), and the EMS (6.90%). Six students failed to attend, out of the 64 recruited.

Faculty eventually only charted thirteen regular teams of four and two teams of three during the workshops, with 58/64 participants. Without team leaders, all student small groups were

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encouraged to include every profession in decision-making processes for management, treatment, and diagnosis.

The workshops' scenario-based activities were designed and developed to be both realistic and inclusive, with support from external health care professionals and simulation experts. Four 90-minute scenarios were completed—two each day over each weekend. Standardized patients were trained for each of these scenarios, which were conducted using low-fidelity environments. Topics included food poisoning, asthma, chronic obstructive pulmonary disease (COPD), heart failure, and a simulated in-flight medical emergency. The scenarios rotated so that all small groups had broader experiential interactions.

The same team members worked together throughout Day 1. At the beginning of Day 2, newly formed groups were created to ensure that no student worked in the same group as the previous day. The change in team membership enabled students to learn and work with new team members from up to six health professions.

Immediately before each scenario, a brief large group session by faculty delivered critical points related to IPE, followed by the opportunity for students to practice. After each complete situation, a team debrief using the R.U.S.T. model was conducted for 30-minutes, followed by a large group discussion for the same time (Karlsen, 2013). All participants shared their experience of interprofessional learning. The topics covered in the longer large group sessions generally related to teamwork and collaboration, shared decision-making, and role clarification.

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Student social interaction at regular daily lunchtimes (one hour) and two coffee breaks (15 minutes each), helped informal communication and discussions between the various health professional trainees. Many had not had any prior chances to interact with other established health profession students.

Three surveys administered before (pre) and after (post) each two-day workshop used the same 5-point Likert range. SPSS was used to conduct t-tests on the pre- and post-workshop data for each of the dimensions "Teamwork and Collaboration," "Professional Identity," and in the RIPL attitude towards interdisciplinary learning surveys (IBM Corporation, 2017). Student's t-tests were generated for all participants and then for each professional group. To better understand the magnitude of changes, all of the variables had effect sizes calculated using Cohen's *d* formula:

$$d = \frac{M_1 - M_2}{SD_{pooled}}$$

Effect sizes greater than 0.30 were considered medium and more than 0.80 considered significant. Each scale, pre- and post-workshop, had a Cronbach's Alpha calculated.

Results

Students had a series of surveys to complete, both at the beginning of the workshop on Day 1 and the end on Day 2. The surveys included:

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1. The 19-item Readiness for Interprofessional Learning survey (RIPL), (Parsell & Bligh, 1999);
2. The attitude towards interdisciplinary learning (Hyer et al., 2000);
3. Interdisciplinary Education Perception Survey (IEPS) (Williams et al., 2018).

At the end of Day 2, after completing the second set of reviews, an evaluation questionnaire was distributed to each student consisting of open-ended questions regarding their experiences overall. For study purposes, we used a modified five-point Likert scale that was consistent with work previously published by Preedy & Watson ("5-Point Likert Scale," 2010), using the same indicators:

1. Strongly disagree;
2. Disagree;
3. Neither agree nor disagree;
4. Agree;
5. Strongly agree.

Data from the four workshops, comprising 58 pre-survey responses, and 56 post-surveys, was analyzed. Two EMS students were absent from one second workshop day due to a schedule misunderstanding necessitating an early departure. Subsequently, both attended all the following sessions ultimately. As most groups had four team members, substituting two four-member as three-member groups enabled the workshop scenarios to continue as a compromise. All data collated from the modified session were built into the statistical analysis

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accordingly. Student recruitment targeted participants near the completion of their professional training, ensuring adequate skills and knowledge. The student representation from each health care profession by year in the program is as shown in Table 1.

Table 1: Student representation of health professions

Program	Year in Program				Total
	1	2	3	4	
Nursing	2	9	3	0	14
Medicine	0	4	1	4	9
Pharmacy	0	6	9	2	17
Pharmacy Technician	0	7	0	0	7
Respiratory Therapist	0	7	0	0	7
Emergency Medical Service (EMS)	0	4	0	0	4
Total (% age)	2 (3%)	37 (64%)	13 (22%)	6 (10%)	58 (100%)

The age of students ranged from 19 to 30 years. There were 47 female and 11 male students.

