

Spring 2018

## Exploring student-led interprofessional education through a community service project

Lindsay Ann Doerschuk  
*Eastern Washington University*

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Exploring Student-Led Interprofessional Education Through a Community Service

Project

A Thesis

Presented in Partial Fulfillment of the Requirements for the

Degree of Masters of Science

in

Dental Hygiene

in the

College of Graduate Studies

Eastern Washington University

by

Lindsay Ann Doerschuk, RDH

Spring 2018

Major Professor: Merri Jones, RDH, MSDH

## EXPLORING STUDENT-LED INTERPROFESSIONAL EDUCATION

THESIS OF LINDSAY DOERSCHUK APPROVED BY

Merri Jones DATE 4-26-18  
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MASTER'S THESIS

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## EXPLORING STUDENT-LED INTERPROFESSIONAL EDUCATION

## Human Subjects Approvals

**EASTERN WASHINGTON UNIVERSITY**

Office of Grant & Research Development  
210 Showalter Hall, Cheney, WA 99004-2444  
509-359-6567

start something **big**

TO: Lindsay Doerschuk, Department of Dental Hygiene

FROM: Ruth A. Galm, <sup>RG</sup>Human Protections Administrator

DATE: February 20, 2018

SUBJECT: Exploring Student-Led Interprofessional Education Through a Community Service Project (HS-5438)

Your Change of Protocol application for HS-5438 entitled "Exploring Student-Led Interprofessional Education Through a Community Service Project" has been reviewed and is approved.

The change is effective from February 20, 2018, through January 11, 2019, the anniversary date of your original application approval.

A signed and approved copy of the COP application is attached.

Please refer to HS-5438 on future correspondence as appropriate as we file everything under this number.

Cc: HS-5438 file  
Prof. Merri Jones, RPI  
Prof. Ann Wetmore, Dept. Chair

## EXPLORING STUDENT-LED INTERPROFESSIONAL EDUCATION

Application for Change of Protocol  
EWU Institutional Review Board for Human Subjects Research

Return this form, signed + two copies (3 in total) to the Office of Grant and Research Development, 210 Showalter (SHW)

HS number: HS-5438

Principal Investigator (PI): Lindsay Doerschuk, RDH, BSDH  
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Project title: Exploring Student-Led Interprofessional Education Through a Community Service Project

Funding: ☒ Non-funded ☐ Internal funding ☐ External funding

Funding agency:

Grant Contract Number:

Briefly describe and explain the reason(s) for the change(s) to the protocol (may attach a separate document):

Due to many participants not able to attend the orientation, the PI would like to compare results of the pre- and post-test of those able to attend the orientation and those not able to attend the orientation. This may provide information about the significance of an orientation prior to an IPE workshop and how participants' attitudes and perceptions may differ. Participants who did not attend the orientation and take the pre-test at that time will instead take the pre-test the day of the Vets Day IPE workshop prior to engaging in any interprofessional activities. The same pre- and post-test (hard copy) will be used for all participants and they will write on the top of their pre-test "orientation" if they attended so the PI can compare results. All participants will complete the post-test following completion of the Vets Day IPE workshop. The same informed consent will be used.

Does the new protocol alter the level of risk for the subjects or change the subject population to a more vulnerable one? ☐ Y ☒ N

Please explain answer:

Participants involved in the study remain at no more than minimal risk.

I certify that the information provided above is accurate and the project will be conducted in accordance with applicable Federal, State and university regulations:

PI Signature:

*Lindsay Doerschuk*

Date: 2/20/18

Submit this original, signed + two copies (3 in total) to the Office of Grant and Research Development, 210 Showalter (SHW)

Recommendations and Action:	Date	Approve/Disapprove
RPI Signature: <i>Merri Jones</i> (Needed only if PI is a student)	2/20/18	(A) D
IRB Rep. or Dept. Chair Print & Sign: <i>Ann O'Keller Wehrmore</i> (Needed if PI is a student OR for faculty PI if required by department)	2/20/18	(A) D
IRB Signature: <i>Ruth A. Galt</i>	2/20/18	(A) D
<input type="checkbox"/> Subject to the following conditions: <i>none</i>		
Approval of change as of 2/20/18 through next anniversary of current approval 1/11/19		

## EXPLORING STUDENT-LED INTERPROFESSIONAL EDUCATION

**Abstract**

**Purpose:** The purpose of this research was to explore the effectiveness of a student-led interprofessional education (IPE) workshop in improving student attitudes and perceptions toward IPE. Students from four health science programs including Dental Hygiene, Communication Sciences and Disorders/Speech and Hearing, Health Services Administration and Occupational Therapy participated in a community service event. Students provided screenings to veteran patients including a health history intake, hearing test, and sleep screening while other students observed.

**Methods:** Students were asked to attend an orientation, the Vets Day IPE workshop, and a debrief session. This mixed methods approach study utilized the Readiness for Interprofessional Learning Scale (RIPLS) to assess students' attitudes and perceptions toward IPE. The RIPLS (Likert scale) was used as a pre- and post-test to assess changes in students' scores. The pre-test was administered prior to the IPE workshop. The post-test was administered following the workshop. Qualitative data derived from a debrief session where students answered guided questions in groups regarding their experience through discussion.

**Results:** Results indicated a statistically significant difference ( $p < .05$ ) in participants' attitudes and perceptions toward IPE using the RIPLS. Statistical significance was found within each RIPLS subscale where participants showed a positive change in their readiness for interprofessional learning. Qualitative data revealed positive feedback about the workshop and an improvement in learning about different professions.

## EXPLORING STUDENT-LED INTERPROFESSIONAL EDUCATION

Conclusion: The results of this study show a student-led approach to IPE through a community service project is beneficial in improving student attitudes and perceptions of IPE.



### **Acknowledgements**

I would like to express my sincere appreciation and thankfulness to the people below who have supported and greatly contributed to my thesis journey:

- Merri Jones, my thesis advisor, for your guidance, encouragement, and support. Your expertise, humor, and words of wisdom kept me on track.
- Ann Wetmore, my second committee member, for your expertise in interprofessional education and commitment to student success.
- Doreen Nicholas, my third committee member, for your guidance, patience and contribution to creating a smoothly run Vets Day utilizing your clinic facilities.
- Boyd Foster, for your expertise in statistical analysis and easy-to-understand explanations.
- Lisa Bilich, thank you for always pushing me to be the best I can be and encouraging me to enroll in the MSDH program. Your mentorship has helped me grow more than I thought possible.
- Finally, my family and friends, thank you for your endless support, love, and encouragement. I could not have done this without you. And to my mom, thank you for believing in me when I did not believe in myself. Your constant love and continual support means the world to me.

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## **Introduction/Literature Review**

### **Introduction to the Research Question**

The World Health Organization (WHO) states, “interprofessional education occurs when students from two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes” (2010, p.7).

Collaborative practice improves health outcomes by strengthening health systems, thus making interprofessional education (IPE) an important step in creating an effective health workforce (WHO, 2010). The American Dental Education Association (ADEA) recognizes the work of health care professionals should be respected and valued (Olenick, Allen, & Smego, 2010). In the rapidly changing landscape of health care, it is essential that tomorrow’s health professionals be prepared to communicate, collaborate, and use evidence-based practice in an interprofessional manner, with the goal of improving patient outcomes (Institute of Medicine [IOM], 2001).

### **Statement of Problem**

Addressing student-led IPE activities, versus instructor-led IPE, may prove beneficial in the development of better attitudes, collaboration and overall patient care. There is a paucity of literature utilizing the student-led approach with dental hygiene students and other professions in IPE activities. IPE is essential in promoting lifelong learning, creating synergy and expanding access to care through the delivery of health care for global populations (American Dental Hygienists’ Association [ADHA], 2009). As members of an interprofessional team, the education of health professionals should be founded on a commitment to patient-centered care, based on the principles of evidence-

based practice, and enhanced through the implementation of informatics and quality improvement (Institute of Medicine [IOM], 2001).

**Research questions.** The research questions for this study are: Does participation in a student-led IPE experience impact students' attitudes toward the roles of other health professions? Does participation in a student-led IPE experience change students' perceptions of interprofessional collaboration? Finally, does participation in a student-led IPE experience affect students' appreciation of teamwork in the academic setting?

### **Overview of Research**

A recent study found the student-led method of IPE beneficial in building respect, establishing relationships, empowering one's own profession, and changing stereotypes (Cooper, MacMillan, Beck, & Paterson, 2009). A student-led approach facilitates self-directed learning, while integrating a diverse student population for each student to learn with and from each other (Cooper et al., 2009). Assessing health professional students' attitudes and perceptions of IPE when participating in a student-led IPE experience may provide pedagogy to promote skill building and competency in interprofessional patient care.

The Interprofessional Education Collaborative (IPEC), an organization representative of various higher educational programs, helps guide the development of curricula. The purpose is to promote, encourage, and support programs in preparing students to be future health care professionals ready for effective interprofessional collaboration, and to aid in better population health (Interprofessional Education Collaborative [IPEC], 2011). The success of IPE requires program-specific educational efforts to encourage interactive learning among health science programs. Learning more



and working with various professions early on may increase students' openness to collaborating as professionals beyond the academic setting (Curran, Sharpe, Forristall & Flynn, 2008). Collaborative practice occurs when health professionals work together with patients, caregivers and communities to deliver quality care. Moving health care workers through a system that provides IPE has shown to help them gain skills needed to become part of a collaborative, practice-ready health care team (WHO, 2010).

**Importance of IPE.** Changes in education and health care are increasing the demand for IPE to improve treatment outcomes. Shared learning is a process in which a team works collectively to achieve a common objective, much like IPE. These shared learning activities affect the student's perceptions of their own profession and how they view others as contributors. Shared learning shapes the formation of interprofessional collaboration rather than uni-professional and leads to valued contributions in the delivery of patient-centered care (Zraick, Harten, & Hagstrom, 2014). IPE eliminates the separation of education between health care professionals, therefore resolving misperceptions, miscommunication, and hierarchy. Elimination of these issues may address the current separation between health care professionals and the resulting problems with health care delivery (Olenick et al., 2010).

**Interprofessional education collaborative (IPEC).** The IPEC was developed in 2009, by six organizations within health professions: the American Association of Colleges of Nursing, American Association of Colleges of Osteopathic Medicine, American Association of Colleges of Pharmacy, American Dental Education Association, Association of American Medical Colleges, and the Association of Schools and Programs of Public Health. In 2016, IPEC approved nine additional members to its association: the

American Association of Colleges of Podiatric Medicine, American Council of Academic Physical Therapy, American Occupational Therapy Association, American Psychological Association, Association of American Veterinary Medical Colleges, Association of Schools and Colleges of Optometry, Association of Schools of Allied Health Professions, Council on Social Work Education, and the Physician Assistant Education Association (IPEC, 2016).

The 2016 IPEC update included three main purposes including: reaffirming the value and impact of the competencies and sub-competencies; organization of interprofessional collaboration as a singular domain encompassing the core competencies; and broadening the interprofessional competencies to better achieve the *Triple Aim*. The *Triple Aim* is a framework developed by the Institute for Healthcare Improvement in 2007, to enhance health care delivery and outcomes. *Triple Aim* functions as a purpose for health care system transformation to better meet the needs of people. The approach incorporates three dimensions simultaneously to improve the patient experience of care, improve the health of populations, and reduce the per capita cost of health care (Institute for Healthcare Improvement, 2017). Since IPEC was created in 2011, required IPE curricular experiences have increased as IPEC recognized that in order to achieve the vision of the *Triple Aim* continuous development of interprofessional competency by health professions students is needed. The 2011 IPEC report is now cited throughout various health professions' literature and is also incorporated in educational textbooks. Increased attention is being given to IPE within curriculum, especially dentistry and medicine (IPEC, 2016).

The Commission on Dental Accreditation (CODA) Standard 2-19 for dental education programs states that “graduates must be competent in communicating and collaborating with other members of the health care team to facilitate the provision of health care” (CODA, 2017a, p. 28). Standard 2-22 states that “graduates must be competent in providing oral health care within the scope of general dentistry to patients in all stages of life” (CODA, 2017a, p. 29). The CODA Standard 2-15 for dental hygiene education programs states “graduates must be competent in communicating and collaborating with other members of the health care team to support comprehensive patient care” (CODA, 2017b, p. 25). Figure 1 shows the program and accreditation requirements among the disciplines involved in this study.

