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“Where I am weak, they are strong”: Students’ Perceptions and Attitudes Toward Interprofessional Education

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Abstract

Purpose: Healthcare professionals strive for interprofessional practice to achieve optimal patient care. Extant research suggests that to best prepare students for interprofessional practice, interprofessional education (IPE) should be a key element in curriculum. The purpose of this mixed-methods study was to evaluate the impact of an IPE activity on participants’ attitudes and perceptions of IPE across five academic programs. **Methods:** This study utilized a modified version of the Readiness for Interprofessional Learning Scale Questionnaire (RIPLS) pre and post IPE and reflective essays. Participants included 67 students from nursing, occupational therapy, athletic training, dietetics, and speech-language pathology programs. After reviewing a hypothetical case study, participants collaboratively developed assessment and treatment recommendations. Questionnaires were analyzed using statistical procedures and reflective essays underwent thematic analysis. **Results:** Collectively, data revealed significant changes in participants’ perceptions, attitudes, and implementation readiness. Occupational therapy student participants had statistically significant increases in the RIPLS composite score, Teamwork and Collaboration, and the Positive Professional Identity components ($p \leq 0.03$). Participants with previous IPE experience scored 4-points higher on the RIPLS composite score ($p = 0.03$). The reflective essays revealed the themes of barriers associated with collaboration, a deeper understanding and appreciation of other discipline’s roles and the value of teamwork in achieving optimal patient care. Participants reported beginning the interprofessional education experience with anxiety and uncertainty about not only their involvement but also the roles of other healthcare professionals. Throughout the experience, participants emerged with an increased knowledge of their role, others’ roles, and the value of working together within a professional setting to achieve the same goal, optimal patient care. **Conclusions:** Our findings reveal the benefits of interprofessional education and the necessity to include several healthcare professionals associated with rehabilitation in interprofessional research and education. With more disciplines represented, students receive a broader, more in-depth understanding of not only patient care but also the roles of multiple disciplines they will collaborate with during actual rehabilitative practice.

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ABSTRACT

Purpose: Healthcare professionals strive for interprofessional practice to achieve optimal patient care. Extant research suggests that to best prepare students for interprofessional practice, interprofessional education (IPE) should be a key element in curriculum. The purpose of this mixed-methods study was to evaluate the impact of an IPE activity on participants’ attitudes and perceptions of IPE across five academic programs. **Methods:** This study utilized a modified version of the Readiness for Interprofessional Learning Scale Questionnaire (RIPLS) pre and post IPE and reflective essays. Participants included 67 students from nursing, occupational therapy, athletic training, dietetics, and speech-language pathology programs. After reviewing a hypothetical case study, participants collaboratively developed assessment and treatment recommendations. Questionnaires were analyzed using statistical procedures and reflective essays underwent thematic analysis. **Results:** Collectively, data revealed significant changes in participants’ perceptions, attitudes, and implementation readiness. Occupational therapy student participants had statistically significant increases in the RIPLS composite score, Teamwork and Collaboration, and the Positive Professional Identity components ($p \leq 0.03$). Participants with previous IPE experience scored 4-points higher on the RIPLS composite score ($p = 0.03$). The reflective essays revealed the themes of barriers associated with collaboration, a deeper understanding and appreciation of other discipline’s roles and the value of teamwork in achieving optimal patient care. Participants reported beginning the interprofessional education experience with anxiety and uncertainty about not only their involvement but also the roles of other healthcare professionals. Throughout the experience, participants emerged with an increased knowledge of their role, others’ roles, and the value of working together within a professional setting to achieve the same goal, optimal patient care. **Conclusions:** Our findings reveal the benefits of interprofessional education and the necessity to include several healthcare professionals associated with rehabilitation in interprofessional research and education. With more disciplines represented, students receive a broader, more in-depth understanding of not only patient care but also the roles of multiple disciplines they will collaborate with during actual rehabilitative practice.

Keywords: interprofessional education; interprofessional practice; multidisciplinary; rehabilitation

INTRODUCTION

A variety of healthcare settings requires practitioners from different professional groups to work as a team. This relationship between multiple practitioners and professionals is referred to as interprofessional practice.¹ In order for a relationship between disciplines to be successful, all team members should communicate, share, actively listen, and trust other team members.² These skills develop through experiences and didactic curriculum within professional schooling. In the context of interprofessional practice, opportunities to interact and learn from other disciplines as part of educational curricula positively impacts the interprofessional interactions, staff morale, and patient outcomes.³ However, coursework continues to emphasize discipline-specific skills without thorough preparation for interprofessional care. Students in healthcare programs complete coursework but enter clinical practice with little knowledge of other disciplines' roles and responsibilities.⁴ The unknown may foster profession-specific stereotypes, which reduces interprofessional interactions.⁵ Therefore, inclusion of interprofessional education (IPE) within the curriculum of health professionals has become a point of focus for many healthcare programs.

