"The Power of Many Minds Working Together": Qualitative Study of an Interprofessional Service-Learning Capstone Course

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Abstract

Background: An interprofessional faculty group analyzed a critical reflection assignment of students in a service-learning practicum interprofessional education (IPE) course. Students were from ten programs: physical therapy, occupational therapy, nuclear medicine technology, radiation therapy, athletic training, nursing, investigative medical science, cytotechnology, nutrition and dietetics, and clinical laboratory science. Research questions investigated what the assignments revealed about students' application of beliefs, emotions, and behaviours, and if course objectives were met.

Methods and Findings: This qualitative study retrospectively analyzed one critical reflection from the course conducted in 2011. Researchers selected a stratified sample of 40 assignments from a population of 278. Nine major themes emerged: achieving IPE outcomes, engaging in team process, learning culture/community engagement, being client/patient centred, becoming aware of behaviours, experiencing barriers, articulating beliefs, connecting with course objectives, and expressing emotions.

Conclusions: In an IPE practicum course, transformative learning was evident. Students articulated beliefs, emotions, and behaviours related to interprofessional teamwork. Students expressed detailed understanding of team processes. For future research, critical reflection assignments were useful to assess student beliefs, emotions, and behaviours in a practicum course. We suggest studying practice among health professionals who have experienced IPE compared with those who have not had IPE in their professional curricula.

Keywords: Interprofessional education; Practicum; Interprofessional; Teamwork; Critical reflection

Introduction

In the United States, our healthcare system and the delivery of healthcare have become increasingly complex [1]. The importance of appropriate collaboration and effective communication among members of the healthcare team cannot be overemphasized in the pursuit of quality healthcare. Concluding a systematic review of literature, Purden [2] recommended that professional schools structure clinical experiences in their curricula that include students from different professions working collaboratively in teams to provide care to culturally diverse populations. The Institute of Medicine reports have recommended preparing health professionals to work together collaboratively to enhance achievement of healthcare outcomes [1,3]. The World Health Organization more recently declared that a "collaborative practice ready" workforce is required to improve the quality of healthcare [4, p.7]. These are

strong recommendations for interprofessional education (IPE). In addition, at least four individual professions (nursing pharmacy, physical therapy, and occupational therapy) specifically include IPE as an essential competency [5-8].

However, although IPE has been identified as important, there is limited empirical research on the topic. Studies of undergraduate IPE have focused primarily on students' reactions to the learning experience and changes in attitudes, knowledge, and skills [8,9]. In a recent research agenda, one author noted that while there is considerable literature about the development and delivery of IPE, there are few evaluative studies, and most of them assess participant satisfaction [10].

Beginning in 2006, faculty at a private Jesuit university in the Midwest U.S. developed an IPE curriculum for undergraduate health professions students. The goal of the curriculum was to prepare students with knowledge, attitudes, and skills of interprofessional practice, leading to: interprofessional collaborative patient/client-centred care, optimal individual patient health outcomes, improvements in community-level (population) health, effective and efficient delivery of healthcare services, and advocacy for improvement of health and health services. The courses were designed to prepare students for effective interprofessional teamwork through interactive learning experiences in which they learned about, from, and with each other. Health professions programs included were physical therapy, occupational therapy, nuclear medicine technology, radiation therapy, athletic training, nursing, investigative medical science, cytotechnology, nutrition and dietetics, and clinical laboratory science. Students from each profession were enrolled in the IPE courses that were embedded within the individual professional curricula. The IPE courses included content related to understanding roles of health professionals, knowledge and skills for effective teamwork, healthcare system, health promotion, patient-centred care, ethical decision-making, evidence-based practice, and advocacy. In the final year of study, students were prepared to take a practicum course titled Integrated Interprofessional Practicum Experience (IPE 490), in which they implemented skills they learned in previous years. Student teams were placed with area community organizations to develop and implement projects agreed upon by the organizations and their clients, students, and faculty.