<b>Interprofessional Education Program and Accreditation Requirements</b>		
<b>Discipline</b>	<b>Program Requirement</b>	<b>Accreditation Requirement</b>
Dental	IPE experiences incorporated into each year of the four-year program. No specific requirement for first year students on Spokane, WA campus, however IPE is still incorporated into curriculum with learning sessions.	Standard 2-19: “graduates must be competent in communicating and collaborating with other members of the health care team to facilitate the provision of health care” (CODA, 2017a, p. 28).
Dental Hygiene	Each student required to have three different IPE experiences per academic year (2-year program).	Standard 2-15: “graduates must be competent in communicating and collaborating with other members of the health care team to support comprehensive patient care” (CODA, 2017b, p. 25).
Communication Sciences and Disorders	No specific program requirements at this time. IPE opportunities are	Standard 3.1.1A: “understand how to perform effectively in different interprofessional team roles to plan and deliver

	presented and encouraged throughout the program.	care – centered on the individual served – that is safe, timely, efficient, effective, and equitable” (CAA, 2017, p. 11).
Health Services Administration	No specific program requirements at this time.	No requirements at this time.
Occupational Therapy	No specific program requirements at this time. IPE opportunities are presented and encouraged throughout the program.	Standard B.5.21: “effectively communicate and work interprofessionally with those who provide services to individuals, organizations, and/or populations in order to clarify each member’s responsibility in executing an intervention plan” (American Occupational Therapy Association, Inc., 2017).
Pharmacy	Each student required to have a minimum of one IPE experience per semester (6-semester program).	Standard 11: “the curriculum prepares all students to provide entry-level, patient-centered care in a variety of practice settings as a contributing member of an interprofessional team” (Accreditation Council for Pharmacy Education, 2016).
Public Health	No specific program requirements at this time.	No requirements at this time.
Speech and Hearing Sciences	No specific program requirements at this time. IPE opportunities are presented and encouraged throughout the program.	Standard 3.1.1A: “understand how to perform effectively in different interprofessional team roles to plan and deliver care – centered on the individual served – that is safe, timely, efficient, effective, and equitable” (Council on Academic Accreditation, 2017, p. 11).

*Figure 1.* Interprofessional Education Program and Accreditation Requirements for Programs Involved this Study.

**IPEC core competencies.** Core competencies were developed by IPEC in 2011 and updated in 2016, to address the importance of collaborative practice to facilitate the

delivery of high-quality, accessible, and patient-centered care. Achievement of this vision requires future and continuous development of these core competencies by health professional students. As a result of the IPE learning process they will enter the workforce already utilizing team-based care (IPEC, 2011). Interprofessional collaboration is the central domain and four core competencies are organized within the central domain, including sub-competencies. The following are desired principles for the core competencies: patient and family centered; community and population oriented; relationship focused; process oriented; linked to learning activities, educational strategies, and behavioral assessments appropriate for the learner; integration across the learning continuum; sensitive to the systems and applicable across practice settings; applicable across professions; use of common and meaningful language across professions; and outcome driven (IPEC, 2016). The four core competencies are: values and ethics for interprofessional practice, roles and responsibilities, interprofessional education, and teams and teamwork (IPEC, 2016). The competencies most related to the study are interprofessional communication and teams and teamwork. Although all competencies are related, the two have sub-competencies that fit the communication factor between students and the student-led approach while working in teams.

***Interprofessional communication.*** To provide overall quality and patient-centered care, health care professionals and other professionals must be able to communicate effectively with each other. Professionals must also communicate with patients, families, and communities in a respectful, responsive and professional manner. It is important that these professionals be able to recognize the contributions of other professions and utilize their expertise through collaboration. Sub-competencies

associated with interprofessional communication were incorporated into this thesis study (IPEC, 2016). All sub-competencies are listed and those bolded are related closest to this study in Figures 2 and 3.

<b>CC1.</b>	Choose effective communication tools and techniques, including information systems and communication technologies, to facilitate discussions and interactions that enhance team function.
<b>CC2.</b>	<b>Communicate information with patients, families, community members, and health team members in a form that is understandable, avoiding discipline-specific terminology when possible.</b>
<b>CC3.</b>	<b>Express one's knowledge and opinion to team members involved in patient care and population health improvement with confidence, clarity, and respect, working to ensure common understanding of information, treatment, care decisions, and population health programs and policies.</b>
<b>CC4.</b>	<b>Listen actively, and encourage ideas and opinions of other team members.</b>
<b>CC5.</b>	Give timely, sensitive, instructive feedback to others about their performance on the team, responding respectfully as a team member to feedback from others.
<b>CC6.</b>	Use respectful language appropriate for a given difficult situation, crucial conversation, or conflict.
<b>CC7.</b>	<b>Recognize how one's uniqueness (experience level, expertise, culture, power, and hierarchy within the health team) contributes to effective communication, conflict resolution, and positive interprofessional working relationships.</b>
<b>CC8.</b>	<b>Communicate the importance of teamwork in patient-centered care and population health programs and policies.</b>

*Figure 2. IPEC Sub-Competencies of Interprofessional Communication: Sub-Competencies Most Related to Thesis Topic.*

<b>TT1.</b>	<b>Describe the process of team development and the roles and practices of effective teams.</b>
<b>TT2.</b>	Develop consensus on the ethical principles to guide all aspects of team work.
<b>TT3.</b>	<b>Engage health and other professionals in shared patient-centered and population-focused problem-solving.</b>
<b>TT4.</b>	<b>Integrate the knowledge and experience of health and other professions to inform health and care decisions, while respecting patient and community values and priorities/preferences for care.</b>

<b>TT5.</b>	<b>Apply leadership practices that support collaborative practice and team effectiveness.</b>
<b>TT6.</b>	Engage self and others to constructively manage disagreements about values, roles, goals, and actions that arise among health and other professionals and with patients, families, and community members.
<b>TT7.</b>	<b>Share accountability with other professions, patients, and communities for outcomes relevant to prevention and health care.</b>
<b>TT8.</b>	<b>Reflect on individual and team performance for individual, as well as team, performance improvement.</b>
<b>TT9.</b>	<b>Use process improvement to increase effectiveness of interprofessional teamwork and team-based services, programs, and policies.</b>
<b>TT10.</b>	<b>Use available evidence to inform effective teamwork and team-based practices.</b>
<b>TT11.</b>	Perform effectively on teams and in different team roles in a variety of settings.

*Figure 3. IPEC Sub-Competencies of Teams and Teamwork: Sub-Competencies Most Related to Thesis Topic.*

***Teams and teamwork.*** Effective leadership and collaboration stem from being open to teamwork. Those involved must build professional relationships to effectively plan, deliver, and evaluate patient-centered care in health settings. Teamwork experiences have potential to increase effectiveness, efficiency and patient safety when providing care. Various teams of different professions must work together to understand comprehensive patient care. The dental hygiene profession is an example of a profession that must continually collaborate with other health professionals. For example, the possible need for premedication prior to dental treatment is extremely important in avoiding infection that could lead to serious health conditions. Teamwork is essential in interprofessional collaboration to deliver quality care. Sub-competencies associated with teams and teamwork were incorporated into this study (IPEC, 2016).

**Measuring competencies.** The Readiness for Interprofessional Learning Scale (RIPLS) has been shown to effectively measure the attitudes and perceptions of students toward IPE (Hertweck et al., 2012). The *IPEC Sub-Competencies of Teams and Teamwork* and *IPE Sub-Competencies of Interprofessional Communication* (see Figure 2 and Figure 3) are the closest related competencies to the RIPLS items.

The RIPLS is a validated instrument designed to assess the readiness of health care students to embrace shared learning (Thannhauser, Russell-Mayhew & Scott, 2010). To ensure the validity and reliability of the RIPLS instrument, a revised instrument was published by McFadyen, Webster, and Maclaren (2005), that included four subscales in place of the original three subscales. McFadyen et al. (2006), performed a test-retest of the four subscales using a larger sample size to determine consistency and reliability of the new and current instrument. See Figure 4 for the timeline of the RIPLS development.

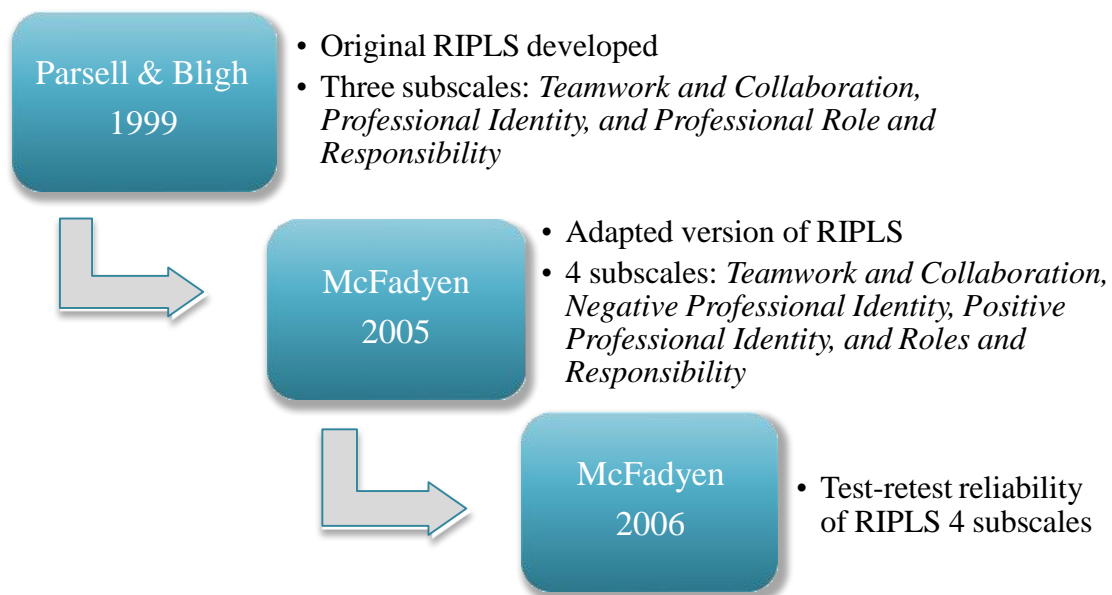


Figure 4. Timeline of Readiness for Interprofessional Learning Scale Subscales.



The original RIPLS instrument is a 19-item survey with three subscales using a five-point Likert-scale ranging from strongly agree to strongly disagree (5=strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree). It includes a midpoint or neutral rating, should students feel they neither agree nor disagree with a statement. The sum of scores range from a minimum of 19 to a maximum of 45. Lower scores indicate negative attitudes toward shared learning and higher scores indicate positive attitudes (Stull & Blue, 2016). The modified version of the RIPLS instrument breaks the second subscale (professional identity) into two subscales. The 2005 modified version includes four subscales (see Figure 5): teamwork and collaboration, negative professional identity, positive professional identity, and roles and responsibility.

<b>RIPLS Subscales (modified version)</b>	
<b>Subscale 1: <i>Teamwork and Collaboration</i></b>	<b>Subscale 2: <i>Negative Professional Identity</i></b>
Items: 1-9 Score range (min-max): 9-45	Items: 10-12 Score range (min-max): 3-15
<b>Subscale 3: <i>Positive Professional Identity</i></b>	<b>Subscale 4: <i>Roles and Responsibility</i></b>
Items: 13-16 Score range (min-max): 4-20	Items: 17-19 Score range (min-max): 3-15

Figure 5. Readiness for Interprofessional Learning Scale Subscales.

**Interprofessional education.** The World Health Organization (WHO) recognizes collaborative practice strengthens health systems. The combination of IPE and collaborative practice in health care settings will improve health outcomes (WHO, 2010). This in-depth literature review suggests topics related to IPE and a variety of health science programs that are important to IPE in the future of health care.

Studies have shown interprofessional collaborative practice (ICP) decreases clinical error rates and hospital admissions. The *Triple Aim* framework in ICP aims to

improve the patient experience of care and satisfaction, improve the health of the population, and reduce the per capita cost of care (Zraick et al., 2014). Results concluded IPE is more effective when: (1) principles of adult learning are involved (e.g., problem-based learning), (2) learning methods reflect real world practice experiences (e.g., simulated-based learning), and (3) instructional activities promote interactions between students (Zraick et al., 2014). The study discusses challenges and an opportunity related to IPE and IPP; and describes different approaches to address changes in the United States regarding education and health care. Referenced within the Zraick et al. (2014) study is an evaluation of IPE and IPP models suitable for implementation, as proposed by Freeth, Hammick, Koppel, Reeves & Barr (2002). Figure 6 depicts the evaluation method.