IPE occurs when students from two or more disciplines collaborate to improve patient care based on knowledge learned in the classroom.⁶ The value of IPE has increased to a level where it is now required for achieving and maintaining accreditation within several professional programs.⁷⁻⁹ Accreditation standards for IPE are often broadly written in order to allow educational programs to use innovative strategies to best prepare students for interprofessional practice in different settings.¹⁰ Within the required standards of the Commission on Accreditation of Athletic Training Programs, standard eight specifies that each student must have multiple exposures to interprofessional education.¹¹ The Accreditation Council for Occupational Therapy Education Standards specify that master's level graduates must "be prepared to effectively communicate and work interprofessionally with all who provide services and programs for persons, groups, and populations."¹² The accreditation standards of speech-language pathology indicate that programs must provide opportunities for students to understand how to work on an interprofessional team understanding the roles and contributions of other disciplines as well as communicate with all team members including a client's family members.¹³ Standards for the American Association of College of Nursing specify that curriculum must include experiences for interprofessional clinical practice.¹⁴ Finally, the Academy of Nutrition and Dietetics specify that interprofessional education is an essential component of medical education.¹⁵

To comply with an IPE-specific accreditation standard, IPE can be delivered in a variety of forms to prepare students to be successful members of the interprofessional healthcare team. Activities may include workshops, field experiences, case studies discussed face-to-face, IPE embedded courses, virtual simulations, and face-to-face simulations using manikins. IPE also includes a combination of healthcare professions within educational programs to simulate clinical practice.¹⁶ For example, Cohen et al investigated the effects of an intensive multi-day IPE training program on knowledge acquisition, attitudes of IPE, and team skills in students of medicine, nursing, occupational, physical, and music therapies, physician assistant, and social work as these professions routinely encounter each other as part of patient care.⁴ Trainees showed statistically significant improvements in knowledge and attitudes of IPP compared to a control group. Furthermore, findings of IPE that utilized case-based learning activities revealed positive outcomes in students learning about professional roles, communicating as a team and general satisfaction.^{10,16} However, a shortfall in the IPE literature involves the lack of investigation of various professional interactions. For example, athletic trainers, nurses, dietitians, speech-language pathologists, and occupational therapists interact routinely in rehabilitative care, yet there are no reports of IPE outcomes following simulated collaborations amongst these five professions. In addition, following a severe head injury, athletic trainers identify acute head injury, nurses serve as the initial contact in emergent or in-patient setting, dietitians are consulted for medical nutrition therapy, speech-language pathologists manage swallowing and cognitive-communication deficits, and occupational therapists rehabilitate independence with activities of daily living, higher order motor function, and functional reintegration.

This study was developed on the principles of organizational theory as described by Senge.¹⁷ Organizational theory in this context falls as a subset of general systems theory which was the seminal work of von Bertalanffy, but originally applied to IPE by Loxley.^{18,19} Loxley described the use of general systems theory to support collaboration by viewing healthcare as a whole and identifying the need for interaction to reach a common goal. Organization theory used within the healthcare system narrows the idea that participants within the system learn from each other in order to enhance patient outcomes.¹⁷ Organizational theory when applied to healthcare, allows individuals to feel safe sharing their views and value perspectives of other team members. With a holistic lens, an organizational theory aims to enhance outcomes by involving all team members.²⁰

Although previous work utilized a case study activity as part of IPE and showed increased knowledge about IPE, positive attitudes toward IPE, and a deeper understanding of other disciplines' roles via mixed method assessments, no reports included the combination of athletic trainers, occupational therapists, dietitians, speech-language pathologists, and nursing student participants. Different results and/or themes may occur with this unique group of student participants. Therefore, the purpose of this mixed-methods study was to evaluate the impact on student participants' attitudes and perceptions of a face-to-face active IPE experience

across five academic programs (nursing, dietetics, athletic training, occupational therapy, speech-language pathology) associated with rehabilitation. This mixed methods study aims to answer the following question: How do themes associated with participants' perceptions of the IPE experience (qualitative) help explain readiness for IPE as measured by the Readiness for Interprofessional Learning Scale Questionnaire (RIPLS; quantitative)? We hypothesize that the themes from the reflective essays and RIPLS scores (teamwork and collaboration as well as positive professional identity) will reflect positive perceptions of the IPE and increased readiness for interprofessional practice following the IPE experience.

MATERIALS AND METHODS

Design

The Institutional Review Board at Eastern Kentucky University approved this study, and all participants signed informed consent. A Convergent Mixed Methods design was used to obtain a deeper understanding of student participants' perceptions of an interprofessional educational experience by converging both quantitative and qualitative data.²¹ Within a convergent mixed methods design, quantitative and qualitative data are collected after each other and then converged/compared to reveal the meaning related to the phenomenon of interest. The phenomenon for this study was students' perceptions of an interprofessional education experience.

Instrument

The Readiness for Interprofessional Learning Scale Questionnaire (RIPLS) is a 16-item questionnaire with three subscales (teamwork and collaboration, negative professional identity and positive professional identity).²² Within the RIPLS, items 1-9 represent subscale "teamwork and collaboration," items 10-12 represent subscale "negative professional identity," and items 14-16 represent subscale "positive professional identity." The questionnaire is scored on a 5-point Likert scale ranging from strongly agree to strongly disagree with higher scores reflecting increased readiness for IPE.²²⁻²⁴ It was validated in the undergraduate context with dietetics, nursing, occupational therapy, physiotherapy, podiatry, prosthetics and orthotics, radiography and social work programs as well as within the postgraduate context with general practitioners, nurses, pharmacists and allied health professionals.²⁵ In this approach, a modified version of the RIPLS was used to measure the effectiveness of an interprofessional education experience on undergraduate and graduate student participants' perceptions of collaboration, attitude, and implementation readiness.²⁶ Modifications included removal of the term "social care" in order to accommodate to the programs represented in this study. Appendix A includes the RIPLS used in this study. After completing the post questionnaire, students wrote a reflective essay about their perceptions of the interprofessional education experience.