IPE 490 was based on study of a pilot course that included compilation of student perceptions about how the course prepared them for interprofessional collaboration [11]. The pilot course was centred in the community, and students perceived the most rewarding aspects to be using the course as a means to enhance interprofessional collaboration. Least rewarding aspects were time constraints (conflicting curriculum schedules among professional programs and limited interaction with agencies or clients), and team conflict. Student perceptions sorted into themes including experiencing teamwork in the real world, developing an appreciation for other professions' expertise, seeing a project come to fruition, time constraints, and team conflict [11].

Following the pilot, IPE 490 was launched as a final course in the IPE curriculum and involved service learning by an interprofessional team, conflict resolution, and team-building skills. This practicum provided opportunities for students to integrate

theory and knowledge of the content of the IPE curriculum, applying these principles and practices in a community environment addressing a health need of that community. The service learning in this course involved a structured learning experience, which has been defined by Seifer as "community service with explicit learning objectives, preparation, and reflection" [12, p. 274]. Consistent with the vision of the practicum experience, the students were to learn about connections between the academic course, their roles as citizens, and as health professionals.

The service-learning component was a collaborative teaching and learning strategy, similar to that described by Ash and Clayton [13] designed to promote personal growth in civic engagement and enhance academic learning. Faculty involved in course development were aware that students may leave a service-learning experience with little development of skills for improving action, such as refining teamwork or understanding organizational issues that may impact projects [14-15]. To build strong educational meaning into the service-learning experience, the course included guided written reflections. Directly related to the course objectives (Table 1), the purpose of the assignment was to allow students to more clearly define

Table 1
IPE 490 course learning objectives

1.	Work effectively to accomplish a common goal based on evidence-based practice.
2.	Demonstrate sensitivity to the cultural diversity of the selected population, for example, health literacy needs, an understanding of their health beliefs and practices, etc.
3.	Exhibit an understanding of the scope of practice and values of the other health professionals on the team.
4.	Identify factors contributing to health disparities and potential strategies for advocacy for social system change.
5.	Collect appropriate data and critically analyze outcomes of the interprofessional team project and improved quality outcomes.
6.	Demonstrate the ability to identify actual and/or potential ethical issues associated with the chosen project.

their values and internal motivations while linking course teamwork activities to their developing knowledge, attitudes, and behaviours. An embedded guided self-reflective component has been widely recommended to increase students' understanding of their own skills, beliefs, and attitudes, as well as a greater understanding of the processes involved in service delivery by the service site [16-18]. Well-structured reflection assignments can function to improve the quality of student thoughts and actions and help the students understand the relationship between thought and action [14-16,18].

The reflection assignments in IPE 490 were designed to allow students to more clearly define their values and internal motivations while linking course teamwork

activities to developing knowledge, attitudes, and practices. Expectations for developing knowledge, attitudes, and practices were explicated in the course objectives (Table 1), which addressed teamwork, cultural diversity, culturally sensitive care, and interprofessional understanding. The purpose of this study was to assess how IPE 490 helped students achieve interprofessional understanding.

The research questions were:

1. In this IPE practicum, what does the critical reflection on interprofessional teamwork reveal about students' application of beliefs, emotions, and behaviours?

    a. Beliefs are defined as "statements or state of affairs on which one is willing to act" [19, p. 200].

    b. Emotions are defined as "expressions of feeling" [19, p. 742].

    c. Behaviours are defined as "treatment shown by a person toward another or others" [19, p. 198].

2. Is there evidence in the reflection assignments that course objectives are being met?

Methods

Approval for the study was obtained from the university Institutional Review Board. A stratified sample was selected to proportionately represent students from each profession enrolled in the course. Class lists from two semesters in 2011 were sorted by profession. For each profession, a minimum of 2 and up to 10% of student names were selected in random fashion. From a population of 278 students in the course, a sample of 40 was obtained. The unit of analysis was the second of two written critical reflection assignments (Table 2) submitted online during the course. This unit was large enough to be considered as a whole and small enough to be kept in mind as a context for each student's particular point of view. The assignments were downloaded from the course online learning management system. They were de-identified, removing individual or agency names. *Atlas.ti 7* [20] was used to facilitate data analysis, and a research journal was kept to create an audit trail and document data analysis decisions.

Table 2.
Critical reflection assignment in IPE 490

What?	What happened; what did the team do?
So what?	What was the impact of teamwork on you and the client?
Now what?	Which course objectives are most relevant to your experience, and how will you use this experience in the future?