<b>Reaction</b>	Assess learners' views on the learning experience and its interprofessional nature.
<b>Modification of Attitudes/Perceptions</b>	Assess changes in attitudes or perceptions between participant groups; assess changes in perceptions or attitudes toward value and/or use of team approaches to caring for specific patients/groups.
<b>Acquisition of Knowledge and/or Skills</b>	Assess acquisition of knowledge and skills linked to interprofessional practice.
<b>Behavioral Change</b>	Assess/identify individuals' transfer of interprofessional learning to their practice setting and the changed professional practice.
<b>Benefits to Patients/Clients</b>	Assess improvements in health or wellbeing of patients/clients.

*Figure 6.* Evaluation of IPE and IPP Model for Future Implementation.

Students in the health science professions recognize their capability of learning and develop respect for other health care providers, when given the opportunity to teach others outside their discipline. Profession, year of study, and gender are identified as

attributes related to attitudes towards interprofessional collaboration (Grant et al., 2011; Curran et al., 2008). Furthermore, IPE provides opportunities for collaborative care and improved patient outcomes (Shoemaker, Platko, Cleghorn, & Booth, 2014).

Interprofessional education effectiveness and attitudes of health professional students have been examined in several studies. Many authors suggest IPE be introduced early on in curriculum for undergraduate students to help reduce negative attitudes associated with other professions and IPE. Additionally, scheduling IPE outside of the curricula is an influencing factor in attitudes and learning experiences among students (Grant et al., 2011).

**Theoretical frameworks and IP.** Olenick et al. (2010) proposed an approach using collaborative learning in IPE addresses issues of fragmentation in health care delivery and the gap among health professionals. The Institute of Medicine (IOM) reports that all health care education should focus on patient-centered care, and students should receive training to be competent in the collaborative approach within interprofessional teams (IOM, 2001; Olenick et al., 2010).

Andragogy (adult learning) is a foundation of IPE (Barr, 2001). Many educators believe the success and continuance of learning as a professional stems from being self-directed, a critical thinker, a reflective practitioner or clinician, a team player, and a good communicator with the ability to adapt to change (Barr, 2001). Respect and understanding of other professions, as well as modification or elimination of stereotypes, is essential in IPE to create opportunities for positive interactions between students. This also facilitates the transfer of collaborative attitudes to others within a profession (Barr, 2001). Adult learners are motivated and successful when information learned involves a

task-centered or problem-based approach and is applied to practice. Reflective practice allows learners to observe and reflect on their experience, while setting aside preconceived perceptions and employing a common learning process between respected professions (Barr, 2001).

**Models of IPE delivery.** The interactive learning method is often used in IPE interventions. This desired approach to IPE is Andragogical and delivered in both intracurricular and extracurricular experiences. Integration of IPE within a curriculum has proven to be difficult, however it is shown students prefer face-to-face and case-based learning (Olenick et al., 2010). Although health science educators have differing opinions as to when IPE should be introduced, evidence-based IPE is progressively offered at early stages of student professional development (Olenick et al., 2010). Didactic settings provide structured knowledge to complement interactive learning by process-focused exercises, rather than content-focused. Proven methods utilized in the delivery of IPE experiences are in Figure 7, and include action-based learning, observation, simulation, practice-based learning, standardized patient learning, and service-learning (Barr, 2001; Bramstedt, Moolla & Rehfield, 2012; Buff et al., 2015; Cooper et al., 2009; Grant et al., 2011; Olenick et al., 2010; Zraick et al., 2014).

Interactive Learning Method	Strategies	Intervention Opportunities
Action-Based Learning	Investigation and collaboration using problem-based learning	-Students from multiple professions combine their expertise to examine questions and influence change

Observation-based Learning	Psychodynamic observation	- Joint visits with a patient by students from different professions -Shadowing experienced students
Simulation-based Learning	Experiential learning using life-like situations	-Role-play -Group-based learning with assigned roles, competition and collaboration to meet objectives
Practice-based Learning	Learning centered on real life problems using critical thinking	-Community-based placements where students share responsibilities -Case studies completed with interprofessional teams
Standardized Patient Learning	Actor portrays a person with a disease or condition to students and clinicians	-Case study modules in lecture and lab sessions -Actor asks prepared questions and answers impromptu questions from students
Service-learning	Learning during community-based experience	-Reciprocity and reflection are key components -Provide care to patients in the community while learning together (mutually beneficial)

*Figure 7. Interactive Learning Methods as a Form of IPE Delivery.*

**IPE in health science programs.** The incorporation of IPE into health science programs has increased since IPEC was founded and introduced to the various professional organizations. The literature shows a variety of interactive learning methods (action-based, observation-based, simulation-based, service-learning, standardized patient, and practice-based) at varying levels of education in IPE, and among various health science disciplines (Barr, 2001; Bramstedt, Moolla, & Rehfield, 2012; Buff et al., 2015; Cooper et al., 2009; Grant et al., 2011; Olenick et al., 2010; Zraick et al., 2014).

The recognition of the need for collaboration has been identified in substantial research as an important aspect of education and the success of treating patients in health care settings (Barr, 2001). Research regarding the programs participating in this study and their IPE participation provides an understanding of how IPE is part of each programs' curricular goals.

**Education and scopes of practice in health science programs.** Each health science profession has a unique scope of practice that contributes to the importance of interprofessional collaboration. Programs' lengths vary in addition to the type of degree earned upon completion. For the purpose of this study, Figure 8 shows the programs involved and the degree earned pertaining to each specific program (Eastern Washington University, 2017a-e; Washington State University, 2017).

	Description/Scope of Practice	Degree Options	Program Length
Dentistry	Trained as orofacial health care professionals in biological, behavioral, social, biomedical, and clinical aspects of dental/overall health.	Doctor of Dental Surgery (DDS)	4 years
Dental Hygiene	Assess and provide oral health education and dental hygiene therapy/procedures to a variety of patients. The scope of practice varies state to state.	Bachelor of Science in Dental Hygiene (BSDH, 4-year degree)	2 years
Occupational Therapy	Assist clients with disabilities to develop, recover, maintain and/or perform activities of daily living.	Master of Occupational Therapy (MOT)	2 years

Pharmacy	Dispenses and compounds medications, administers flu vaccines, takes blood pressure and runs blood glucose tests, while assessing overall patient health.	Doctor of Pharmacy (Pharm. D.)	4 years
Communication Sciences Disorders/Speech and Hearing Sciences	Assist clients with impairments of speech, language, swallowing, and hearing.	Master of Science in Communication Sciences and Disorders (CMSD-EWU) and Master of Art in Speech and Hearing Sciences (WSU)	2 years

*Figure 8.* Education and Scopes of Practice of Students Involved in Veteran's Day IPE Workshop in Health Science Programs.

***Dental and dental hygiene.*** A quasi-experimental research design was conducted in 2014, to examine dental and pharmacy students' perceptions and knowledge of interprofessional ethical decision-making processes (Wilhelm, Poirier, Otsuka, & Wagner, 2014). During two separate, two-hour sessions, 82 ( $n=82$ ) third-year pharmacy students and 51 ( $n=51$ ) first-year dental students ( $N=133$ ) introduced their professions and knowledge base, analyzed two ethics cases, and debriefed (faculty led) on the ethical cases addressing veracity, autonomy, beneficence, and non-maleficence. The methods of data collection and analysis consisted of pre-assessments for individual and team ethics knowledge and the RIPLS survey. Post-assessments included an individual ethics knowledge quiz, post-RIPLS survey, and a Likert scale perception survey. A  $t$ -test and one-way ANOVA was used for analysis. Results yielded significant differences in the pre- and post-ethics knowledge quiz ( $p<0.05$ ). Findings revealed student learning

regarding ethical decision making was enhanced and students desired more interprofessional learning (Wilhelm et al., 2014).

In 2011, Grant et al. conducted a study utilizing a mixed method approach for development of an IPE initiative within curricula for dental hygiene and nursing students. Oral health and blood pressure assessments were used to address the oral and systemic health concerns for collaboration among the two professions. Through a student-led approach, the IPE initiative took place over four days, each day a two-hour session. The oral health component used second-year dental hygiene students ( $n=8$ ) and two faculty mentors to teach nursing students ( $n=200$ ) how to perform oral assessments and daily oral care. The blood pressure component used second-year nursing students ( $n=15$ ) and three faculty mentors to teach first-year dental hygiene students ( $n=8$ ) how to manually take blood pressure and pulse. After completion of the IPE initiative, each participant was asked to anonymously answer a questionnaire, using a Likert scale to evaluate student learning and the program. Statistical Package for the Social Sciences (SPSS®) was used to analyze data from the questionnaire, where they found students agreed or strongly agreed with statements regarding the accuracy of information presented, the knowledge level of student teachers, and the ease of understanding. Based on the questionnaire, students enjoyed practicing their skills with student teachers, and reported they enjoyed working with students from another profession. Grant et al. (2011) offered the following recommendations for future IPE events: (a) choose a primary skill or competency from a profession that can be performed by another health profession, (b) implement a pilot version first to gain feedback from student participants, (c) plan joint debriefing sessions for faculty involved, (d) plan debriefing sessions for the student teachers involved, (e)



schedule adequate planning time for each academic year, and (f) schedule voluntary focus groups for further feedback.

In similar research, Wamsley et al. (2012) conducted a quasi-experimental study utilizing an interprofessional standardized patient exercise (ISPE) to assess attitudes toward working in interprofessional teams. Participants ( $N=253$ ) included dental ( $n=42$ ), medical ( $n=73$ ), nurse practitioner ( $n=48$ ), pharmacy ( $n=74$ ), and physical therapy ( $n=16$ ). A pre- and post-ISPE Likert scale questionnaire was administered to participating students and compared to a convenience sample of non-participating student volunteers (ISPE group  $N=101$ ; comparison group  $N=152$ ). The Attitudes Toward Health Care Teams (ATHCT) questionnaire consisted of 20 items representing three concepts: attitudes toward team value, team efficiency, and physicians' shared roles on the team. Of the participating students (ISPE group,  $n=101$ ), 84 completed both the pre- and post-survey yielding an 83% response rate. Comparison of surveys among the ISPE group showed a significant increase in team value and professions ( $p<0.001$ ). Dental and medical students had lower scores than other professions overall. A significant difference between professions was noted. Nurse practitioner students had more favorable attitudes ( $p=0.001$ ) than medical students. Researchers compared participant (ISPE group) and non-participant scores and found a notable difference. Post hoc scores showed dental students had less favorable attitudes regarding team value than nurse practitioner ( $p<0.001$ ), pharmacy ( $p=0.002$ ) and physical therapy students ( $p=0.001$ ). A significant interaction between participation and profession was found for team efficiency ( $p=0.003$ ).

Additionally, students from each profession (dentistry=2, medicine=5, nursing=4, pharmacy=5, physical therapy=6) participated in focus groups where students expressed ways their groups worked well together and any challenges the groups faced during the exercise. Student responses were thematically organized into professional roles, skills and confidence. Negotiation of roles was a challenge, as various roles are similar between medical and nurse practitioner students. Time restraints and dental student integration was also a barrier due to the specialized nature of their profession. All of the focus groups expressed their appreciation for other professions, and that they learned about the roles and skills each would bring to an interprofessional team. Several focus groups mentioned the activity increased their confidence and comfort level with regard to communicating with other health care professionals (Wamsley et al., 2012). Use of focus groups and a comparison group of non-participating students may be beneficial in future research to show the significance of IPE activities and interactions.

***Physical therapy.*** A retrospective study from 2014 was composed of second-year health science students ( $N=100$ ), including physical therapy students ( $n=46$ ), physician assistant students ( $n=30$ ), and occupational therapy students ( $n=24$ ), to incorporate use of virtual patient cases for IPE (Shoemaker et al., 2014). Twenty-four groups developed a comprehensive treatment plan for the virtual patient and a qualitative analysis determined whether the IPE learning objectives were met. Additionally, reflective questions were submitted with the treatment plan, where student responses were categorized into three themes. The themes supported the following learning objectives: collaborate as an interprofessional team in the diagnosis and management of a virtual patients, develop an understanding of the underlying philosophical approach to diagnosis and management of

a disease process by other professions, and identify opportunities for collaboration among physical therapists, physician assistants and occupational therapists with diabetic peripheral neuropathy (Shoemaker et al., 2014). Virtual patient cases were used as self-directed learning during this process, making it easier for students to meet at their convenience without faculty facilitation. Themes identified based on student reflective responses included the benefits of collaborative care, role clarification, and relevance for future practice. Benefits of collaborative care resulted in a comprehensive and accurate plan for the patient. Role clarification resulted in an increased knowledge of each role, scope of practice and overlap between professions. Relevance for future practice resulted in an increased comfort level and confidence for future collaboration with different professions (Shoemaker et al., 2014). The importance of role clarification and education within IPE establishes rapport and respect among students prior to collaboration.