Pre- and Post-Survey Results

Table 2: Teamwork (RIPL and Attitude)

	RIPL						Attitude					
	Pre ($\alpha=.842$)		Post ($\alpha=.901$)		Effect Size	Stat. Sig.	Pre ($\alpha=.840$)		Post ($\alpha=.912$)		Effect Size	Stat. Sig.
	Mean	SD	Mean	SD			Mean	SD	Mean	SD		
Nursing	4.5	0.42	4.9	0.27	1.13	*	4.4	0.41	4.7	0.37	0.77	*
Medicine	4.5	0.40	4.6	0.33	0.27		4.2	0.34	4.6	0.36	1.14	*
Pharmacy	4.4	0.42	4.7	0.43	0.71		4.4	0.45	4.6	0.41	0.46	
Pharm Tech	4.8	0.27	4.6	0.43	-0.56		4.6	0.36	4.7	0.35	0.28	
Respiratory Therapist	5.0	0.13	4.9	0.38	-0.35		4.8	0.35	5.0	0.05	0.80	
EMS	4.5	0.28	4.3	0.47	-0.52		4.4	0.48	4.7	0.14	0.85	
All	4.6	0.40	4.7	0.38	0.26	*	4.4	0.42	4.7	0.36	0.77	**

* $p < 0.05$, ** $p < 0.01$

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Table 3: Professional Identify (RIPL and Attitude)

	RIPL						Attitude					
	Pre ($\alpha=.535$)		Post ($\alpha=.400$)		Effect Size	Stat Sig.	Pre ($\alpha=.426$)		Post ($\alpha=.607$)		Effec t Size	Stat. Sig.
	Me an	SD	Mea n	SD			Mea n	SD	Me an	SD		
Nursing	4.4	0.42	4.6	0.42	0.48		4.3	0.48	4.3	0.50	0	
Medicine	3.9	0.32	4.4	0.37	1.45	**	3.8	0.48	4.4	0.39	1.37	*
Pharmacy	4.0	1.11	4.5	0.56	0.57		4.0	0.51	4.1	0.64	0.17	
Pharm Tech	4.4	0.38	4.1	0.71	-0.53		4.1	0.37	4.1	0.64	0	
Resp Therapist	4.8	0.27	4.7	0.25	-0.38		4.4	0.40	4.3	0.60	-0.2	
EMS	3.9	0.31	2.2	0.58	-3.66		4.4	0.41	4.4	0.57	0	
All	4.2	0.73	4.3	0.96	0.12		4.1	0.48	4.2	0.55	0.19	

* $p < 0.05$, ** $p < 0.01$

Tables 2 and 3, concerning RIPL and Attitude towards interdisciplinary learning surveys, showed statistically significant gains on the Teamwork dimension. Nursing students showed the largest gain, while medical students also showed statistically significant gains in terms of Professional Identity. Although some effect sizes were in the high-to-medium range (near .80), most were in the medium range. A few exceptions were statistically significant, with effect sizes larger than 0.80.

Interdisciplinary Education Perception Survey (IEPS)

Using the IEPS survey, each participant had to indicate all the students' perceptions in their profession and from others. As there were five other professions present at the workshops, this resulted in six sets of survey results for each participant. A Chi-square test was conducted on the survey items to see if participants perceived each other similarly. Subsequently, items 3, 5, 8, and 10 were removed as the chi-square test suggested at least one occupation was viewed

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differently than the others for those items. The remaining results for the three other specialties were combined to form a new variable 'others' indicated by the mean of the three.

As before, t-tests were conducted on the pre and post results for the two variables "my profession" and "other professions." Effect sizes are as indicated in Table 4.

Table 4: Interdisciplinary Education Perception of "my" profession and "other professions."