Participants

Participants included undergraduate and graduate-level university students enrolled in either nursing, athletic training, dietetics, occupational therapy, or speech-language pathology courses taught by the investigators at the same university. During a scheduled class, the research methods and procedures were explained to all participants in both verbal (class announcement) and written formats (cover letter).

Data Collection

Once consent was obtained, participants completed three phases of data collection: preparation, collaboration, and reflection.

Preparation

Initially, all participants completed the RIPLS. Then, each participant received the case study of a hypothetical client with a neurological impairment to determine the most appropriate assessment and treatment recommendations based on the participant's program of study. For example, participants in the speech-language pathology course assessed swallowing function and determined the most appropriate diet or compensatory strategies to reduce choking risks. To develop the most appropriate case study, all professors involved in the study reviewed the case study and added discipline-specific content. In order to accommodate athletic training, the case study was an acute physical injury. For speech-language pathology, the case study involved swallowing and communication components. Nursing and dietetics added laboratory results and occupational therapy included sections related to activities of daily living (self-feeding, mobility).

Collaboration.

Participants converged on a predetermined day in a location on campus for approximately two hours. Participants were greeted and provided instructions as a large group. Researchers divided participants into ten groups. Each group included at least one, but up to two representatives from each participating class. Once participants located their group and introduced themselves to fellow group members, they reviewed the instructions for the collaboration event. Then, they completed three collaborative tasks: reviewed case study, developed assessment recommendations, and determined appropriate plan of care for the hypothetical client. Participants were given a timed schedule to complete the collaborative tasks and foster participation. Professors from the

represented programs individually approached each group to answer questions and ensure collaboration. If one participant was not involved, the professor posed a question to enhance collaboration.

Reflection

At the end of the collaboration, participants completed a post-questionnaire (RIPLS). Participants also wrote a one-page self-reflection of the interprofessional education experience using the following prompts: What were the benefits of interprofessional collaboration/working as a team, and what problems did you have from this experience?

Data Analysis

Following data collection, data was analyzed using side-by-side comparison of both quantitative and qualitative results.

Quantitative

Responses on RIPLS were analyzed using statistical procedures to reveal differences between the two time periods (pre and post collaboration event) as well as differences between participating classes and student participants with previous IPE experience. Descriptive statistics for all subjects were reported as frequencies and percentages for categorical variables. The Shapiro-Wilk test for normality was utilized revealing the variables were not normally distributed. Accordingly, non-parametric procedures were employed, including Wilcoxon sign rank tests for pre-activity and post-activity comparisons, Mann-Whitney U rank sum for comparisons between student participants with and without previous IPE experience and each dependent variable, and Kruskal-Wallis procedures for comparisons between academic program and each dependent variable. All values were assessed to determine if they exceeded standard error of measurement (SEM) and minimal detectable change at the 90% confidence level (MDC₉₀), which were calculated for the RIPLS composite score and each factor (Table 1).²⁶ Statistical significance was set at $p \leq 0.05$. All statistical calculations were performed using STATA/SE (version 15.1 for Windows, StataCorp, LP, College Station, TX).

Table 1. Standard Error of Measurement and Minimal Detectable Change Values

	Overall SEM	Overall MDC ₉₀	No Previous IPE Experience SEM	No Previous IPE Experience MDC ₉₀	Previous IPE Experience SEM	Previous IPE Experience MDC ₉₀
RIPLS Composite	2.8	6.5	2.9	6.8	2.5	5.9
Teamwork and Collaboration	2.0	4.5	2.2	5.2	1.4	3.4
Negative Professional Identity	1.4	3.2	1.4	3.2	1.3	3.1
Positive Professional Identity	1.2	2.8	0.9	2.0	1.5	3.5

RIPLS=Readiness for Interprofessional Learning Scale; IPE=Interprofessional Education; SEM=Standard Error of Measurement; MDC₉₀=Minimal Detectable Change at 90% Level

Qualitative

Sixty-five participants completed the reflective essays (nursing [14], athletic training [0], dietetics [14], occupational therapy [13], and speech-language pathology [24]). Reflective essays were analyzed using qualitative methods outlined by Braun and Clark and Attride-Stirling to reveal themes associated with interprofessional education and practice.^{27,28} More specifically, thematic network analysis was used to generate and associate recurring patterns within the reflective essays to create a story reflecting participants' views of interprofessional education and practice. Data analysis included four phases (familiarity with data, code, themes, and story). During all phases of data analysis, four researchers frequently referred to the data to ensure analysis represented the words expressed by the participants. Data was organized into a Microsoft excel document and on notecards. An audit trail tracked the number of codes and themes as well as the data extracts. The results are described in more detail below within each phase of data analysis.

Familiarity with Data

Researchers, during the first phase, each read 16 to 17 reflective essays to become familiar with the data and search for meanings or patterns. While reading, researchers highlighted significant quotes.

Coding

During the second phase, two researchers collectively reviewed ten reflective essays line-by-line and highlighted semantic codes. Codes reflected an actual quote from the participant or a general idea of the data extract. See Table 2 for an example of codes applied to a short segment of data. Researchers defined each code. A total of 75 codes emerged from the data. Two different researchers reviewed the same ten reflective essays to determine agreement with initial codes. No new codes surfaced. As a group, researchers reviewed the codes to adequately define and ensure no overlap between codes resulting in a total of 35 codes.