An IPE workshop conducted in 2016 at a Midwest U.S. university, included students ( $N=413$ ) from eight health care disciplines to collaborate on roles in stroke care. The purpose of the study was to describe an innovative approach to IPE through a stroke workshop, and to examine student learning outcomes and their understanding of roles of other disciplines (Wallace et al., 2016). Specific learning objectives included identify professional roles and responsibilities of various disciplines in stroke care, develop insightful questions to ask during a history and physical examination, and develop appropriate collaborative care plans to enhance patient outcomes. Stratified random assignment put the disciplines in each group, including those in physical therapy ( $n=29$ ), athletic training ( $n=13$ ), health management systems ( $n=10$ ), nursing ( $n=47$ ), occupational therapy ( $n=25$ ), speech-language pathology ( $n=29$ ), physician assistants

( $n=40$ ), and pharmacy ( $n=140$ ). Volunteers who completed the pre- and post-tests, based on knowledge of strokes and each disciplines' role in stroke prevention and rehabilitation, was about 81% of the original 413 participants ( $n=334$ ). Three workshop sessions with the learning objectives included were held for students. The workshop activities and materials presented included a pre- and post-test, pre-workshop learning materials, a patient biography and questionnaire, and a plan of care worksheet. Stroke knowledge increased overall in workshop participants. The physical therapy students demonstrated an increase in accuracy of role identification ( $p=0.001$ ) and significant increase in that for occupational therapists specifically ( $p=0.001$ ). The authors concluded the results of health professionals' roles and responsibilities suggested the activity changed the role identification accuracy; however, it is suggested further comparison of other educational approaches to this workshop IPE (Wallace et al., 2016).

***Occupational therapy.*** Clinical interprofessional education wards (CEWs), established in 1998, are courses that allow students to actively participate in interprofessional clinical teamwork, thus creating a more involved learning experience (Hallin, Kiessling, Waldner, & Henriksson, 2009). A study in 2009, recruited students from the disciplines of occupational therapy ( $n=68$ ), medicine ( $n=175$ ), nursing ( $n=290$ ) and physiotherapy students ( $n=83$ ) to evaluate their perceptions of interprofessional competence after participating in clinical teamwork training. Students completed pre- and post-questionnaires with a 96% ( $N=591$ ) response rate using an unnumbered visual analogue scale (VAS), where students placed an X on a 10-centimeter line to indicate their scaled answer. Rounds, reports and joint planning of diagnostics, therapy and care were given to patients by teams for two weeks. All student groups indicated an increase

in knowledge of the other professions after the CEW training ( $p<0.001$ ). All eight groups assessed that the CEW contributed to their communication and teamwork ( $p<0.001$ ) and students' clarity of their own professional role ( $p<0.001$ ). Occupational therapy students had the greatest gain in clarity ( $p<0.001$ ). Occupational therapy and medical students demonstrated the greatest achievement and gain in interprofessionalism in the study, when compared to other professions. Conclusions identified the call for further research to examine the long-term effects of IPE and students' attitudes towards their own and others' professional roles.

**Pharmacy.** Quantitative and qualitative data was analyzed in a 2015 community interprofessional fall prevention study, to assess changes of students' attitudes about IPE before and after participation in the event. The study used a pre- and post-test RIPLS survey and individual reflection on a community fall prevention event using pharmacy, nursing, physician assistant and physical therapy students (Sullivan et al., 2015). Prior to the event, where health screenings were provided to patients at risk for falling, students attended a pre-event session to provide each other information about their professions. Each student participant observed and/or performed the following screenings: blood glucose testing, medication reviews, orthostasis testing, balance and mobility testing, and dissemination of general health resources and information. Following the event, a debriefing session was held to discuss and reflect on the community intervention provided, which was thematically organized. Out of 63 participating students ( $N=63$ ), 46 completed both the pre- and post-test RIPLS survey, yielding a 73% ( $n=46$ ) response rate. Mean scores of the modified RIPLS survey for all professions incorporated in the study showed overall improvement toward IPE receptiveness and teamwork across all

professions. Pharmacy student findings showed a statistically significant change in their comfort level when collaborating with other professions that have more knowledge in a particular area of patient care. Importantly, this study demonstrated how the use of a community service event in IPE has the ability to reinforce positive attitudes regarding collaborative and team-based patient care. Findings suggest this team-based and interprofessional practice can be improved by offering an approach for incorporating IPE into curricula for multiple health science programs (Sullivan et al., 2015).

***Public health.*** Recognizing IPE is crucial as health care progresses toward the Triple Aim concept to practice better care. Addy, Browne, Blake, and Bailey (2015) conducted a mixed methods study design to evaluate the effectiveness of IPE as an elective course in 2013 and 2014 for public health, medical, nursing, pharmacy and social work students. The elective course included three live meetings and six web-based modules, where each group had its own web-based discussion board. The live meetings used student-centered facilitation and the activities included readings, case studies, interactive exercises, and systems-based problem analysis. The purpose of the elective course was to provide students with foundational knowledge of collaborative care, teamwork, and enrich their communication in health systems. At the end of the course, students ( $N=432$  in year 2013;  $N=504$  in 2014) were asked to complete an evaluation using a Likert scale. The response rate was 59% ( $n=256$ ) in 2013, and 79% ( $n=394$ ) in 2014. A  $t$ -test was used in evaluation and showed an increase in student ratings of course objectives from 2013 to 2014, as course material was improved. Additionally, qualitative data was obtained through student reflection using open-ended questions. Responses supported the course objectives, as derived from the IPEC competency domains, were

met (Addy et al., 2015). This study serves as a model for incorporation of public health into IPE and use of elective courses as a gateway to IPE integration into curriculum.

***Communication sciences and disorders.*** Gunaldo et al. (2015) used a mixed methods approach to assess student perceptions about IPE after taking an elective course developed to improve awareness, knowledge, and application of interprofessional collaboration. Included in this study were 38 health science students from the disciplines of speech-language pathology ( $n=11$ ), dentistry ( $n=6$ ), medical technology ( $n=2$ ), medicine ( $n=7$ ), nursing ( $n=3$ ), occupational therapy ( $n=5$ ), physical therapy ( $n=3$ ), and public health ( $n=1$ ). Students varied from first to fourth year in their educational program levels. The RIPLS survey was distributed to all participants as a pre- and post-survey, in addition to three open-ended questions about students' knowledge of IPE and the impact of the elective course. The RIPLS survey was evaluated using  $t$  tests and the open-ended questions were thematically organized and coded by faculty members. After data was cleaned for missing data or incomplete tests, the response rate was 79% ( $N=30$ ). The  $t$ -tests indicated that the Roles and Responsibilities subscale on the RIPLS survey was the only scale with a significant pre- and post-test difference ( $p<.01$ ). Themes indicated students believe communication, collaboration, respect and teamwork are essential in interprofessional collaborative care. It was stated the elective course differed in that various studies showed significant changes in teamwork and collaboration while this study demonstrated changes in role and responsibility (Gunaldo et al., 2015). More research in elective courses is needed to show significance in IPE. Utilization of IPE into a community service event would serve as a foundational study to incorporate IPE in elective courses in the future.

***Health services administration.*** Research is limited regarding IPE and health services administration students, however this profession is a crucial part of successful collaborative care, thus more research is needed. Buff et al. (2015) conducted post-test experimental study design in a service-learning pilot study spanning eight health professions with the aim to evaluate student appreciation and knowledge of their own and other professions, their interaction, and teamwork skills. An existing resource, the South Carolina Area Health Education Consortium (AHEC), was used to coordinate student learning and a health promotion curriculum for obesity outreach. Participating students ( $N=230$ ) varied from the disciplines of health administration, medicine, nursing, biomedical science, dietetics, pharmacy, physical therapy, and physician assistants. Four online modules were used and three interactive team learning sessions. A 13-item Likert scale post-questionnaire was distributed to collect quantitative data and had a 65% response rate ( $n=149$ ). On a 5-point rating scale from 5= “strongly agree” to 1= “strongly disagree” participants either “agreed” or “strongly agreed” that through the activity, their appreciation of interprofessional collaboration increased ( $n=28$ ; 85%), knowledge about their profession’s role in interprofessional work increased ( $n=86$ ; 58%), their knowledge about specific professions increased ( $n=107$ ; 72%). Participants found the activity to be worthwhile for professional development ( $n=104$ ; 70%) and beneficial in learning with students from other professions ( $n=138$ ; 93%). Participants found their teamwork skills improved through the activity ( $n=114$ ; 77%), and rated the effectiveness of their teamwork in the projects as “excellent” ( $n=108$ ; 73%). The study was limited due to lack of a pre-test to provide comparative analysis in determining significance over the course of the project.



**Student-led approach.** An IPE study conducted in 2009, found a student-led method to be beneficial in building respect, establishing relationships, empowering one's own profession, and changing stereotypes (Cooper et al., 2009). In addition, use of a pre-post design to research students' attitudes after encountering IPE instruction would narrow down appropriate strategies in the curriculum.

The Indiana University Student Outreach Clinic was used to assemble a model to provide free health care to underserved populations and students from various disciplines the opportunity for professional development (George et al., 2017). The Outreach Clinic is a student-led, interprofessional environment with a goal of decreasing health care disparities and providing students with learning in patient care, collaborative practice, and leadership. The clinic is comprehensive where physical therapy, pharmacy, legal, social work, dental, occupational therapy, public health and nursing students provide services. As physical therapy was the newest profession added to this assortment of disciplines, George et al. evaluated the first-year students' experiences. Students were required to participate at the clinic at least once during their first year in the physical therapy program. A survey, utilizing a set of open-ended questions, was given to the students ( $N=24$ ) after participation to reflect on the impact of the interprofessional experience on their professional development. Three evaluators assessed the qualitative data and developed common themes. Data was triangulated to produce a core set of learning outcomes. George et al. found 100% ( $N=24$ ) of the students indicated they would volunteer again. Themes revealed students had positive experiences in four specific areas: professional responsibility, professional competency, civic identity, and philanthropy. Fifty-eight percent of physical therapy students expressed an increase in

their confidence by providing physical therapy services. Sixty-three percent discussed the importance of their professional responsibility while 46% expressed interest and more awareness of health disparities and giving back to their community (George et al., 2017). As shown in Figure 9, student reflective comments were categorized into themes that supported the American Physical Therapy Association (APTA) core values.

Response %	Students' Reflective Comments	Themes	APTA Core Values
58%	<ul style="list-style-type: none"> <li>• "It is necessary to get a clear picture of the patient."</li> <li>• "This was a valuable learning experience and helped to increase my confidence in what I can do and how I can help."</li> </ul>	Professional Competency	Excellence
63%	<ul style="list-style-type: none"> <li>• "Importance of gathering a comprehensive history."</li> <li>• "It is important to be an active member of my profession."</li> </ul>	Professional Responsibility	Professional Duty
63%	<ul style="list-style-type: none"> <li>• "Today has made me more likely to volunteer in society."</li> <li>• "It has made me realize that I need to be an advocate. "Patient can only receive treatment once a month."</li> <li>• "...working here has helped me to understand how best to relate with our patients."</li> </ul>	Civic Identity	Social Responsibility
46%	<ul style="list-style-type: none"> <li>• "I'm also more interested in doing pro bono work someday."</li> <li>• "It helped me to see how the patient should come first always, especially if a patient can only receive treatment once a month."</li> </ul>	Philanthropy	Altruism

*Figure 9.* Assessment of Student Perceptions at Indiana University IPE Event.

More comprehensive data could have been obtained by including a pre- and post-test to provide baseline and comparative results of participant perceptions of this interprofessional experience. Given this limitation, George et al. (2017) offers a step-by-step developmental plan for implementation. The following are identified as important steps in a student-led model:

- Step 1: Develop a marketing plan and engage in interprofessional education
- Step 2: Consider financial resources and solicit donor participation

- Step 3: Establish a risk management plan
- Step 4: Develop student leadership roles: an essential element for success
- Step 5: Construct mentorship opportunities among students
- Step 6: Offer clinic hours as able: start small and increase when ready
- Step 7: Outline the clinic manager and volunteer roles during hours of clinic operation
- Step 8: Develop timely and efficient documentation
- Step 9: Determine clinic and learning outcomes to be evaluated from the outset

George et al. (2017) also offers the necessary steps taken within their research study to ensure legal participation of physical therapy students shown in Figure 10 below.