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Qualitative inductive content analysis [21] was used by six interprofessional faculty co-researchers for the investigation. The process is described here in detail to assist transferability of the research [22] and is illustrated in Figure 1. All co-

researchers analyzed two data files for a pilot and discussed them as a group. The purpose was to facilitate understanding of qualitative inductive content analysis by the co-researchers. Co-researchers then broke into two subgroups and each subgroup analyzed 19 data files. Codes were developed to identify data that had similar content or meaning across several units of analysis. The research team compared all codes for similarity, reaching agreement on grouping into higher-order categories. Categories were assigned content-characteristic labels. Co-researchers returned to the data frequently to check reliability of the categories, to be sure they reflected the meaning of the data. Co-researchers formed three subgroups of two people each for further analysis and development of categories into themes. All co-researchers met to discuss categorization and reach agreement on development of themes. Using guidance from procedures by Graneheim & Lundman [22], the themes were abstracted as threads of underlying meaning in the data, codes, and categories. Once the co-researchers determined the themes reliably represented the data, they identified data quotes that were particularly typical of the themes. Examples of transformative learning were noted.

Figure 1
Data analysis process
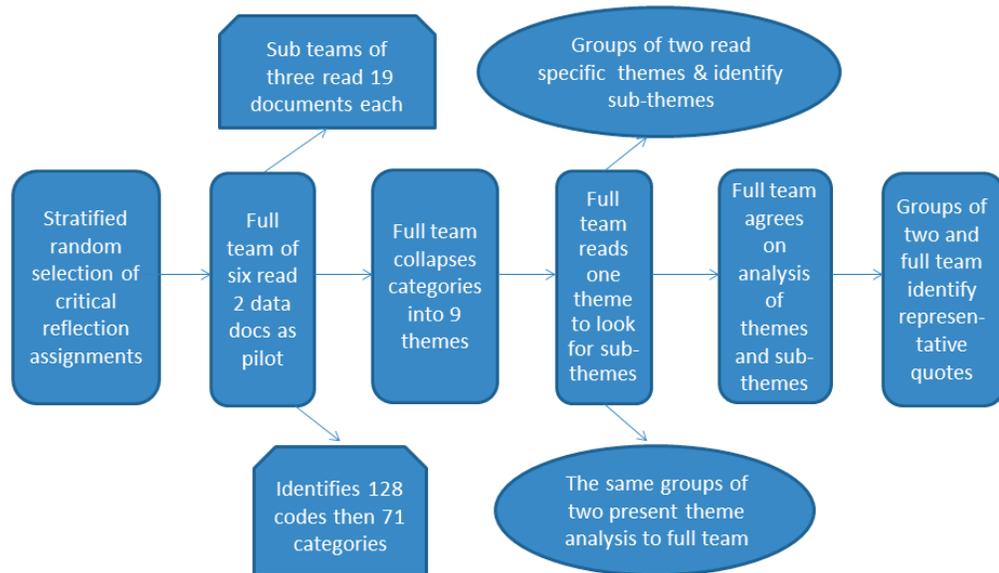
Trustworthiness was enhanced through numerous design strategies as suggested by Shenton [23]. For example, credibility was strengthened through prolonged engagement with the data during the data analysis stage, utilizing random sampling in selection of which reflective assignments to analyze, and the previous qualitative research backgrounds of three of the six researchers. While specific demographic information was not collected for the participants, some degree of transferability is possible through the description of the educational programs that were represented in the study. Dependability was strengthened by the authors' attempts to provide clear details about the data collection and analysis processes. Confirmability was

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increased by the utilization of an analysis log or research journal to capture the analysis process during the researchers' group meetings. Trustworthiness would have been further enhanced had we been able to engage in member-checking; however, due to the retrospective design of the study this was not possible as most of the student participants had graduated and left the university. In addition, the participant journals were de-identified except for the program of study of each participant.