Table 2. Example of Code

Code	Definition	Data Extract
Communication	Communication is an important component of interprofessional education and practice	Communication is a cornerstone for positive patient outcomes

These codes were arranged into a coding framework with definitions for each code. Then, four researchers applied the codes within the coding framework to 16 or 17 unfamiliar reflective essays each. Eleven new codes emerged, and one previous code was deleted due to indistinctiveness. Appendix B includes the final coding framework with 46 codes. Each code represents perceptions from multiple participants. In addition, the first author reviewed codes with multiple data extracts to ensure correct coding of data (collaboration to improve patient care, learn roles of different disciplines, positive and beneficial experience). No changes were made.

Themes

In the third phase, four researchers collectively organized similar codes into themes. Each code was written on a notecard and similar codes were categorized into themes. The themes were defined to ensure no overlap and reviewed to ensure adequate representation of the data. Within each theme, subthemes emerged. During this phase, the themes and subthemes were organized into a thematic map for a visual illustration of the data. Four themes emerged from data analysis (barriers to collaboration, real-world application, mastering a puzzle, and where I am weak, they are strong). Appendix B also includes each theme and its definition as well as subthemes, codes, and a sample of the data extract that correspond to each code. The researchers each read 16 to 17 unfamiliar reflective essays to ensure themes accurately portrayed the data representing participants' positive and negative views of the interprofessional experience.

Story

In the final phase, a story representing the data surfaced. The story included a description of each theme and how themes collectively reflect participants' views of interprofessional education and practice. The next section includes a description of each theme with supporting quotes.

Validation/Verification of Data

Study rigor included several verification procedures based on criteria outlined by Guba and Lincoln.²⁹ Triangulation was utilized through a variety of data analysis methods to ensure validity of results. To increase credibility of findings, member checking was used in which participants read the story (final data analysis) to ensure all their views were expressed accurately. No changes were made. Verification of data analysis was confirmed using memos and in vivo quotes. In addition, four researchers participated in all phases of data analysis. Each reflective essay was read twice by two different researchers. All reflective essays were included in the analysis and each analyzed by two different researchers to ensure data reflected participants' views. Also, an audit trail and field notes were kept ensuring an accurate record of the presence and number of codes and themes.

RESULTS

Quantitative

Sixty-seven student participants from the five health-related academic programs participated in the study (athletic training [9], speech-language pathology [21], nursing [15], dietetics [9], and occupational therapy [13]). Thirty-nine percent of student participants (26 of 67) reported having previous IPE experience.

Previous IPE Experience

When examining whether or not previous IPE experience affected the pre or post-activity RIPLS score, there was a statistically significant 4-point increase in the RIPLS composite score for those with previous IPE experience following the IPE activity ($p=0.003$) (Table 3). The increase was beyond the SEM but not the MDC. Small 1 to 2 point statistically significant increases occurred in the Teamwork and Collaboration as well as Positive Professional Identity subscales for student participants with and without previous IPE experience ($p\leq 0.04$). Although the increases were statistically significant, they were not beyond minimal detectable change values.

	<u>Pre-Activity</u>	<u>Post-Activity</u>	<u>P-Value</u>
RIPLS Composite			
No Previous Experience (n=41)	76 (71-79)	77 (72-80)	0.65
Previous Experience (n=26)	75 (70-80)	79 (76-80)	0.003
Teamwork and Cooperation			
No Previous Experience (n=41)	44 (42-45)	45 (45-45)	0.04
Previous Experience (n=26)	44 (41-45)	45 (44-45)	0.01
Negative Professional Identity			
No Previous Experience (n=41)	14 (12-15)	13 (12-15)	0.13
Previous Experience (n=26)	14 (12-15)	15 (13-15)*	0.24
Positive Professional Identity			
No Previous Experience (n=41)	19 (17-20)	20 (20-20)	0.01
Previous Experience (n=26)	18 (16-20)	20 (19-20)	0.006

Table 3. Pre-test/Post-test Results for RIPLS by Previous IPE Experience (reported as median and interquartile range)
RIPLS=Readiness for Interprofessional Learning Scale; IPE=Interprofessional Education; *Significantly greater compared to No Previous Experience $p=0.02$

Academic Program

When examining the RIPLS scores within and between academic programs, occupational therapy student participants had statistically significant increases in the RIPLS composite score, Teamwork and Collaboration, and the Positive Professional Identity components ($p\leq 0.03$) (Table 4). These 3-to-6-point changes were the largest increases for any of the academic programs. A 2-point shift in scores occurred for the athletic training student participants from pre to post-activity, with the Negative Professional Identity score decreasing and the Positive Professional Identity increasing ($p\leq 0.05$). Positive Professional Identity significantly increased for 3 of the 5 academic programs ($p\leq 0.05$); however, only the 3-point increase for the occupational therapy student participants was beyond minimal detectable change.