1. Gained full support of leadership, including the dean and department chairs of each DPT program.
2. Coordinated effort with legal department, including site visits and many conversations amongst all participants.
3. Obtained a memorandum of understanding individually between each physical therapy school (IU and UIndy) and the Neighborhood Fellowship Church;
  - Identify the responsibilities of each party involved regarding space utilization, expenses, and staffing;
  - Establish terms of liability;
  - Delineate the rights of each party involved to terminate or modify the agreement.
4. Created guidelines for faculty supervision.
5. Developed an application process for licensed PTs to become unpaid adjunct faculty.
6. Set eligibility criteria requiring the following: complete an application form; licensed PT in good standing; experience as a fulltime PT with at least 1 year of clinical experience; pass a criminal background check; commit to volunteering at least 2 times/year; shadowing twice before supervising without a fulltime faculty member.
7. Approved fulltime faculty coverage under the university malpractice umbrella, and the physical therapy department covered the malpractice insurance fee for qualified adjunct faculty.

*Figure 10.* Steps Taken to Allow Legal Participation of Students at Indiana University IPE Event.

**Online format and facilitation.** Online learning helps address challenges in IPE by bringing together professionals in multiple geographical locations. It also addresses scheduling conflicts associated among different professions and even different college programs. Cartwright, Franklin, Forman, and Freegard (2015) recognized the importance

of interprofessional collaboration and the following as outcomes of interprofessional geriatric care in medical settings: improve patient outcomes, facilitate in reduction of hospital re-admission rates, and more trusting relationships between patients and health care teams. Their 2015 research study implemented and evaluated an online IPE dementia case study for health science students (Cartwright et al., 2015). A mixed methods design assessed student values, attitudes, and learning outcomes through an interprofessional socialization and valuing scale. The scale was completed before and after the online dementia case study in addition to free text responses. Students from five health science disciplines ( $N=125$ ) participated in the online IPE case study. Participants included students from speech pathology ( $n=48$ , required to participate), health information management ( $n=4$ , required to participate), social work ( $n=24$ , required to participate), occupational therapy ( $n=9$ , volunteer participation), and nursing ( $n=9$ , volunteer participation). Students were divided into 10 interprofessional groups, with an IPE facilitator. The Blackboard® learning management system (LMS) was used for students to access groups, activities, resources, and group discussion boards. Technical support was available to all participants throughout the entire study. The four-week case study was created to be effective in group communication and collaborative learning, with a clinical scenario and structured activities for interactive learning and shared clinical reasoning. Quantitative data derived from students completing the 24-item questionnaire used the Likert scale to assess their comfort working with others, self-perceived ability to work with others, and the value in working with others. Of the 125 participants ( $N=125$ ), 42 ( $n=42$ ; 34%) completed both the pre- and post-case questionnaire. A two-tailed, paired sample  $t$ -test was used to compare pre- and post-test

data. The improvement of scores among all three sub-scales was statistically significant ( $t=5.85$ ;  $p < 0.001$ ). Qualitative data was derived from student responses to open-ended questions where participants ( $n=65$ ) provided responses that were analyzed thematically. Responses revealed students had an increased value and understanding of the roles and paradigms of other professions and how teams can work together. Sixty-one percent of participants commented on how the case study provided insight into other professions and shared decision making. The authors recommended a control group to compare online IPE to alternative modes of instruction for future research (Cartwright et al., 2015).

**Curriculum.** Scheduling IPE outside of the curriculum was identified as a barrier (Grant et al., 2011). Integration of IPE into curricula may assist health care students in understanding different professions and demonstrate how to work with other professions to provide beneficial care to patients. Early integration of IPE into curricula promotes a culture of interprofessional collaboration early in their careers (Cooper et al., 2009). Research suggests integrating IPE into health care curricula encourages the understanding of differences and demonstrates how professions can work together to provide better health care via interprofessional collaboration (IPC) early in their careers (Cooper et al., 2009). Incorporation of specific IPE requirements (hours and number of experiences) in the Commission on Dental Accreditation (CODA) dental hygiene standards could be the first step in implementation of formal IPE training in dental hygiene education (Navickis & Mathieson, 2016). IPE in curricula and practice settings offer optimal outcomes in patient-centered care, highly effective teams, and a strong collaborative approach to patient care and safety (Olenick et al., 2010).

**Summary**

Interprofessional education is a proven pedagogy in education. As evidenced in the literature, various adult-learning strategies, or andragogy have improved students' readiness to engage in interprofessional learning. By incorporating IPE into the health science curricula, students may be better prepared to engage in teamwork beyond academia as professionals. Being competent in interprofessional teamwork communication has potential to improve patient health outcomes through IPE experiences.

## **Methodology**

### **Research Method or Design**

This research study used a mixed methods pre-test and post-test study design to examine health professions students' attitudes toward and perceptions of interprofessional communication, teamwork, and professional roles. This study examined the impact of a student-led IPE experience on health professions students' attitudes and perceptions toward IPE, using the modified RIPLS survey to gather quantitative data. The study utilized the EWU Veteran's Day IPE experience that involves students collaborating in interprofessional teams; each centered on providing assessments of a veteran patient. The student-led approach involved students from a variety of health professions who worked together to run the IPE experience. Instructors were present to provide supervision while student-led teams worked together to run the IPE experience, gather a health history intake, and provide two basic screenings to assess potential hearing problems and sleep problems. The veterans completed a consent for the study and completed the two basic screenings. In addition to the two screenings, each veteran had the opportunity to be provided with dental care (dental exam, radiographs, dental hygiene therapy, etc.) in the EWU Dental Clinic. The student-led team worked together to review the health history and determine the need for each screening while prioritizing the screenings. The team took the veteran to each screening where the discipline-specific student professional conducted the screening while participants from other disciplines observed. Students were exposed to the roles and responsibilities of

other professions and gained an insight to the importance of interprofessional collaboration.

## **Procedures**

**Human subjects protection/informed consent.** The Principal Investigator (PI) obtained informed consent in addition to Institutional Review Board (IRB) approval prior to implementation of this study. Minimal risk was involved with participating students and participation was voluntary. Withdrawal from participation was permissible at any time during the study. Students who volunteered to participate in the study signed two copies of the consent form. The student participants received one copy and a second copy was kept for study records. Information regarding this study were kept in the PI's personal, password protected computer to insure confidentiality. Upon consent, participants were provided a manila envelope containing a pre-test and post-test with a linked unique identification number. The majority of participants completed the pre-test at the orientation and returned it to the envelope. Participants unable to attend the orientation completed the pre-test the day of implementation of the Vets Day IPE Workshop. Following the Vets Day IPE Workshop, participants completed the post-test. The pre- and post-test questionnaire was anonymously completed and the unique identification number created by the participant linked the pre- and post-test to the student. The pre-tests and post-tests in the manila envelope were then submitted to the PI for analysis.

**Sample source, plan, sample size, description of setting.** Participants were recruited from a convenience sample of students enrolled in health science programs at Eastern Washington University (EWU) College of Health Science and Public Health,



Washington State University (WSU) School of Pharmacy, and University of Washington (UW) School of Dentistry. Programs invited to participate in the study included Dental Hygiene (EWU), Communication Sciences and Disorders/Speech and Hearing Sciences (EWU/WSU entity), Occupational Therapy (EWU), and Public Health (EWU), Health Service Administration (EWU), UW School of Dentistry (RIDE, Spokane, WA campus), and Pharmacy (WSU). There were no exclusion criteria. This sample was easily accessed from a centrally and co-located multi-collegiate (EWU, WSU, UW) campus in Spokane, Washington. The population was selected for sampling due to the convenience and accessibility of being on the same campus, the presence of related topics among health science curricula, and the importance of integrating IPE within each program to produce successful professionals in collaborative care. The IPEC recognizes that collaboration between academic institutions will promote and prepare interprofessional collaboration as health care professionals enter the workforce (IPEC, 2016). See Figure 1 for a comparison of the program and accreditation requirements involved in this study.

The Vets Day IPE Workshop had the capacity to serve twelve (12) veteran patients, with each patient being assigned to an interprofessional team of students. Four of the eight programs invited participated in the community service project. Each interprofessional team consisted of at least one student from each of the three main participating disciplines (Dental Hygiene, Communication Sciences and Disorders/Speech and Hearing Sciences and Occupational Therapy) and one team had a participant from the Health Service Administration program, yielding a sample size of 46 student participants ( $N=46$ ).

The study utilized the EWU Dental Clinic, EWU/WSU Communication Sciences and Disorders treatment rooms, and co-located classroom setting. The study included a student-led IPE workshop preceded by an orientation, and followed by a pre- and post-test questionnaire to evaluate the students learning and attitudes. A final debrief session was held on the EWU Spokane campus four days after the Vets Day IPE workshop.

**Variables.** The Vets Day IPE workshop was the independent variable. The dependent variables were student attitudes and perceptions toward IPE.

**Instruments and tools.** Qualitative and quantitative data was derived from the validated and modified RIPLS (Readiness for Interprofessional Learning Scale) instrument. A modified version of the RIPLS (McFadyen et al., 2005) based on the original RIPLS instrument (Parsell & Bligh, 1999), was employed in this study. The RIPLS is a 19-item survey instrument using a 5-point Likert scale ranging from “strongly agree” (5) to “strongly disagree” (1) (McFadyen et al., 2005) (see Appendices A and B). RIPLS items were organized to assess whether students meet two of the IPEC competencies, interprofessional communication and teams and teamwork. Figures 11 and 12 include the RIPLS items used to assess these two IPEC core competencies.

<b>IPEC Core Competency: Interprofessional Communication and Sub-Competencies</b>		<b>Related RIPLS Items to Assess Interprofessional Communication</b>
<b>CC2.</b>	<b>Communicate information with patients, families, community members, and health team members in a form that is understandable, avoiding discipline-specific terminology when possible.</b>	<b>1, 3, 5, 13, 15</b>
<b>CC3.</b>	<b>Express one’s knowledge and opinion to team members involved in patient care and population health improvement with confidence, clarity, and respect, working to ensure common understanding of information, treatment, care decisions, and population health programs and policies.</b>	<b>2, 3, 5, 6, 7, 8, 13, 14</b>

<b>CC4.</b>	<b>Listen actively, and encourage ideas and opinions of other team members.</b>	<b>7, 9, 10, 13, 14</b>
<b>CC7.</b>	<b>Recognize how one's uniqueness (experience level, expertise, culture, power, and hierarchy within the health team) contributes to effective communication, conflict resolution, and positive interprofessional working relationships.</b>	<b>1, 4, 5, 6, 8, 9, 12, 18, 19</b>
<b>CC8.</b>	<b>Communicate the importance of teamwork in patient-centered care and population health programs and policies.</b>	<b>1, 2, 5, 7, 13, 15, 16</b>

*Figure 11.* IPEC Core Competency: Interprofessional Communication and Sub-Competencies Related to RIPLS Items.

<b>IPEC Core Competency: Teams and Teamwork and Sub-Competencies</b>		<b>Related RIPLS Items to Assess Teams and Teamwork</b>
<b>TT1.</b>	<b>Describe the process of team development and the roles and practices of effective teams.</b>	<b>1, 4, 7, 8, 9, 14, 16, 18</b>
<b>TT3.</b>	<b>Engage health and other professionals in shared patient-centered and population-focused problem-solving.</b>	<b>1, 2, 3, 12, 13, 15</b>
<b>TT4.</b>	<b>Integrate the knowledge and experience of health and other professions to inform health and care decisions, while respecting patient and community values and priorities/preferences for care.</b>	<b>2, 13, 15</b>
<b>TT5.</b>	<b>Apply leadership practices that support collaborative practice and team effectiveness.</b>	<b>1, 4, 6, 7, 8, 10, 11, 14, 16, 17</b>
<b>TT7.</b>	<b>Share accountability with other professions, patients, and communities for outcomes relevant to prevention and health care.</b>	<b>2, 13, 15</b>
<b>TT8.</b>	<b>Reflect on individual and team performance for individual, as well as team, performance improvement.</b>	<b>1, 3, 8, 9, 10, 13, 16, 18</b>
<b>TT9.</b>	<b>Use process improvement to increase effectiveness of interprofessional teamwork and team-based services, programs, and policies.</b>	<b>1, 3, 4</b>
<b>TT10.</b>	<b>Use available evidence to inform effective teamwork and team-based practices.</b>	<b>11, 12, 13, 16</b>

*Figure 12.* IPEC Core Competency: Teams and Teamwork and Sub-Competencies Related to RIPLS Items.