Study findings

Findings clearly indicated that health professions students can articulate beliefs, emotions, and behaviours related to interprofessional teamwork. The course learning objectives and desired course outcomes were present in the data. Researchers identified nine major themes (Table 3) from over 71 data categories. The themes were: engaging in team process, experiencing barriers, achieving IPE outcomes, expressing emotions, connecting with course objectives, being client/patient-centred, articulating beliefs, becoming aware of behaviours, and learning culture/community engagement. The themes provide evidence that students understand interprofessional

Table 3.
Major themes and subthemes; titles and brief descriptions

Major theme	Subthemes or brief description of theme
Engaging in team process	Working together Focus on a goal Using individual strengths Use in future practice Value of communication Members performing professional roles Overcoming logistical issues
Achieving IPE outcomes	What happened in the team projects
Being client/patient centred	A focus on clients or patients Contrasted with a focus on student or team
Experiencing barriers	Student Agency Client
Articulating beliefs	Expressions of values about teamwork, clients, and the projects
Expressing emotions	Expressions of emotions, particularly about the teamwork and the projects
Becoming aware of behaviours	Descriptions of behaviours
Learning about culture/ community engagement	Involvement with the community Cultural sensitivity
Connecting with course objectives	How were course objectives met through the projects

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interaction as a process, rather than a one-time event, and that interprofessional practice is infused throughout patient care in a variety of settings.

The nine major themes are presented in three clusters: interprofessional engagement, community engagement, and personal growth (see Table 4). Themes sorting into the interprofessional engagement cluster included data about the process of teams working on the projects. The community engagement cluster contains themes that revealed how students became involved with the communities and populations served by the projects. Lastly, the cluster of personal growth incorporates themes in which students expressed how they personally changed through the course and the team/project activities.

Table 4.
Clusters of the major themes

Cluster	Major themes			
Interprofessional engagement	Engaging in team process	Achieving IPE outcomes	Experiencing barriers	
Community engagement	Being client/patient centered	Learning culture/ community engagement		
Personal growth	Becoming aware of behaviours	Articulating beliefs	Expressing emotions	Connecting with course objectives

Engaging in team process

As a dominant theme in the data, engaging in team process sorted into seven sub-themes: working together, focusing on a goal, using individual strengths, applying skills in future practice, understanding the value of communication, members performing professional roles, and overcoming logistical issues. Data included both positive and negative aspects of team interactions, and evidence of students' understanding of teamwork from previous IPE courses was present. For example, students identified the stages of team development that had been previously taught.

In working together, students described how individuals worked with each other through brainstorming, co-operation, talking things out, bringing team members close, and not worrying about offending other team members. Understanding the value of working together is succinctly evident in this student quote: "The power of many minds working together can be much more dynamic, efficient, and thorough than one person making decisions."

The course was structured so teams completed a project and data reflected the team focus on the goal or outcome. Students identified barriers to reaching the goals, modified plans to move past obstacles, and involved the full team in reaching the desired outcome. Team members joined together to focus on the goal.

Students wrote in detail about using the varied individual strengths that each member brought to the team and building upon those strengths in accomplishing

the projects. Students acknowledged the collaboration evident among professions and people. They noted that each profession used its own knowledge and skills; they divided the work and embraced different types of learning and unique perspectives as they worked together for the project. One student noted, "With different majors we have the advantage to put all our talents and knowledge together."

Evidence of prior IPE learning was present in the subtheme of members performing professional roles. While students had learned about individual professions in previous IPE courses, they now actually experienced the roles in this course. Students frequently recognized the unique values each profession brought to the project. They described taking responsibility for their respective professional roles while not giving up responsibility for the project as a whole. Students were growing in their knowledge about other health professions: "I understand much more about the scope of practice of occupational therapy and nursing from my team members outside my physical therapy field."

Teams encountered logistical issues to overcome; they mentioned having to learn to be flexible and adopt new roles when scheduling conflicts arose. Other logistical issues included devising back-up plans when anticipating program changes, adapting to space availability, and team members taking on additional work if other members could not attend specific events.

Students focused on how they would apply the outcomes of the experience to their performance in the future, and described that they would "not be afraid" to open their mind to varying opinions about patient care. Several students detailed the skill of looking at other professions with respect and knowing that everyone played an equally important role in the care of the patient. Students observed that the course experiences expanded their insight into the power of a healthcare team, as evidenced by this entry: "As a group we can come up with great ideas by collaborating and giving each other feedback."