Table 4. Pre/Post-test Results for RIPLS by Academic Program (reported as median and interquartile range)

	<u>Pre-Activity</u>	<u>Post-Activity</u>	<u>P-Value</u>
RIPLS Composite			
Athletic Training (n=9)	78 (75-79)	77 (77-79)	0.68
Speech-language Pathology (n=21)	78 (71-80)	78 (76-80)	0.31
Nursing (n=15)	75 (71-77)	77 (68-80)	0.89
Dietetics (n=9)	77 (75-80)	80 (79-80)	0.17
Occupational Therapy (n=13)	71 (67-75)	77 (74-79)	0.03
Total	75 (71-79)	78 (74-80)	0.03
Teamwork and Collaboration			
Athletic Training (n=9)	45 (44-45)	45 (45-45)	0.29
Speech-language Pathology (n=21)	45 (42-45)	45 (44-45)	0.64
Nursing (n=15)	44 (41-45)	45 (45-45)	0.02
Dietetics (n=9)	45 (44-45)	45 (45-45)	0.32
Occupational Therapy (n=13)	41 (39-45)	45 (44-45)	0.02
Total	44 (41-45)	45 (45-45)	0.002
Negative Professional Identity			
Athletic Training (n=9)	14 (13-15)	12 (12-14)	0.05
Speech-language Pathology (n=21)	14 (12-15)	15 (14-15)**	0.16
Nursing (n=15)	12 (12-15)	12 (3-15)	0.21
Dietetics (n=9)	14 (12-15)	15 (14-15)**	0.58
Occupational Therapy (n=13)	14 (12-15)	13 (11-15)	0.36
Total	14 (12-15)	14 (12-15)	0.55
Positive Professional Identity			
Athletic Training (n=9)	18 (17-20)	20 (20-20)	0.03
Speech-language Pathology (n=21)	20 (16-20)	20 (17-20)	0.38
Nursing (n=15)	18 (17-20)	20 (20-20)	0.09
Dietetics (n=9)	20 (16-20)	20 (20-20)	0.05

Occupational Therapy (n=13)	17 (16-18)	20 (19-20)*	0.02
Total	18 (16-20)	20 (19-20)	<0.001

RIPLS=Readiness for Interprofessional Learning Scale; *Exceeded minimal detectable change; **Significantly greater compared to Nursing $p \leq 0.04$

Qualitative

Barriers to Collaboration

Initially, participants identified barriers to interprofessional collaboration. They acknowledged personal fears and authentic obstacles of the collaboration experience. Participants expressed a lack of awareness and uncertainty about the experience itself and their role, as well as an understanding and appreciation of other professionals. One participant stated, "I was unsure of what to expect and somewhat nervous (speech-language pathology)." After engaging in the IPE experience, participants identified challenges of collaboration and strategies to overcome the obstacles. A participant indicated, "In school it is easy to think we work in silos (nursing)." Other participants made the following comments about challenges and strategies the group developed to solve the problems.

"It was hard at times because every profession focused on what they would do (dietetics)."

"Some personalities in the group tended to dominate the conversation, not allowing everyone to share about their professional opinions (speech-language pathology)."

"During this experience, I learned how easily individuals can be dominated in conversation (speech-language pathology)."

"It was hard at times because every profession focused on what they would do (dietetics)."

"Some differing opinions were expressed. These were discussed professionally, and a decision was made as a group on what appeared to be the best for the patient (speech-language pathology)."

Real-world Application

Then, participants felt better prepared to apply interprofessional skills during "real-world" practice. This preparation involved communicating professionally, practicing clinical skills and learning about other discipline's assessments.

"This gave us practice with communication skills. This experience gave us a chance to talk to people of other areas which will help improve our communication skills in the future (nursing)."

"Another benefit of working as a team was that we were able to get a broader picture of the client's overall health & understand her needs (speech-language pathology)."

Mastering a Puzzle

Next, participants gained an in-depth understanding of their own role, other discipline's roles, and how the roles overlap. In understanding their own role, participants increased self-efficacy by sharing classroom knowledge and communicating their position in patient care. Through this, participants felt confident and free to share their point of view.

"This experience taught me many different things about my profession and about myself (occupational therapy)."

"I felt so accomplished (speech-language pathology)!"

In learning other disciplines' roles, participants gained knowledge of each discipline's scope of practice and began seeing patient care through a new viewpoint.

"I thought this event was very useful as it allowed me to have a more in-depth view of what each professional does (occupational therapy)."

"It was really interesting to hear from the other programs and what role they would play in the care of the patient (dietetics)."

"I learned a lot about the other professions that I didn't know before (speech-language pathology)."

"The benefits of this interprofessional experience were that each domain of profession was able to see what other departments see as a priority (nursing)."

Eventually, participants noticed how some of the responsibilities of different disciplines are the same. Participants worked together to expand and generate ideas collaboratively which yielded networking and development of relationships.

"It was good though because it opened up brainstorming and critical thinking skills, and it really got us to work together as a team (dietetics)."

"It allowed me to better connect the dots between the similarities among the disciplines (occupational therapy)."

"Every student's field was so different, yet so alike at the same time (speech-language pathology)."

"All disciplines have a piece of the puzzle and it can't be completed unless they are all there (occupational therapy)."

Where I am weak, they are strong

At the end of the interprofessional education experience, participants perceived the benefits and values of interprofessional collaboration. Overall, the student participants described the interprofessional education experience as eye opening, positive, and beneficial. Their initial fears were invalidated, and they noticed the efficiency of collaboration which involved respecting and valuing each profession and collaboration itself. In the end, there was a strong desire for more interprofessional opportunities.

"I learned today that not only is it beneficial to the client, but it is beneficial to each of us. This experience enhanced my understanding of the overall benefits of working with an interprofessional team (occupational therapy)."

"Teaching students to acquire and appreciate this dynamic of healthcare early on is smart and is a good educational practice (dietetics)."