	My						Other					
	Pre		Post		Effect Size	Stat. Sig.	Pre		Post		Effect Size	Stat. Sig.
	Mean	SD	Mean	SD			Mean	SD	Mean	SD		
Q1	4.19	0.67	4.39	0.71	0.29		3.80	0.59	4.28	0.49	0.89	***
Q2	2.76	1.07	2.56	1.17	-0.18		2.90	0.68	2.81	0.99	-0.11	
Q3	3.84	0.80	4.04	0.91	0.23		3.58	0.59	4.13	0.60	0.92	
Q4	4.37	0.70	4.50	0.60	0.20		4.00	0.56	4.27	0.53	0.50	**
Q5	3.30	0.89	3.25	1.08	-0.05		3.10	0.59	3.08	0.82	-0.03	
Q6	4.36	0.72	4.43	0.74	0.10		3.87	0.59	4.09	0.62	0.36	*
Q7	3.16	0.94	3.45	1.01	0.30		3.37	0.62	3.54	0.89	0.22	
Q8	3.19	0.95	2.71	1.17	-0.45	*	2.87	0.73	2.87	0.96	0.00	
Q9	3.54	0.81	3.82	1.11	0.29		3.34	0.62	3.61	0.83	0.37	*
Q10	3.72	0.75	4.00	0.89	0.34		3.60	0.64	4.11	0.56	0.85	
Q11	3.20	1.07	3.07	1.26	-0.11		3.29	0.73	3.45	1.09	0.17	
Q12	3.60	0.90	3.98	0.92	0.42	*	3.42	0.80	4.01	0.65	0.81	***
Q13	2.04	0.80	2.21	1.19	0.18		2.46	0.64	2.00	0.68	-0.70	***
Q14	4.30	0.82	4.46	0.76	0.21		3.83	0.70	4.23	0.59	0.62	**
Q15	3.95	0.86	4.23	0.93	0.32		3.60	0.61	4.17	0.57	0.97	***

* p<.05, ** p<.01, *** p<.001

Question key 1-15 in Table 4 is narrated below

1. Are competent

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2. Have very little autonomy
3. <i>Understand the capabilities of other professions [remove]</i>
4. Are highly concerned with the welfare of the patient
5. <i>Sometimes encroach on other professional territories [remove]</i>
6. Are highly ethical
7. Expect too much of other professions
8. <i>Have a higher status than other professions [remove]</i>
9. Are very defensive about the professional prerogatives
10. <i>Trust others' professional judgments [remove]</i>
11. Seldom ask for others' professional advice
12. Fully utilize the capabilities of other professions
13. Do not cooperate well with other professions
14. Are well trained
15. Have good relations with other professionals

The sample size did not fully support a factor analysis of the Interdisciplinary Education Perception Survey items.

However, it did appear that items roughly corresponded to the following dimensions:

1. Professionalism, consisting of items 1, 6 and 14
2. Collaboration, consisting of items 12, 13, and 15
3. Patient-centeredness, consisting of item 4

The students were happy to work with students from other institutions and different health care backgrounds. The workshops also allowed them to understand the role of other health care members in their team.

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Discussion

The results of the three surveys highlighted many unusual characteristics of our student samples. It appeared that most students arrived at the workshops positively disposed towards interprofessional learning in terms of teamwork and collaboration and professional identity. The mean values for each dimension across disciplines were consistently above the value of 4, indicating that they either reported *Agree* or *Strongly Agree* with the statements associated with each aspect. Changes were mostly positive, indicating movement from *Agree* towards *Strongly Agree*. The only professions that showed statistically significant differences were nursing and medicine. Nursing students showed changes in the RIPL dimension of Teamwork while medical students showed changes in Professional Identity. While not statistically significant, pharmacy students showed positive effect sizes of medium size.

Students in all the health care professions showed various changes on the RIPL scales, both positive and negative. The magnitude of the changes, as measured by effect size, was mid-range. Based on the data, it appeared that the impact of the workshop on these students was marginally negative. That is, they may have left the session feeling slightly less ready for IPE than when they arrived.