Six open-ended items were used in the post-test to gather data related to aspects of the IPE experience (see Appendix B). The qualitative items were accompanied with a 5-point Likert scale rating scale ranging from “excellent” (5) to “poor” (1). Demographic data included student age, gender, program, year of study (in their program), prior IPE experiences, and any other health professions degree or experience. After collection of the data, it was analyzed using SPSS software by the PI.

**Equipment.** Computer software programs used in this study included IBM SPSS® version 2.4 to collect and analyze data. EWU Canvas LMS platform was used by the Vets Day IPE committee members for organizing the workshop.

**Steps to implementation.** Upon EWU IRB approval, the study was implemented (see Figure 13).

Step One: 6 Weeks Prior	Step Two: 4 Weeks Prior	Step Three: 3 Weeks Prior	Step Four: 1 Week Prior
1/11/18 Vets Day IPE Committee meeting  Announced Vets Day IPE workshop to interested department chairs	Vets Day IPE signup (12 per dept.)  Department chairs identified students to serve on Vets Day IPE committee	Obtained email address of each participant through SignUp Genius  Email sent to confirm participation and inform them of important dates	2/15/18: IPE Orientation (1 hr.) Completed pre-test RIPLS survey
Step Five: Implementation	Step Six: 3 days After IPE Workshop	Step Seven: Evaluation	Step Eight: Review
2/23/18: Implementation of Vets Day IPE workshop  Completed post-test RIPLS survey	2/26/18: Vets Day IPE workshop Debrief Session	Statistical Evaluation  PI analyzed results of quantitative and qualitative data with statistician	PI reviewed results with statistician and wrote conclusion

*Figure 13. Research Plan and Design.*

**Step one.** Once IRB approval was obtained in early January, the PI communicated with faculty in participating programs to invite their participation in the study. The PI worked in cooperation with the Vets Day IPE committee to announce the orientation and Vets Day IPE workshop dates and times to participating health science department chairs.

**Step two.** The Vets Day IPE signup lists were presented to each department chair for student signup within their respective disciplines via email. SignUp Genius® was used for students to sign up for the Vets Day IPE Workshop where the recruitment letter (see Appendix C) explained the PI's intentions of the study. Twelve teams, closely representative of each participating discipline, were randomly chosen and created by the PI and the Vets Day IPE coordinator. The department chairs were instructed to identify one or more students to serve on the Vets Day IPE Committee. These students were responsible for gathering student registrations for their department and also participated as a member on one of the twelve Vets Day IPE teams.

**Step three.** The student Vets Day IPE committee member facilitated communication regarding important dates and information of the event. The committee member sent follow up announcements to ensure spots were filled on the SignUp Genius® and reminded students of the importance of their attendance to the orientation, Vets Day IPE workshop, and debrief session.

**Step four.** The face-to-face orientation to the Vets Day IPE workshop was held February 15, 2018, for an early evening one-hour session. The orientation served four purposes: 1) to orient the students to the agenda and objectives of the Vets Day IPE workshop, 2) obtain informed consent and pre-test RIPLS results, 3) facilitate student IPE

team member introductions, have students provide their IPE team with a brief description of their profession, and discuss scope of practice and potential interprofessional roles and responsibilities as a member of the IPE team, and 4) serve as an opportunity for the PI to introduce the study to student members of the IPE teams, explain the consent process, and address any questions relating to the study (see Appendix C). Figure 14 shows the orientation schedule and elements incorporated. Participants signed the informed consent for the PI to use their pre- and post-test RIPLS test scores and audio record the responses at the debrief session.

Time Allotment	Time Frame	Vets Day IPE Workshop Orientation	Presenter
15min.	5:30pm	Introduced the IPE Student-led workshop and study Handed out manila envelopes and students created unique coding Participants signed consent and took pre-test RIPLS	Vets Day IPE Workshop 2018 IPE Coordinator and Principal Investigator
5 min.	5:45pm	Identified IPE teams Students gathered in IPE Teams	Student-led teams
30 min.	5:50-6:20pm	<b>An orientation to the Professions</b> Team-led member introductions Student-led introductions to their respective discipline and professional role/scope of practice.	Student-led teams
10 min.	6:30pm	Conclusion of the Vets Day IPE Orientation Collect Manila Envelopes	Principal Investigator and Vets Day IPE Coordinator

*Figure 14.* Vets Day IPE Workshop Orientation.

Upon arrival, the participants were given a manila envelope with a colored dot (blue, red, green, yellow) and time (12:30pm, 1:30pm, 2:30pm) representative of their randomly assigned team associated with the time each student signed up for. Participants were asked to create a unique identification code to place on the front of the manila

envelope and the pre- and post-tests. The code linked the pre- and post-test for comparison and to ensure validity and confidentiality. The PI recommended participants follow a coding system for the ease of remembering their code. It was recommended to use a four-digit code with the day of their birthday, their mother's first initial, and mother's middle initial (i.e., 18CK). The manila envelope included two copies of the informed consent form, the demographics questionnaire; and the modified RIPLS pre-test to be completed upon arrival to the orientation, and the RIPLS post-test to be completed following the workshop.

Following completion of the pre-test, participants gathered into their color and time-coded groups to complete their guided discussions related to the respective disciplines. The PI encouraged students to introduce their professions, their role within the profession, and how they could be utilized in the IPE workshop.

*Step five.* Implementation of the Vets Day IPE workshop was held on February 23, 2018, where participants worked in groups to provide care to patients in a variety of settings, while learning with and from one another. Upon arrival, Vets Day IPE workshop team members who volunteered to participate in the study picked up their manila envelope with their unique identification code. Participants who were unable to attend the orientation completed the pre-test prior to the workshop and completed the post-test on the same day following the workshop.

Upon arrival to the EWU Dental Clinic, veteran patients completed the IP consent form. The IPE workshop consisted of twelve (12) student-led teams who worked in collaboration to gather a health history intake and provide two basic screenings to assess possible hearing problems and sleep problems. Figure 16 provides a step-by-step process

of the Vets Day IPE Workshop. Upon patient arrival, the student team was notified. Each team collaborated and assigned roles to each team member for the IPE workshop. Examples of assigned roles included the patient greeter, health history interviewer, patient liaison, and screening clinicians. The team proceeded to their assigned health history intake room in the EWU Speech Hearing Clinic. Each team selected two students to accompany the patient to the designated screening room. Remaining team members gathered in the adjacent area of the screening room, that was divided by a one-way mirror where they were able to use observation-based learning to gain insight and learn from other participants. Once the interview was complete, all team members moved to a conference room to discuss the health history (HH) review and IP team verbal history (see Appendix D), and prioritize the screenings. One student remained in the screening room with the patient. Team members presented their assessment to the patient, discussed recommendations, and proceeded to complete the two screenings with the patient. Following the screenings and discussion of recommendations for the patient, the patient was dismissed and escorted to the exit. Team members returned to the Quad classrooms to return all patient forms. At this time, study participants completed the RIPLS post-test and handed in their manila envelope to the PI. Participants were thanked verbally for their time and participation and reminded of the debrief session scheduled the following week.

<b>Vets Day IPE Teams</b> IPE experience (workshop) objectives: <ul style="list-style-type: none"> <li>• Develop effective interprofessional and patient communication skills by participating in the student-led Vets Day IPE patient health history assessment and screenings.</li> <li>• Demonstrate collaborative decision making by developing assessing and prioritizing patient needs.</li> </ul>	<b>Meeting Room</b>
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<ul style="list-style-type: none"> <li>• Demonstrate a general understanding of the roles and responsibilities of participating disciplines.</li> <li>• Attain appreciation of the interprofessional experience gained through all aspects of the IPE experience (workshop): orientation, workshop experience, and post-workshop debriefing.</li> </ul>	
<b>Workshop IPE experience: Arrival</b> Students arrived 15 minutes prior to assigned Vets Day workshop session. Sessions: 12:30pm, 1:30pm and 2:30pm	Quad 110D
<b>Completed initial assessments</b> Consenting students completed the: <ul style="list-style-type: none"> <li>• Informed consent if they did not attend the orientation.</li> <li>• Demographic questionnaire and RIPLS pre-test if they did not attend the orientation.</li> </ul>	Quad 110D
<b>Student-led IPE teams huddled</b> <ul style="list-style-type: none"> <li>• Teams organized in their groups.</li> <li>• Students were provided a completed patient health history form, a IP team verbal history form, and screening assessment forms.</li> </ul>	Quad 110D
<b>Patient arrival</b> <ul style="list-style-type: none"> <li>• Upon arrival to the EWU Dental Clinic, Veteran patients completed the IP consent form. The form was collected and kept with the PI's study records.</li> <li>• Patient IPE team assessment and screenings were performed following dental treatment.</li> </ul>	EWU Dental Clinic front office
<b>Student-led patient assessment</b> <ul style="list-style-type: none"> <li>• One team member was selected to greet the patient upon arrival and escort the patient to the assigned screening/treatment room.</li> <li>• This student was given a copy of the patient's health history.</li> <li>• Patient and IPE teams proceeded to designated screening room.</li> </ul>	Speech/Hearing treatment rooms
<b>Student-led discussion of HH assessment</b> <ul style="list-style-type: none"> <li>• Team members moved to conference room to discuss HH review and IP team verbal history and prioritize the screenings.</li> <li>• A student was assigned to stay with the patient.</li> </ul>	Speech/Hearing treatment rooms
<b>IPE team presentation of assessment</b> <ul style="list-style-type: none"> <li>• IPE team members presented their assessments to the patient, discussed recommendations, and proceeded to screenings with the patient.</li> </ul>	Speech/Hearing treatment rooms

<b>Conducting screenings</b> <ul style="list-style-type: none"> <li>• Patient was informed of screening findings and needs recommendations.</li> </ul>	Speech/Hearing treatment rooms
<ul style="list-style-type: none"> <li>• Patient was dismissed.</li> </ul>	Speech/Hearing treatment rooms
<ul style="list-style-type: none"> <li>• IPE team members returned to Quad rooms to return all patient forms.</li> </ul>	Quad 110D
<ul style="list-style-type: none"> <li>• Study participants completed the modified RIPLS post-test.</li> </ul>	Quad 110D
<b>Team member departures</b> <ul style="list-style-type: none"> <li>• Students were thanked for participating.</li> <li>• Students were reminded of the debrief session.</li> </ul>	Quad 110D

Figure 15. Implementation of Vets Day with Objectives.

*Step six.* A 30-minute, student-led debriefing session was held for members of the IPE teams to reflect on their IPE experience. The debriefing session was held on the Tuesday evening following the workshop (February 27<sup>th</sup> at 5:30pm) at the EWU Spokane campus in five of the Communication Sciences and Disorders observation rooms. The discussions were video and audio recorded in each room, to be reviewed for qualitative data. Participants were informed of the recording on the consent. The IPE teams were provided with guided questions to facilitate reflection of their IPE experience and the debrief session was a student-led discussion. The guided questions were: (1) Were there any unexpected improvements in your attitudes toward IPE? (2) Did your team's effectiveness reflect your personal perceptions of IPE? (3) Was the IPE experience helpful in relieving any anxiety or doubts you may have had towards interprofessional collaboration? (4) How effective was your team's communication during the IPE workshop? (5) Was your respect and appreciation for other health care professions enhanced by your IPE workshop experience? (6) Will this experience improve your ability and commitment to interprofessional collaboration beyond academia? (7) How did the student-led aspect of the IPE workshop affect your learning experience and

appreciation for IPE? (8) What did you learn about the different professions involved? (9) What was your favorite part? Please share any other comments regarding your experience.

***Step seven.*** The PI analyzed qualitative data from the debrief session and open-ended items on the RIPLS form thematically. Quantitative data derived from the validated RIPLS survey was analyzed by the PI and a statistician to ensure accurate and complete data analysis. The statistician helped address the negative items of the RIPLS survey, as the data collected may appear skewed when it was not.

***Step eight.*** The PI collaborated with the statistician to review analyzed results for better understanding. Results were reviewed and an explanation provided to ensure validity of the study.

### **Summary**

This research design and implementation ensured all participants remain anonymous, however they were asked to identify specific demographics, including their program of study, to allow further investigation into the variety of professions involved in the study. The PI administered the pre- and post-test RIPLS survey with open-ended items to evaluate student attitudes and perceptions toward interprofessional teamwork and communication prior to and upon completion of involvement in the Vets Day IPE workshop. Students who did not attend the orientation, completed both the pre- and post-test on the day of the Vets Day IPE workshop.