"Benefit of working with various disciplines is that where you are weak, they are strong (speech-language pathology)

DISCUSSION

The purpose of this mixed-methods study was to evaluate the impact of a face-to-face active IPE experience on students' attitudes and perceptions across five academic programs (nursing, dietetics, athletic training, occupational therapy, speech-language pathology) involved in rehabilitation. Both quantitative and qualitative data showed significant changes in participants' perceptions, attitudes, and implementation readiness as a result of the IPE experience. The discussion relates findings to previous research and then provides potential reasons for the differences in RIPLS scores by participants from occupational therapy and those with previous IPE experience.

Student participants expressed initial uncertainty about the learning experience as well as the need to overcome collaboration challenges as indicated by ratings on the RIPLS and comments on reflective essays. For the athletic training students, Negative Professional Identity ratings decreased and Positive Professional Identity ratings significantly increased following the IPE experience ($p \leq 0.05$). In addition to athletic training, students from dietetics and occupational therapy rated items within the Positive Professional Identity subscale higher ($p \leq 0.05$) following the IPE experience. Participants' comments further support the initial uncertainty as noted in the first theme, Barriers to Collaboration (see Appendix B). Multiple authors agree that participants are often uncomfortable at first and apprehensive about collaborating with other professionals.^{1,30} Similar to clinical practice, novice professionals are unsure about their first real-world, independent application of classroom knowledge as it relates to interprofessional collaboration. As an evolving professional, individuals become aware of obstacles and develop strategies to overcome them which was like the experiences shared by participants in this study. Participants reflected the value of equal communication and participation in overcoming barriers to collaboration and preparation for professional practice, which Wallace and Gill noted as significant attributes to optimal patient care.³¹ For example, an occupational therapy student commented, "Communication skills and problem-solving skills are needed in order to address any concerns brought up by other professionals."

Student participants indicated that a component of the teamwork involved a better understanding of their own role as well as the roles of other disciplines. This was further supported by the change in RIPLS scores amongst some of the participant groups as well as comments from all disciplines who completed the reflective essays. For example, nursing and occupational therapy students showed a statistically significant difference ($p = .02$) in the Teamwork and Collaboration subscale from pre to post activity responses. Participants' comments reflect a deeper understanding of each discipline's role as noted in the third theme, Mastering a Puzzle (see Appendix B). Holthaus et al also found that in understanding their own role, participants reflected an increase in self-efficacy and confidence applying knowledge learned in the classroom to clinical practice.¹ Participants also reported the experience was helpful in understanding and clarifying roles of other healthcare disciplines.^{1,32-34} While learning more about other healthcare professionals, participants reflected a deeper appreciation and respect for the value each professional brings to patient care as

well as the benefits of interprofessional education in achieving ideal patient care, both of which corroborated findings by Sangaleti et al and Guraya and Barr^{2,10}.

A unique component of this study was the inclusion of the five specific academic programs of athletic training, nursing, dietetics, speech-language pathology, and occupational therapy. While composite scores of all disciplines on the RIPLS demonstrated an increase in attitudes, perceptions and readiness towards interprofessional practice, only occupational therapy showed a statistically significant change. Since procedures were similar between the student groups, this result may relate to several variables. The change in occupational therapy scores may relate to the variations in didactic learning or previous IPE experiences between disciplines. It is also possible the occupational therapy students had limited exposure to interprofessional experiences with the other four disciplines in the study prior to this activity reflecting a significant change in the RIPLS composite score (pre 71, post 77; $p=0.03$). In addition, this result demands the consideration of an unseen characteristic, such as professional identity. Adams et al define professional identity as the shared attitudes and beliefs among a professional group which influence that group's roles, knowledge, and interactions with others.³⁵ Adams and colleagues found that healthcare students develop a professional identity prior to beginning professional training influenced by gender, past experiences, knowledge of the profession, and many other variables. The concept of professional identity provides one explanation for occupational therapy student participants' performance on the RIPLS. The relationship between professional identity and attitudes towards IPE within different healthcare disciplines is an area for future research.

Additionally, those participants with previous IPE experience demonstrated a statistically significant 4-point change in their RIPLS composite scores. The increase was beyond the SEM but not the MDC. There are two potential reasons for this finding. First, the RIPLS scale which measures students' readiness of IPE participation was utilized too soon after the end of the activity. Readiness implies you are measuring a student's understanding of preparedness prior to an event, in this case interprofessional education. If the scale were to be utilized at a later date following the IPE activity, such as the following academic year, then the results may be different and exceed beyond MDC. Furthermore, Sciascia et al recommended that interpretations of RIPLS scores account for previous IPE experiences.²⁶ Thus, administering the RIPLS later versus immediately after an activity would have merit. The second reason participants with previous IPE experience scored significantly higher on the RIPLS relates to the differences in educational preparation among the five academic programs. Researchers attempted to recruit student participants with limited IPE within their academic program. However, due to the variability in student participant's length of time in their program, program specific curriculum, and clinical rotation and observational requirements of the programs, it is possible that some student participants had more exposure to IPE than other students. Furthermore, the same consideration regarding the development and influence of student's professional identity applies to this result.