There were numerous entries related to students' understanding about the value of communication and listening. These included constructive criticism, coming to agreement, the impact of communication on group dynamics, and the importance of focused discussion in project planning. The following quote addresses multiple subthemes in team process:

> I have worked with this same group of people for almost 4 months, and I have noticed a huge change in our team dynamics. Now when we meet we can talk things out, bounce ideas off each other, give constructive advice and tips without worrying about voicing our opinion or offending a group member. We work really well together and have become very efficient. It is easy for us to delegate tasks to each other, and we can fully rely on getting back results from every team member.

Achieving IPE outcomes

The end results of working together on the team projects and what actually happened during the projects comprised the data in this theme. One student's quote captured the essence, writing:

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> It was neat to see how each profession used their knowledge and skills to impact the women on a practical level. It was not simply medical professionals speaking at a group of people about what they should do, but rather it was a group of human beings sharing their lives and experiences with one another.

The research team identified a surprise finding in that students articulated interprofessional practice as a process, not simply one event. This was not a planned learning objective for the course. In addition, students clearly included the patient/client as a member of the interprofessional team. Illustrative quotes are: "Working together and effective communication can only benefit the patient." "I realized during this team work that in the hospital setting, if healthcare members do focus on patients and the strengths and positives of different people, that the outcomes would be more successful."

Several students stated that they had more confidence in working with other professions and felt more at ease discussing issues and concerns, and they felt more ready to collaborate with an interprofessional team in the workplace.

> "… it taught me how to work with other specialties and to bring evidence based practice to help."

> "It has taught me to be respectful of other professional opinions and … how to work together with other healthcare members to achieve a common goal for the patient."

> "… has laid a foundation for the importance of the interprofessional team and has positively influenced me. I have more confidence now working with other professions and feel more at ease discussing issues and concerns with them."

Expressing emotions

A broad range of both positive and negative feelings was evident in the data. Students expressed frustration at the interactions of team members and the pace of their projects. They stated "confronting peers is hard" and "there were frustrations because each person considered their area to be extremely important and each person had a different way of communicating." Students used the following words to express their emotions: excited, jealous, negative, enthusiastic, confident, pleased, looking forward, worried, grateful, happy, wish, enjoyed, proud, impatient, and concerned. Expressions of positive emotions outnumbered the negative expressions. "I was really pleased with how we were able to work off of each other."

Learning culture/community engagement

It was clear in the written assignments that the students were becoming involved with the communities or populations served by the projects. Data reflected that they came to realize clients did not want to be "talked at." They were surprised at the higher than expected health literacy level and awareness the clients already had on

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topics and how well clients absorbed new key phrases. Students expressed that they needed to take into account the clients' pre-conceived views. They realized the necessity of understanding clients' health beliefs and recognizing varying degrees of health literacy. Students acknowledged that they were out of their "comfort zone" and were going into unfamiliar geographic areas. One student's observation captured this theme: "I think that this experience gave me a lot of insight on the character of people and will help in future clinical rotations by helping me to remember to keep an open mind at all times."

Being client/patient centred

The theme being client/patient centred related to a focus on clients or patients, rather than a focus on students. Data included a desire to try and minimize the use of stereotypes or pre-conceived perceptions about clients and patients. Students articulated that learning about the needs and wants of a client is vital for developing rapport with them, and the importance of patients receiving information that is practical for their lifestyle.

> What I believe makes our project as successful as it [is] was the fact that our group was able to develop a rapport with the ladies and presented them material in a way that engaged them and that they could understand; this is just as important when working with patients.

A contrasting view of this theme described a student's own needs as a learner or their team's needs. When students expressed this view, it was infused throughout their critical reflections, not captured in one specific quote. The entries were focused on themselves as learners and not as care providers.

Becoming aware of behaviours

The theme becoming aware of behaviours was closely related to the themes of learning culture/community engagement, being client/patient centred, and learning team process. Students described behaviours that focused on building rapport with both clients and teammates, becoming more aware of their cultural bias throughout the project, and that they were learning from the clients and other professions' students. For example, more than one student mentioned the importance of having written materials translated into Spanish to facilitate communication. Translation was not an expectation for the course but was evidence of student engagement with the community. Student growth related to behaviour is evident in the following quote: "We learned that going into the project with an open mind and creating a rapport was vital."