## Results

### Description of Sample

The PI recruited students enrolled in seven health science programs at the WSU/EWU Spokane campus via an invitation over email to each program chair. Participants ( $N=46$ ) included students in the following programs: Dental Hygiene ( $n=22$ ), Communication Sciences and Disorders (Comm D)/Speech and Hearing Sciences ( $n=12$ ), Occupational Therapy ( $n=11$ ), and Health Service Administration ( $n=1$ ). Of the total participants who completed the informed consent ( $N=46$ ), 96% of participants ( $n=44$ ) attended the Vets Day IPE Workshop and completed both the pre-and post-test RIPLS survey. However, when comparing data some participants circled two answers, leaving the PI missing data and the number ( $n$ ) to vary depending on the question answered. Attendance to the orientation included 72% of participants ( $n=33$ ) and the debrief session 56% ( $n=26$ ).

The demographic survey completed at the beginning of the pre-test identified the majority of participants, 91% ( $n=42$ ), had prior IPE experience, and 98% of students ( $n=45$ ) were in their first or second year of study in their respective program. The majority of students, 69% ( $n=32$ ), were 18 to 24 years of age and 98% ( $n=45$ ) were female. Out of all participants, 37% ( $n=17$ ) had another health professions degrees or experience. See Table 1 for all demographic characteristics and percentages related to this study.

Table 1

*Demographic Characteristics of Vets Day IPE Workshop*

Characteristic	Percentage of Sample (N=46)
Program of Study	
Dental Hygiene	48% (n=22)
Comm D/Speech and Hearing	26% (n=12)
Health Service Administration	2% (n=1)
Occupational Therapy	24% (n=11)
Year of Study	
1 <sup>st</sup>	72% (n=33)
2 <sup>nd</sup>	26% (n=12)
3 <sup>rd</sup>	-
4 <sup>th</sup>	2% (n=1)
Prior IPE Experience	
No	9% (n=4)
Yes	91% (n=42)
Other Health Professions Degree or Experience	
No	59% (n=27)
Yes	37% (n=17)
	*two students did not answer this question
Gender	
Male	2% (n=1)
Female	98% (n=45)
Age	
18-24	69% (n=32)
25-34	22% (n=10)
35-44	9% (n=4)
45-54	-
55+	-

**Statistical Analysis**

Quantitative data was collected and compared from the pre- and post-test RIPLS survey. Qualitative data was collected from the post-test open-ended questions and the debrief session, and organize thematically. Quantitative data was representative of all disciplines that participated in the Vets Day IPE Workshop (N=46). Qualitative data was representative of students who participated in the debrief session (see Table 6 and Table 7).

**Quantitative analysis.** All quantitative data was input into SPSS® for statistical analysis. No identifiers other than the unique code participants created were entered into SPSS to ensure anonymity. Results were stored on a password-protected computer. Due to a limited number of participants leaving questions blank, the degrees of freedom and *t*-tests show the PI took into consideration the missing values when analyzing data and configuring statistical significance. Frequencies were run through IBM SPSS® to ensure validity of data entered. The PI took each RIPLS pre- and post-test to compare the mean score using a *t*-test (see Table 2). Reverse coding in SPSS was used on specific RIPLS items (9, 10, 11, 17, 18, 19) to reflect changes in reverse scores where a lower score indicates readiness for IP learning. With using a five-point Likert-scale ranging from strongly agree to strongly disagree (5=strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree), the maximum total score on the RIPLS survey is 95, meaning a higher score indicates readiness for IP learning. Overall data of the pre-test showed a high baseline mean score for each RIPLS item.

Table 2

*Comparison of Pre- and Post-test For Each RIPLS Item*

RIPLS Item	Maximum Possible Score	Pre-test			Post-test		
		<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
1. Learning with other students will help me become a more effective member of a health care team	5	44	4.54	.504	44	4.80	.408
2. Patients would ultimately benefit if health care students worked together to	5	46	4.67	.474	44	4.86	.347

									understand clinical problems
3.	Shared learning with other health care students will increase my ability to understand clinical problems	5	46	4.59	.498	44	4.77	.424	
4.	Learning with health care students before qualification would improve relationships after qualification	5	46	4.48	.623	44	4.68	.601	
5.	Communication skills should be learned with other health care students	5	46	4.30	.785	44	4.59	.583	
6.	Shared learning will help me to think positively about other professionals	5	46	4.30	.695	44	4.70	.509	
7.	For small group learning to work, students need to trust and respect each other	5	45	4.62	.576	44	4.73	.624	
8.	Team-working skills are essential for all health care students to learn	5	45	4.78	.471	44	4.80	.509	
9.	Shared learning will help me to understand my own limitations	5	45	4.02	.753	44	4.59	.658	
10.	I don't want to waste my time learning with other health care students**	5	46	1.63	.903	44	1.25	.488	
11.	It is not necessary for undergraduate health care students to learn together**	5	46	1.65	.849	44	1.36	.613	

12. Clinical problem-solving skills can only be learned with students from my own department**	5	46	1.41	.580	44	1.36	.650
13. Shared learning with other health care students will help me to communicate better with patients and other professionals	5	46	4.26	.855	44	4.73	.451
14. I would welcome the opportunity to work on small-group projects with other health care students	5	46	3.87	1.024	44	4.66	.526
15. Shared learning will help me to clarify the nature of patient problems	5	46	4.22	.664	43	4.70	.513
16. Shared learning before qualifications will help me become a better team worker	5	46	4.17	.769	44	4.68	.518
17. The function of nurses and therapists is mainly to provide support for doctors**	5	46	2.09	.939	44	1.89	1.017
18. I'm not sure what my professional role will be**	5	46	1.83	.877	44	1.50	.762
19. I have to acquire much more knowledge and skills than other health care students **	5	46	2.39	1.022	44	2.16	1.098

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*Note. \*p < .001 and \*\*reverse coded in SPSS, low is a better score*



A paired samples *t*-test was run to compare the total mean score change in the RIPLS from the pre-test to post-test for all participants regardless of the program of study (see Table 3). Overall, the mean improvement in RIPLS score was 5.9 ( $t=5.85$ ,  $df=1,41$ ) with a  $p$  value  $<.05$  indicating statistical significance in changes to participants attitudes and perceptions toward IPE after completing the Vets Day IPE Workshop.

Table 3

*Paired Samples t-test Comparing Total Change in RIPLS Pre- and Post-test*

n	Mean Total Score Pre-test	Mean Total Score Post-test	Mean Improvement in RIPLS Score	Std. Deviation	t	df	Sig. (2- tailed)
42	81.69	87.60	5.905	6.547	5.845	41	.000*

Note. \* $p < .001$

Due to the significant improvement of a mean change of difference of 5.9 in RIPLS scores, the PI ran a paired samples *t*-test on each individual RIPLS subscale to further test these results. Subscale one, teamwork and collaboration, showed a mean improvement score of 2.2 ( $SD=3.7$ ,  $t=3.8$ ) and a  $p$  value  $<.05$ . Subscale two, negative professional identity, showed a mean improvement score of .7 ( $SD=1.5$ ,  $t=3.0$ ) and a  $p$  value  $<.05$ . Subscale three, positive professional identity, showed a mean improvement score of 2.3 ( $SD=2.2$ ,  $t=6.8$ ) and a  $p$  value  $<.05$ . Subscale four, roles and responsibility, showed a mean improvement score of .7 ( $SD=2.4$ ,  $t=2.0$ ) and a  $p$  value  $<.05$ . Results showed no one subscale drove the significance of the findings, as all subscales showed significant improvement in scores (see Table 4), thus supporting the initial results that participants had a positive change in attitudes and perceptions of IPE.

Table 4

*Paired Samples t-test Comparing Total Change in RIPLS Pre- and Post-test Within Subscales*

Subscale	Items	<i>n</i>	Mean Improvement in RIPLS Score	Std. Deviation	<i>t</i>	df	Sig. (2-tailed)
1: Teamwork and Collaboration	1-9	43	2.186	3.692	3.883	42	.000*
2: Negative Professional Identity	10-12	44	.682	1.506	3.003	43	.004
3: Positive Professional Identity	13-16	43	2.256	2.161	6.844	42	.000*
4: Roles and Responsibility	17-19	44	.727	2.366	2.039	43	.048

*Note.* \* $p < .001$

Demographic data was collected on the pre-test, giving the PI a wide range of data comparisons. Data was collapsed to more easily compare the program of study, year of study, age, prior degree/experience, and orientation attendance due to sample sizes within each demographics category. Dental hygiene students ( $n=19$ ) were compared to a collapsed group containing all other programs ( $n=23$ ) involved in the study. First year students ( $n=29$ ) were compared to a collapsed group containing students beyond their first year ( $n=13$ ). The age group of 18-24 years of age ( $n=30$ ) was compared to a collapsed group containing all other students ranging from age 24-44 ( $n=12$ ). The group of students with another degree or healthcare experience ( $n=16$ ) was compared to a collapsed group containing students without another degree of healthcare experience ( $n=25$ ). Lastly, the group of students who attended orientation ( $n=30$ ) were compared to students who did not attend orientation ( $n=12$ ).

The Levene's test was run to see if there was a significant difference in the demographics (program, year of study, age, degree/experience, and orientation) and the mean change in the RIPLS total score. This nonparametric test showed there was no significant difference in the statistical ranging of variances when comparing demographics, thus indicating the ability to run the equal variance test (parametric test). Independent paired samples *t*-tests were run after the Levene's test and showed the data is parametric, meaning the data did not have widely ranging variances.

Table 5

*Demographics in Paired Samples t-test Comparing Difference in RIPLS Total Score Change from Pre- and Post-test*

Compared Samples		<i>n</i>	Difference in RIPLS Total Score Change	SD	<i>t</i>	df	<i>p</i> value
Program of Study	Dental hygiene	19	2.229	4.989	1.101	40	.278
	All other programs	23					
Year of Study	1 <sup>st</sup> year	29	.138	7.244	.062	40	.951
	Beyond 1 <sup>st</sup> year	13					
Age	18-24	30	1.033	6.424	.458	40	.650
	25-44	12					
Other Degree/Experience	Yes	16	.633	6.706	.295	39	.770
	No	25					
Orientation	Yes	30	.600	6.184	.265	40	.792
	No	12					

The paired samples *t*-test was run to compare the mean change in the RIPLS total score change from pre- to post-test for each demographic item (see Table 5). Data comparing the dental hygiene students to all other programs showed a difference of 2.2 in the change of the RIPLS total score from pre- to post-test ( $SD=4.9$ ,  $t=1.1$ ) with a *p* value  $>.05$ . Data comparing the first-year students to students beyond their first year of their program showed a difference of .138 in the change of the RIPLS total score from pre- to post-test ( $SD=7.2$ ,  $t=.062$ ) with a *p* value  $>.05$ . Data comparing students age 18-24 to all other students ranging from 25-44 years of age showed a difference of 1.03 in the change of the RIPLS total score from pre- to post-test ( $SD=6.4$ ,  $t=.46$ ) with a *p* value  $>.05$ . Data comparing the students with prior health science degrees or experiences to all other students without showed a difference of .633 in the change of the RIPLS total score from pre- to post-test ( $SD=6.7$ ,  $t=.295$ ) with a *p* value  $>.05$ . Data comparing students who attended the orientation to those who did not attend orientation showed a difference of .600 in the change of the RIPLS total score from pre- to post-test ( $SD=6.2$ ,  $t=.26$ ) with a *p* value  $>.05$ . The *p* values indicate, regardless of the demographic factors, the Vets Day IPE Workshop experience improved participants' scores and a positive response to attitudes and perceptions of IPE. The scores were not related to the demographics reported on the pre-test.

**Qualitative analysis.** Qualitative data derived from the debrief session the Tuesday following the Vets Day IPE Workshop where participants ( $N=26$ ) answered nine guided questions in groups of five to six students in a room for thirty minutes. Five different rooms were providing for the debrief session and students were randomly put into a room as 56% of the participants participated in the debrief session. Students

participating in the debrief session included Dental Hygiene ( $n=12$ ), Communication Sciences and Disorders/Speech and Hearing ( $n=9$ ), Health Service Administration ( $n=1$ ), and Occupational Therapy ( $n=4$ ) (see Table 6). Each group was representative of at least two professions to bring a variety to the discussion. The debrief session included only students and the discussion was student-led. Each room was audio and video recorded to gather qualitative data.