The attitude towards interdisciplinary learning data showed similar trends to those found in the RIPL data (Curran et al., 2008) as far as the professions of nursing, medicine, and pharmacy were concerned. Once again, only nursing and medical students showed statistically significant positive changes. Both showed medium-to-large effects on the Teamwork and Collaboration dimension, with only medicine showing substantive differences in the Professional Identity

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dimension. Contrary to the RIPL results, nursing, pharmacy, and EMS students showed positive effects ranging from small-to-large on the Teamwork scale, and none-to-small negative changes on the Professional Identity scale.

In general, as measured by the RIPL and Attitude scales, all professions reported *Agree* or *Strongly Agree* with statements related to Teamwork and Professionalism. Changes oscillate between the two indicators as may be expected when considering possible differences in the experiences between professions and their regular place in the health care flow for a patient from admission to release from a hospital or beginning to end of a health care episode. For example, it may be more typical for health care team composition to include nursing, medicine and pharmacy, but not necessarily to include an EMS professional, a pharmacy technician, or a respiratory therapist.

Interdisciplinary Education Perception Survey (IEPS)

The third survey, IEPS, was the most illustrative of change, supporting the need for IPE. The analysis for this survey was conducted item by item. However, the size of the perceptual difference, indicated by the effect sizes, showed that professional perceptions of self were relatively unchanged, with some exceptions. The understanding of others showed medium-to-substantial change on 10 of the 15 items. Participants learned a lot about their colleagues resulting in positive changes in perception towards them.

Items 1, 6, and 14 showed medium-to-large effect sizes indicating that participants perceived their colleagues to be more professional after the workshop than at the beginning of the workshop. They also had more positive perceptions of their willingness and ability to

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collaborate with effect sizes, all larger than 0.70. Appreciating a shared focus on patient-centeredness was also demonstrated by item 4. These clearly showed positive changes in attitudes of other professions, particularly in terms of competence, collaboration, and a shared focus. Those two surveys showed that participants were ready and willing to engage in IPE activities, but that this did not change much from pre- to post-workshop. This third survey demonstrated the benefits of such events, highlighting the potential for misperceptions of other professions.

Item 9 suggested that participants found themselves and others to be protective of their respective areas of practice. Seen as a positive indicator, it indicates that professions can develop and consolidate their professional identity.

Of the three surveys, the IEPS showed the most exciting results. While in many cases, the RIPL and Attitude survey pre-workshop indicators were already above 4 (*Agree*), many of the IEPS indicators were between 3 and 4 (*Unsure of accepting*). This finding suggests a somewhat equivocal stance, perhaps due to a lack of exposure to other professions. The changes indicated by the post-workshop responses were firmly in the *Agree* range. In at least one case, item 13, suggesting that other participants did not cooperate well with other professions, changed from an equivocal 2.46 (between *Unsure* and *Disagree*) to a firm 2.0 (*Disagree*). These changes were the result of a single, albeit prolonged, workshop. Repeated exposure through shorter but perhaps more frequent workshops would likely continue to increase positive perceptions of other professions as a hypothesis.

Open-Ended Feedback

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Discussions with students during coffee breaks revealed that all students learned from their workshops' experience. They also sought to have multiple similar training sessions as part of their regular curriculum. In terms of materials included and concepts taught in the workshop, students thought that they benefitted, and sought further engagement in more health care scenarios.

Student responses upon completion of the workshop:

- 1. Communicating and knowing more about the other health care students were the highlight. I learned more about the different health care roles, so I intend to apply how to communicate effectively with them to have better patient care. Suggestions: Please add more activities and simulations lab scenarios as these are effective*
- 2. I would use this practice in work life. Because it helped a lot to communicate with the other professionals and know/gain more knowledge.*
- 3. It was an amazing opportunity to work with different professionals. As a result of the workshop, when I see other professions at the hospital, I will communicate with them.*
- 4. I now better understand each profession's role in the team and how to cooperate in providing better patient-centered care.*
- 5. I got a clear idea of what to expect from other team members and where my focus in my major (profession) lies.*

Limitations

1. Sample size

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The sample size is small and not a completely random selection of students, dependent on student availability. For example, students who agreed to attend could be considered highly motivated and not representative of all student bodies at each academic institution. The knowledge and perceptions of IPE is a moving target, mainly as this is being introduced into program curricula. Therefore, the results are viewed in the context of the place and time at which they were obtained.