Articulating beliefs

Profound learning and personal growth were apparent when students wrote about their beliefs. Students explicated that their views were changing through this experience. This theme closely ties into themes presented earlier, such as learning team process, becoming aware of behaviours, and being client/patient centred. Students related that teamwork is essential, that teams have an advantage to put all talents and

knowledge together, that there is a different focus by each profession, and that all foci together are stronger than only one focus. The deep learning was reflected in these students' words:

> "… with no one person feeling overwhelmed with too much or feeling as though they are not contributing. To me, this is the essence of interprofessional relations."
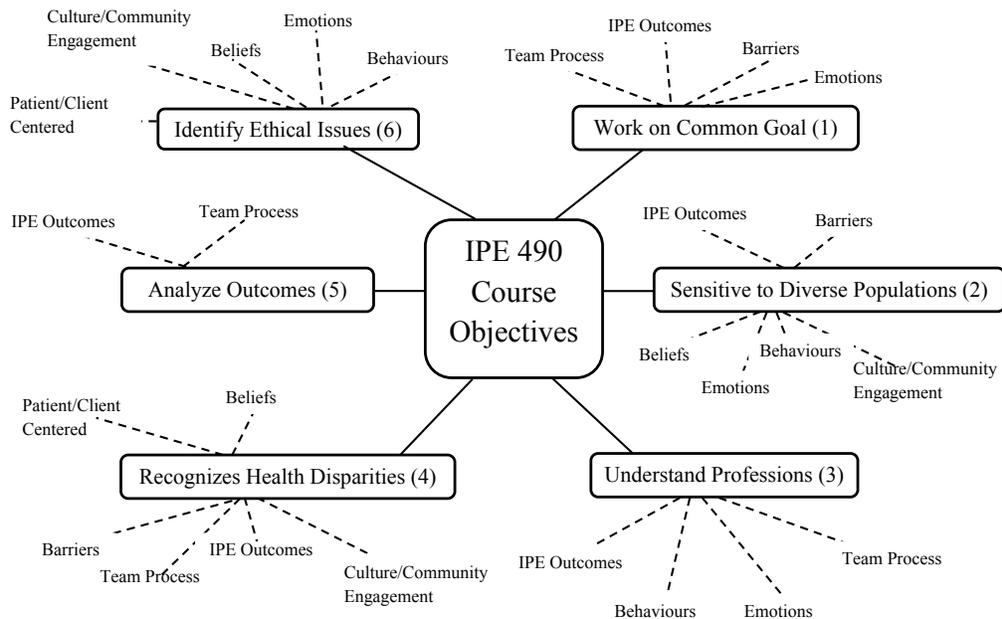
> "Without the collection of various experiences and perspectives that is contained in my own team, the challenge of restructuring our product … would have been very difficult."

Experiencing barriers

Data revealed obstacles that hindered the progress of projects, and this theme produced three subthemes of student, agency, and client. Most frequently mentioned was the student issue of scheduling time for team meetings. Individual students' organizational skills were another barrier, and it was frustrating for teammates when individuals did not complete tasks as expected. Agency barriers were evident when the students encountered difficulty communicating with agency personnel, when the agencies had staff changes, or when agency operational hours did not coincide with student schedules. Few client barriers were mentioned and they involved accessibility of clients during the time students had available.

Figure 2
Relationship of major themes to IPE490 course objectives

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Connecting with course objectives

The critical reflection assignment (Table 2) required students to write about how one or two course learning objectives (Table 1) were met through the teamwork and proj-

ects. Across the data sample, researchers found all objectives were mentioned. Specific course objectives were reflected in the themes, including working together toward a common goal (engaging in team process), being sensitive to cultural diversity (learning culture/community engagement), learning more about the scope of practice and values of professions (engaging in team process), and analyzing outcomes from the projects (achieving IPE outcomes). Several students addressed the ethical principle of beneficence, a real sense of the clients benefitting from the projects: "we are working to enhance the lives of these families," and "we put together a presentation that really benefitted the ladies."