In summary, our findings are the first to include the unique combination of nursing, athletic training, dietetics, occupational therapy, and speech-language pathology academic programs within an IPE experience, which adds to previous literature. Qualitative findings reflect that participants within all disciplines characterized the IPE experience as a positive and beneficial learning opportunity. Participants reported beginning the interprofessional education experience with anxiety and uncertainty about not only their involvement but also the roles of other healthcare professionals. Throughout the experience, participants emerged with an increased knowledge of their role, others' roles, and the value of working together within a professional setting to achieve the same goal, optimal patient care. Occupational therapy and students with previous IPE experience were the only groups which demonstrated a statistically significant change in attitudes and perceptions towards readiness to engage in IPE as indicated by scores on the RIPLS.

Clinical Application

The findings from this study apply to both interprofessional education and practice. This interdisciplinary education experience met accreditation standards from all participating programs by providing exposure to interprofessional education (athletic training, nursing, dietetics) which created an opportunity to work interprofessionally with several other individuals within rehabilitation programs (occupational therapy) and understand the various roles of the other professionals (speech-language pathology). Participants gained confidence in applying classroom knowledge with other student participants who were unfamiliar with specific terminology and procedures. For instance, nursing participants shared information about specific lab values to participants from other academic programs. This enhanced not only the nursing students' self-efficacy and confidence communicating the information to unfamiliar listeners but also other participants' knowledge of nursing care. Within clinical practice, this skill is important in opening lines of communication between healthcare professionals to facilitate patient care. Each discipline better understands the nomenclature associated with other disciplines which facilitates comprehension of documentation and effective communication.^{31,36}

As participants began sharing information about the case study, they learned more about each other's roles and how these roles often overlap during patient care. Disagreements emerged in relation to primary responsibilities (overlap between occupational and speech therapy in treating cognition) which fostered development of communication skills. Within the theme barriers to collaboration, student participants noted obstacles and challenges of the IPE experience such as one person dominating the conversation and student participants only focusing on their discipline-specific skills. Within clinical practice, healthcare professionals use effective and professional communication to solve problems and ensure optimal patient care.³⁷ This aligns with the World Health Organization's (WHO) definition of optimal healthcare that is described as a holistic approach focusing on complete physical, mental, and social well-being and not just the absence of disease or illness.³⁸

Furthermore, this study included undergraduate and graduate students from five academic programs. Each level of students added value to the collaborative effort and benefited from the IPE experience. By including multiple academic programs related to rehabilitation, student participants gained a broader view of the client's overall health and rehabilitation process. This mimics clinical practice because we interact with different disciplines specific to each patient.³⁹ Following the experience, participants felt better prepared to step out of their discipline's silo and engage in both conversation and clinical care with other disciplines.

Limitations

Although both the quantitative and qualitative results reflect positive outcomes of the IPE experience, limitations occurred throughout the study. Participants included both graduate and undergraduate students with varied interprofessional experiences and didactic learning and demographic data (age, gender, culture) were not collected. Participants' preparation for the experience was not controlled. There was no accountability for who reviewed the case study prior to the event, which may influence the amount of participation. In addition, we did not control the amount of in-class education related to interprofessional practice across programs. During the collaboration event, the number of students in each group differed. Also, the study was limited by the brief period of time for data collection. Participants from athletic training did not complete a reflective essay, which may add depth to the codes.

Future Research

Future research may address these limitations. In addition, a longitudinal analysis of results will validate this study's findings. Across a three-year time span, do different participants in the same academic programs, receiving the same instructional techniques, and participating in the same procedures express similar views of the IPE experience? Moreover, investigating the impact of previous IPE experience on collaborative attitudes and implementation readiness is warranted. Additional research may investigate the variability between disciplines, especially occupational therapy. While researchers made every attempt to provide an equal environment, occupational therapy students still stood out as a group that had a significant pre-post change on the RIPLS questionnaire.

CONCLUSION

As healthcare continues to strive for optimal patient care, interprofessional education must be a top priority within college curriculum. Interprofessional education aligns with WHO's requirements and serves as a starting point to enhance patient outcomes by fostering *development* of better practitioners. Our findings reveal the benefits of interprofessional education and the necessity to include several healthcare professionals associated with rehabilitation within IPE. With more disciplines represented, students receive a broader, more in-depth understanding of not only patient care but also the roles of multiple disciplines they will collaborate with during actual rehabilitative practice. Ultimately, we hope that IPE during pre-licensure education will impact patient care and practice. But, we can only confidently note that the results will impact education at this time.

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Appendix A

Title: Establishing Test/Re-Test Reliability for Assessments of Interprofessional Education Readiness and Perspectives
Readiness for Interprofessional Learning Scale (RIPLS) Questionnaire

Name of class _____

The purpose of this questionnaire is to examine the attitude of students in health-related programs towards interprofessional learning.

Have you had previous experience of interprofessional education? Yes ____ No ____

If you answered yes to the previous question, please give a very brief statement of what this IPE was and any impact it may have had.

Please complete the following questionnaire.