2. Scheduling

Health care education for each profession brings with it different features and varied programming. This feature was true of the jobs sampled in this study. Initially, attempts were made to schedule during the week to avoid conflicts with weekend plans, but this proved impossible. It became clear that weekends were the better choice, and this became the way forward. Many difficulties remained as medical students were on course rotations that varied in length compared to nursing and pharmacy students and included, as part of the rotation, elective time abroad. Due to a shorter program and smaller class sizes, many health care students who participated in this study were recent graduates with shift-based workloads. Given our workshop constraints that only 16 student participants attend each workshop with four professions giving us four full IPE groups, we needed to make decisions such as permitting students with less than or more than the targeted experience to participate (e.g., the third year in their program). Although this had little impact on the team-based games, it did affect students' ability to participate in the health care scenarios. The scenarios initially used skillsets associated with third-year students or, in the case of all other health care students, after

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completion of their second-year programs. After the first workshop, we modified the scenarios to accommodate the required skillsets and align them with second-year students.

The scheduling issues had an impact on the consistency of our sample and the scenario complexity. These issues may have affected how students responded to the surveys. For students who were further along in their program, the scenarios may have been more familiar with and not adequately stimulated by the challenges. However, the construction of situations looked at interprofessional education rather than practicing discipline skills.

Conclusions

Despite the scheduling and recruitment challenges, this study showed that, in general, students positively like IPE. There were slight gains along teamwork and collaboration and professionalism dimensions, but the starting points were already quite high. The most significant impact appeared to be in how participants perceived other health care professions. There were small changes in self-perception but medium-to-substantial differences in the perception of others.

Repeated exposure to students from other health care professions is a problematic but beneficial part of student training. The difficulty lies in the scheduling; the benefit lies in improved perceptions of different occupations. However, recognizing the logistical challenges, it may be useful to consider the WHO definition of IPE, which suggests that at least two professions learn together. More than two may be better, but at least two are necessary.

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Students indicated that they enjoyed the workshop and wanted more. The meager attrition rate (zero if considering the two EMS participants as a misunderstanding), suggests their willingness to engage in IPE even on their own time. It was gratifying to see almost all the students fully participate in both days of each workshop.

Ethics IRB Approval

Ethics approval was granted by the University of Calgary – Qatar, and Weill Cornell Medicine – Qatar, Institutional Review Boards.

Consent for publication

All student participants gave their approval for publication.

Competing interests

None

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Authors contribution

All three authors contributed to the writing of this paper

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References

- 5-Point Likert Scale. (2010). In V. R. Preedy & R. R. Watson (Eds.), *Handbook of Disease Burdens and Quality of Life Measures* (pp. 4288-4288). New York, NY: Springer New York.
- Adedunye, F. (2011). *Simulations and games for team development: A qualitative case study*. (D.M.). University of Phoenix, Ann Arbor. ProQuest Dissertations & Theses Global database. (3510591)
- Barr, H. (1998). Competent to collaborate: Towards a competency-based model for interprofessional education. *Journal of Interprofessional Care*, 12(2), 181-187. doi:10.3109/13561829809014104
- Buring, S. M., Bhushan, A., Brazeau, G., Conway, S., Hansen, L., & Westberg, S. (2009). Keys to successful implementation of interprofessional education: learning location, faculty development, and curricular themes. *American Journal of Pharmaceutical Education*, 73(4), 60. doi:10.5688/aj730460
- Canadian Interprofessional Health Collaborative. (2010). *Interprofessional Education & Core Competencies: Literature Review*, p6. Retrieved from Vancouver, BC: <https://drive.google.com/open?id=1JgduPZpZx9TmJJEFO5C6E9J2f7nzNmo5>

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Carraccio, C. L., & Englander, R. (2013). From Flexner to competencies: reflections on a decade and the journey ahead. *Academic Medicine*, *88*(8), 1067-1073. doi:10.1097/ACM.0b013e318299396f

Clark, P. G. (2011). Examining the interface between interprofessional practice and education: lessons learned from Norway for promoting teamwork. *Journal of Interprofessional Care*, *25*(1), 26-32. doi:10.3109/13561820.2010.497751