Figure 2 was designed to facilitate readers' clarity about the theme connections with specific course objectives. Themes often connected with more than one course objective; for example the theme "Engaging in Team Process" connected with four of the six course objectives (Figure 2). To summarize this theme, all six of the course learning objectives were mentioned across the sample of student reflection data.

Discussion

In this analysis of an IPE practicum service-learning course, we drew on student reflection assignments to gain insight into the educational outcomes. Utilizing the "What, So What, Now What" framework [15] for critical reflection, students were able to step back from themselves and move into the second-order reflection [16] needed for effective IPE learning. The nine major themes emerging from the data were generally congruent with those identified by prior researchers [24-28]. In addition, the research team found multiple subthemes in the theme engaging in team process, and at least two of the subthemes had not been identified in literature reviewed for this study. There was one surprise finding of transformative learning in which the student data provided evidence of students realizing a process of becoming an interprofessional practitioner. Students articulated that interprofessional practice is not a one-time event; rather, it is an overall mode of focusing on patient care.

The research team found the nine major themes were connected with each other and did not stand independently of each other (see Table 5).

For the first research question, data revealed considerable depth in students' application of beliefs, emotions, and behaviours related to interprofessional teamwork. Findings supported prior research examining the process of student growth and development in a variety of interprofessional learning experiences. Themes and student quotes indicated that themes applied both to clients and to team members. This study's second research question asked if the critical reflection assignments provided evidence of course objectives being met. Across the data sample, this question was thoroughly answered and all course objectives were met.

Reflection assignments, journals, or discussion are frequently used in IPE [9,27-32] to help students understand what they are learning. In this study, the reflection assignments allowed researchers to gain insight into how students applied their prior learning and how they understood the course objectives, further underscoring the value of critical reflection in IPE.

Table 5.
Connections across the major themes

Major themes	Connections with other major themes
Engaging in team process	Achieving IPE outcomes, experiencing barriers, being client/patient centred, becoming aware of behaviours, articulating beliefs, expressing emotions, connecting with course objectives, learning culture/community engagement
Achieving IPE outcomes	Engaging in team process, experiencing barriers, becoming aware of behaviours, connecting with course objectives
Experiencing barriers	Engaging in team process, achieving IPE outcomes, expressing emotions
Being client/patient centred	Engaging in team process, becoming aware of behaviours, articulating beliefs, connecting with course objectives
Learning culture/ community engagement	Engaging in team process, being client/patient centred, articulating beliefs, expressing emotions, connecting with course objectives
Becoming aware of behaviours	Engaging in team process, achieving IPE outcomes, being client/patient centred, articulating beliefs, expressing emotions, learning culture/community engagement

Students were able to articulate team processes in detail. Emergence of the theme of engaging in team process with seven subthemes is evidence that students found teamwork to be deep and multifaceted, not superficial. Through the team experience, students expressed gaining a sense of competence regarding themselves, other health professions, and the full team, which included community agencies and clients. Students conveyed understanding of the value of communication and an increase in their self-confidence to function on an interprofessional team similar to other studies [27,30,31]. Students expressed that they learned first-hand about members performing professional roles, findings supported by Derbyshire and Machin [26].

An interprofessional approach to patient care was foundational for the subtheme working together, in which students recognized the valuable contributions from all team members. This finding is congruent with other research [31] and is similar to a theme of "effortful planning" identified in a study by Bazyk et al. [25]. A strong subtheme of engaging in team process was the focus on a goal, or mutual commitment to projects, also found in a study of 24 interprofessional students in a mixed method study of problem-based IPE [27].

Students developed an understanding of the value of communication and they looked forward to using this understanding in their future professional practice. Other researchers have reported comparable findings in IPE student learning [24,30,31].

The subtheme overcoming logistical issues specifically addressed availability of agency personnel, changing agency priorities during the project period, and changing project schedules. This was not identified in literature reviewed for this discussion and may be a unique contribution about logistical issues for IPE students. In addition, the subtheme using individual strengths was not identified in the research literature review, and this may be a unique contribution of the study.