		Strongly agree	Agree	Undecided	Disagree	Strongly disagree
1	Learning with other students/professionals will make me a more effective member of a health care team					
2	Patients would ultimately benefit if health care professionals worked together to solve patient problems					
3	Shared learning with other health care students/ professionals will increase my ability to understand clinical problems					

4	Communication skills should be learned with other health care students/professionals					
5	Team-working skills are essential for all health care students/professionals to learn					
6	Shared learning will help me to understand my own professional limitations					
7	Learning between health care students before qualification and for professionals after qualification would improve working relationships after qualification/collaborative practice					
8	Shared learning will help me think positively about other health care professionals					
9	For small-group learning to work, students/professionals need to respect and trust each other					
10	I don't want to waste time learning with other health care students/professionals					
11	It is not necessary for undergraduate/postgraduate health care students/professionals to learn together					
12	Clinical problem solving can only be learned effectively with students/professionals from my own department					
13	Shared learning with other health care professionals will help me to communicate better with patients and other professionals					
14	I would welcome the opportunity to work on small-group projects with other health care students					
15	Shared learning and practice will help clarify the nature of patients' or clients' problems					
16	Shared learning before and after qualification will help me become a better team worker					

Appendix B. Final Coding Framework**Theme 1: Barriers to Collaboration**

Definition: Student participants acknowledge personal fears and authentic obstacles of interprofessional practice

Subthemes	Code	Data Extract
Lack of awareness	New Experience	In lecture we often mention these other professions, but really never got to hear their input on care.
	Role Apprehension	What if they asked me a question I didn't know? What if I didn't know what was best for my patient? Do I know what I'm doing?
	Disrespect of other disciplines	Some professions did not feel like they needed others; some did not do as well working as a team
	Misperceptions of each discipline's responsibilities	I thought I knew what the roles were for these disciplines. I clearly feel like my understanding was inept.
	Jargon	Disciplines have their own terminology and jargon; other disciplines may not fully understand or be able to keep up with those terms.
Fears	No experience with direct patient care	I was afraid that I may not represent our profession very well since I have not actually worked with patients yet
	Lack of preparedness	A few setbacks came from other group member's lack of knowledge
	Initial uncertainty of IPE	I was nervous that I would not contribute that much information
	Silo	No one person contains the amount of knowledge necessary to best treat a patient
	Hesitant to work with other professionals	I have never explained what we would do with other disciplines
Obstacles and Challenges of Interprofessional Practice	Challenges of working collaboratively	Some personalities in the group tended to dominate the conversation, not allowing everyone to share about their professional opinions.
	Perceptions of clinical rotations	We have experience with patients during clinical rotations, but we do not get to see much collaboration between the different professions in the hospital setting
	Differences in opinion	Even one person in a large group can make interdisciplinary work difficult
	Overcoming obstacles	It became easier to only share an idea on the most important aspects of the case

Theme 2: Real-world Application

Definition: Student participants felt prepared to use professional skills during interprofessional practice

Subthemes	Code	Data Extract
Communicating Professionally	Communication Skills	Able to communicate a way to co-treat and work in complimentary ways
	Communication	Communication is a cornerstone for positive patient outcomes.
Patient Care	Collaboration to improve patient care	If we don't work with other professions, we aren't going to know all of the aspects about the client that we need to know for therapy.

Same Goal	Although we were all from different professional backgrounds, we all had the same goal for our client
Assessments	I was constantly learning new assessments and treatment from the other healthcare team members.
Practice Clinical Skills	Chance to really utilize our ability to apply the nursing process

Theme 3: Mastering a Puzzle

Definition: Ability to understand my role, other discipline's roles, and how they overlap.

Subthemes	Code	Data Extract
Learning my own role	Knowledge-based learning	We have always been taught to collaborate but actually getting to do it was very insightful.
	Build self-efficacy	I believe that learning from other professionals will enable me to be a more effective member of the health care team in the future.
	Identify my role	I learned more about other disciplines, but even more about myself and my chosen field.
	Positively represent my own discipline	I wanted to be sure I was prepared to communicate the value of occupational therapy.
	Communicate my role	Explaining the importance of labs & diagnostic findings helped the other teams decide who needed to act first.
	Confidence Sharing	I felt very confident and positive about the information I provided other professions.
	Respect my point of view	The other professions valued my opinion as an educated nursing student.
Learn other discipline's roles	Learn roles of different disciplines	I was able to gain insight on the scope of practice and education of other professionals.
	Perspective	I realized that different professions have different interpretations of short-term and long-term goals different ways of writing them.
Overlapping Roles	Professions Overlap	Overlapping areas of knowledge can benefit the client
	Idea Sharing	It was good though because it opened up brainstorming & critical thinking skills, and it really got us to work together as a team.
	Building relationships	Benefit was making connections and friendships with other individuals. By doing so, it allows better communication, trust, and understanding.

Theme 4: Where I am weak, they are strong

Definition: Student participants perceive the benefits and values of interprofessional collaboration

Subthemes	Code	Data Extract
Positive and beneficial experience	Positive and beneficial experience	I learned today that not only is it beneficial to the client but it is beneficial to each of us. This experience enhanced my understanding of the overall benefits of working with an interprofessional team.
	How collaborating personally feels	Step outside of our comfort zones.

	Fears invalidated	Feelings of apprehensiveness quickly subside.
	Eye opening experience	This experience opened my eyes on just how important collaboration is.
	Efficiency of collaboration	It is like all disciplines having a piece to the puzzle and it cannot be completed unless they are all there.
Respect and value each profession and collaboration	Better prepared to work collaboratively	Laid the foundation to prepare for team collaboration once I have entered the workforce.
	Respect for other disciplines	I will be even more conscious to be a good team member and listen to other discipline's opinions.
	Value other professions	Ensures continuity of care and that patients are being referred to someone who can better meet their healthcare needs.
	Desire for more Interprofessional Education	This was a great experience and I think that various healthcare programs at ECU should continue to work like this together as much as possible.