Cohen, A. B. (2009). Many forms of culture. *American Psychologist*, *64*(3), 194-204. doi:10.1037/a0015308

Curran, V. R., Sharpe, D., Forristall, J., & Flynn, K. (2008). Attitudes of health sciences students towards interprofessional teamwork and education. *Learning in Health and Social Care*, *7*(3), 146-156. doi:10.1111/j.1473-6861.2008.00184.x

Gebbie, K. M., Meier, B. M., Bakken, S., Carrasquillo, O., Formicola, A., Aboelela, S. W., . . . Larson, E. (2008). Training for interdisciplinary health research: defining the required competencies. *Journal of Allied Health*, *37*(2), 65-70. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/18630780>

Gum, L. F., Lloyd, A., Lawn, S., Richards, J. N., Lindemann, I., Sweet, L., . . . Bramwell, D. (2013). Developing an interprofessional capability framework for teaching health care students in a primary health care setting. *Journal of Interprofessional Care*, *27*(6), 454-460. doi:10.3109/13561820.2013.807777

Hyer, K., Fairchild, S., Abraham, I., Mezey, M., & Fulmer, T. (2000). Measuring attitudes related to interdisciplinary training: revisiting the Heinemann, Schmitt and Farrell attitudes toward health care teams scale. *Journal of Interprofessional Care*, *14*(3), 249-258. doi:10.1080/jic.14.3.249.258

IBM SPSS Statistics for Windows, Version 25.0. (2017). IBM Corporation (Version 25.0) [Software].

Measuring student changes of role perceptions - IPE

Johnson, B., Pyburn, R., Bolan, C., Byrne, C., Jewesson, P., Robertson-Malt, S., . . . Verjee, M. (2011).

Qatar Interprofessional Health Council: IPE for Qatar. *Avicenna*, 2011(1).

doi:<https://doi.org/10.5339/avi.2011.2>

Parsell, G., & Bligh, J. (1999). The development of a questionnaire to assess the readiness of health care students for interprofessional learning (RIPLS). *Medical Education*, 33(2), 95-100.

doi:10.1046/j.1365-2923.1999.00298.x

Tashiro, J., Byrne, C., Kitchen, L., Vogel, E., & Bianco, C. (2011). The Development of Competencies in Interprofessional Health Care for Use in Health Science Educational Programs. *Journal of Research in Interprofessional Practice and Education*, 2(1), 63-82.

doi:<http://dx.doi.org/10.22230/jripe.2011v2n1a64>

Thistlethwaite, J. E., Forman, D., Matthews, L. R., Rogers, G. D., Steketee, C., & Yassine, T. (2014).

Competencies and frameworks in interprofessional education: a comparative analysis. *Academic Medicine*, 89(6), 869-875. doi:10.1097/ACM.0000000000000249

Thistlethwaite, J. E., Moran, M., & World Health Organization Study Group on Interprofessional Education and Collaborative Practice. (2010). Learning outcomes for interprofessional education (IPE): Literature review and synthesis. *Journal of Interprofessional Care*, 24(5), 503-513.

doi:10.3109/13561820.2010.483366

Williams, B., Lynch, M., Olausson, A., Lachmann, H., Kalen, S., & Ponzer, S. (2018). Translation and psychometric evaluation of the Swedish version of the Interdisciplinary Education Perception Scale. *Journal of Interprofessional Care*, 32(1), 63-68. doi:10.1080/13561820.2017.1381077

World Health Organization. (1988). Learning together to work together for health. Report of a WHO Study Group on Multiprofessional Education of Health Personnel: the Team Approach. *World Health Organization Technical Report Series*, 769, 1-72. Retrieved from

<https://www.ncbi.nlm.nih.gov/pubmed/3140499>

Measuring student changes of role perceptions - IPE

World Health Organization. (2010). *Framework for action on interprofessional education and collaborative practice*. Retrieved from Geneva, Switzerland:

http://apps.who.int/iris/bitstream/10665/70185/1/WHO_HRH_HPN_10.3_eng.pdf?ua=1