In the theme achieving IPE outcomes, students looked into their future careers, describing a growth in confidence for interprofessional practice, similar to findings reported by Clark [16] and Abbott et al. [24]. Study data suggested the students gained deeper insight into the potential for interprofessional practice through the course activities. Students drew meaning from their experiences in real-life events and specific project outcomes.

The challenge of time constraints identified in this study echoed findings reported by several other researchers; student schedules across professional curricula are busy, and they have difficulty finding time for team meetings [11,30,31,33,34]. In the current study, students found a variety of ways to move past the barriers, including meeting just prior to full class sessions, and using wikis or other online collaborative tools.

Student engagement was evident in a range of emotions, from excitement and enthusiasm to frustration. Expressions of emotions underlie the student attitudes toward this IPE experience. While most of the emotions were positive, they also expressed negative feelings such as jealousy and impatience. The findings about generally positive student attitudes toward IPE are congruent with results reported by several researchers [9,24,27,31,33].

The study was conducted at a private Jesuit university with a mission of commitment to diversity and service. This may have influenced the students' attitudes toward cultural sensitivity and community service. Student data revealed a shift in attitude in the four themes of learning culture/community engagement, being patient/client centred, becoming aware of behaviours, and articulating beliefs. When viewed together, the combined findings in these themes signify growth in both knowledge and attitudes about interprofessional practice through the course. Working with the communities engaged the students in patient/client advocacy, as they looked beyond stereotypes toward more socially responsible roles as healthcare professionals. This kind of transformative learning has been noted by other researchers in both uniprofessional service learning and interprofessional learning [16,25,27-29,32,35]. It was clear from data in these four themes that students were achieving the course objective of demonstrating sensitivity to cultural diversity.

Strengths and limitations

Strengths in the design included stratified sample selection to proportionately represent students' health professions. A research journal was maintained and regularly distributed to co-researchers for review or correction. Research questions were frequently reviewed, and original data was available to all co-researchers for reference. Two data documents were piloted to assist understanding of qualitative inductive content analysis. All co-researchers discussed the definition of categories and came to agreement about grouping coded data into categories. Subgroups developed categories into themes and returned to the full study team for further discussion and verification of subthemes. The full study team reviewed and agreed on representative quotes, including positive and negative aspects of the themes.

Despite careful planning, limitations arose. The retrospective study design, with de-identified data, prohibited member checking. Of the six co-researchers, only three

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had experience with qualitative inductive content analysis. This limitation was countered by pairing experienced and non-experienced within co-researcher subgroups. Co-researchers may have been faculty in the course, so a research assistant reviewed course faculty lists and ensured the co-researchers did not review data from students they taught. One co-researcher had not begun to teach any of the IPE courses until after the data collection time period, which further insulated the research from inadvertent recognition of students or agencies. Team meetings did not always include all six co-researchers due to scheduling, workload, and unexpected events. For this reason, data analysis work occurred outside the full group. File sharing strategies were used to overcome this challenge.

Conclusions and recommendations

We conclude that students expressed a broad range of beliefs, emotions, and behaviours related to interprofessional teamwork through critical reflection assignments. Students were able to articulate multiple facets of team processes in detail and demonstrated personal growth in understanding interprofessional practice. Identified themes provide evidence that students understand interprofessional interaction as ongoing, rather than a one-time event. An interprofessional faculty research team (including quantitative researchers) was effective in using a qualitative method to evaluate a critical reflection assignment.

Barriers to IPE related to time constraints and schedule conflicts have been well documented by other researchers and were a finding from this study. We recommend investigations into use of online strategies to address such barriers. Online strategies can include videoconferencing, asynchronous online discussion, and social networking. While this study adds to the evidence that IPE creates positive interaction and interprofessional collaboration for students, it does not address improvement of client care. We suggest future research include prospective data collection from health professions graduates related to interprofessional teamwork as they enter their first year of practice. Such research may focus on how the IPE experience affects their transition into practice. Interprofessional teamwork experiences could be compared between new professionals who have had IPE in their curriculum and those who have not had the benefit of IPE.

Acknowledgements

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Abbreviation

IPE: Interprofessional education

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Journal of Research in
**Interprofessional
Practice and
Education**

Vol. 4.2
December 2014

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