Table 6

*Debrief Session Participation*

<u>Program of Study</u>	<u>N</u>	<u>Completed</u>	
		<u>n</u>	<u>%</u>
Dental Hygiene	22	12	54
Comm D/Speech and Hearing	12	9	75
Health Service Administration	1	1	100
Occupational Therapy	11	4	36
Total	46	26	56

The PI reviewed and transcribed the recordings, then thematically organized the data. Themes within each of the nine questions were organized using key terms. Subsequently, major themes were organized as overall categories of student discussions and their experience with the Vets Day IPE Workshop (see Table 7 for major themes). The four major themes from the debrief session included observation, teamwork, preparation, and interest.

Table 7

*Major Themes of Participant Responses in Debrief Session*

<u>Thematic Category</u>	<u>Key terms</u>	<u>Debrief responses</u>
Observation	See	“I feel like we always talk about what we do at IPE events, so I liked that we got to see other students perform screenings.”

		<p>“I thought it was great to see and hear how much knowledge about pharmacology dental hygiene students have. And I didn’t realize they can look in the mouth and know so much about a patient’s medical history.”</p>
Teamwork	Collaborate Interact Relationships	<p>“In other IPE experiences, we just talked and it felt like our professions were separated and not collaborating much. This was so nice to actually get to interact with each other. “</p> <p>“I liked how interactive this experience was compared to others.”</p> <p>“I think it’s important that we are starting to build those interprofessional relationships now, so we can continue after school.”</p>
Preparation	Orientation	<p>“I was a little unclear on who was supposed to do what because I didn’t go to the orientation.”</p> <p>“We had to wing it because some students didn’t come to the orientation, so we only had a few minutes to talk.”</p>
Interest	See more Learn more Wish	<p>“I didn’t realize there’s so much to know about dental hygiene just from talking to you and that we should actually interact with them more. I wanted to see more of what you do rather than just the health history portion.”</p> <p>“I wish more HSA students would have participated because I’ve worked in hospitals and see how important the administrative role is in health care.”</p> <p>“I had no idea what occupational therapists did, so it was great to learn about what they can do.”</p>

***Debrief question one: Was the IPE experience helpful in relieving any anxiety or doubts you may have had towards interprofessional collaboration? Students***

expressed their appreciation for the opportunity to observe screenings and see the different professions in action. Many students recognized that other IPE experiences only include discussion on the different professions rather than seeing the professions in action, so their satisfaction was higher with the Vets Day IPE Workshop. This was indicated by responses like “I feel like we always talk about what we do at IPE events, so I liked that we got to see other students perform screenings” and “I thought it was great to see and hear how much knowledge about pharmacology dental hygiene students have; I didn’t realize they can look in the mouth and know so much about a patient’s medical history.”

***Debrief question two: Did your team’s effectiveness reflect your personal perceptions of IPE?*** Student responses indicated their teams worked well together and contribution played a key role. Responses included, “Everyone worked great together. I liked being on a team that was communicated effectively in IPE” and “I feel like all of us established a connection. We worked well together and it makes me want to participate in more events like this.”

***Debrief question three: Was the IPE experience helpful in relieving any anxiety or doubts you may have had towards interprofessional collaboration?*** Students did not report having anxiety or doubts towards interprofessional collaboration. Rather students emphasized how the interactive experience was enjoyable based on responses like, “other IPE experiences we just talked and it felt like our professions were separated and not collaborating much. This was so nice to actually get to interact with each other,” and “I did like how interactive this experience was compared to others. I didn’t have any anxiety or doubts about it.”

***Debrief question four: How effective was your team's communication during the IPE workshop?*** This question brought insight into the orientation aspect of the workshop. Although quantitative data shows no significant difference in the pre- and post-test RIPLS scores from students who attended the orientation to those who did not attend orientation, responses to this debrief question show some students felt the organization and effectiveness of the Vets Day IPE Workshop was related to the orientation attendance. Students reported, "I was a little unclear on who was supposed to do what because I didn't go to the orientation," and "We had to wing it because some students didn't come to the orientation, so we only had a few minutes to talk. It was good, but could've been better," and "I think it helped that we all had clear and pre-defined roles."

***Debrief question five: Was your respect and appreciation for other health care professionals enhanced by your IPE workshop experience?*** Students acknowledged they were unaware of the roles of different professions indicated by, "I didn't realize there's so much to know about dental hygiene and we should actually interact with them more" and "I had no idea what occupational therapists did, so it was great to learn about what they can do." Additionally, students expressed an interest in seeing more of what the dental hygiene students do in their clinical setting, rather than just the health history intake indicated by responses such as, "I didn't realize there's so much to know about dental hygiene just from talking to you and that we should actually interact with them more. I wanted to see more of what you do rather than just the health history portion," and "I would have loved to watch the dental hygiene students while they work on a patient." Students hoped to see more from the occupational therapy students and wished



to see pharmacy students participate in the workshop based on the following responses, “I wish I could’ve seen more from OT. I want to know more about what they do,” and “It would’ve been nice to see what pharmacy does and how their profession plays a role.” These responses are helpful in organizing future IPE events.

***Debrief question six: Will this experience improve your ability and commitment to interprofessional collaboration beyond academia?*** Responses to this question showed an appreciation for interprofessional collaboration and establishing relationships with other professions while in school and beyond academia. Many students recognized how important it is to create connections and continue collaboration with responses such as, “yes, I think we all tend to focus so much on our own professions that the collaboration isn’t always there. I think it’s important to continue with these learning experiences,” and “I think it’s important that we are starting to build those interprofessional relationships now, so we can continue after school,” and “it helped me learn about my profession and what my limits are.” Overall students expressed a commitment to collaboration beyond academia.

***Debrief question seven: How did the student-led aspect of the IPE workshop affect your learning experience and appreciation for IPE?*** Students expressed appreciation of the student-led aspect of the workshop and recognized teamwork made their team successful. Students expressed, “it helps us prepare when we are out in the real world because it will only be us,” and “everyone was confident and did what they needed to do or stepped in when needed,” and “it was nice to learn from each other and do most of it as just students.” Responses to the student-led workshop were positive and emphasized how their interactions will help prepare them for the future.

***Debrief question eight: What did you learn about the different professions involved?*** Many students reflected on how each profession interprets the answers to questions asked to patients differently. For example, one student responded, “the fall risk question made the occupational therapy student think about previous contributing injuries, while the speech and hearing student considered an inner ear issue. There is a crossover between the professions.” Many students wanted more exposure to dental hygiene students and health services administration students indicated by, “I didn’t feel like I learned enough about the dental hygiene students. I would have liked to learn more and see what they do in the clinic,” and “I wish more HAS students would have participated because I’ve worked in hospitals and see how important the administrative role has in health care.” Expressions about the importance of collaboration was incorporated into many answers to this question.

***Debrief question nine: What was your favorite part? Please share any other comments regarding your experience.*** Every group focused on the rewarding aspect of providing care to Veterans during this experience. Response examples included, “we were able to provide so much to the Veterans that day, so it made it a good experience for the patient and the students,” and “my patient was really appreciative of this day and how well we worked together.” With these responses, the PI can conclude IPE incorporated into community projects is helpful in the appreciation of interprofessional collaboration and the overall experience.

**Quantitative and qualitative post-test IPE survey items.** At the end of the post-test RIPLS survey, participants were asked five questions using a five-point Likert-scale (excellent, good, average, fair, poor) regarding their IPE experience. *Figures 16, 17,*

18, 19, and 20 show an overall positive response to the Vets Day IPE Workshop with the majority of answers being excellent and good for all questions. The total number of respondents to these questions varied as some did not answer the last page of the questionnaire.

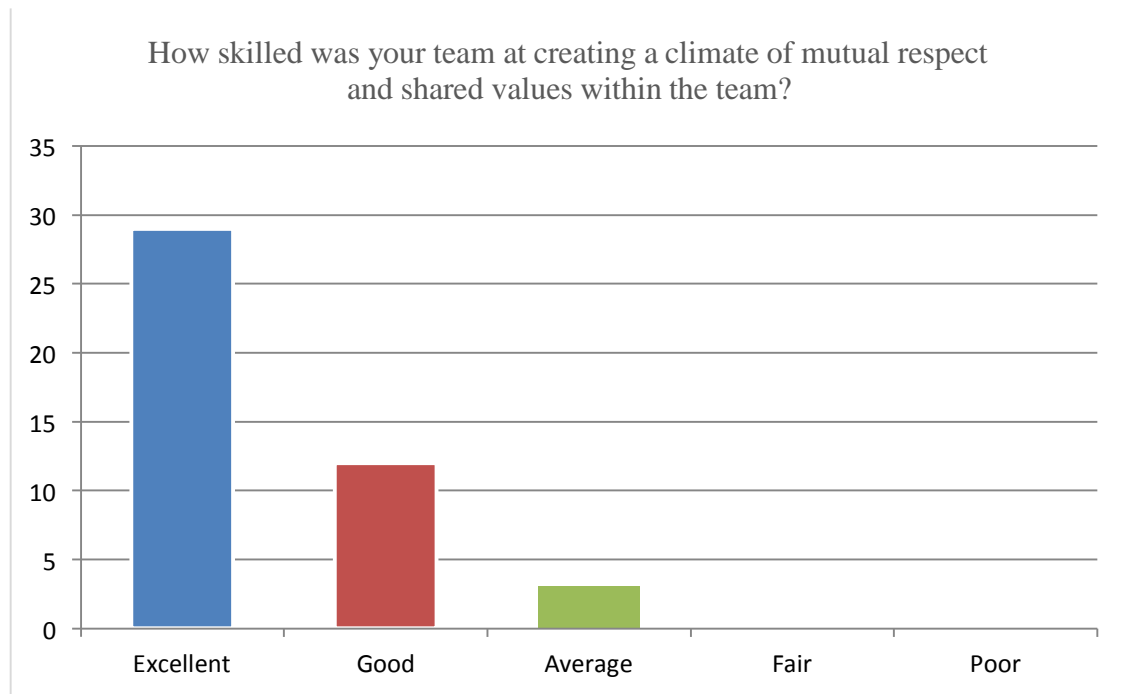


Figure 16. Question 1 Post-test Survey Item.

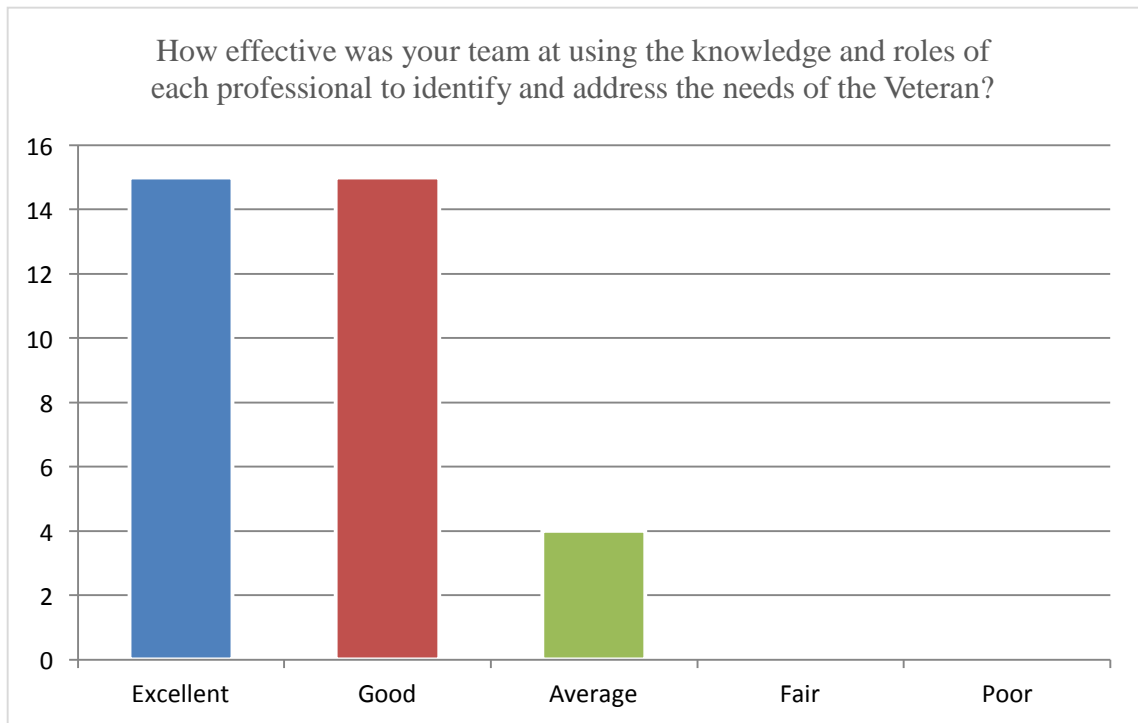


Figure 17. Question 2 Post-test Survey Item.



Figure 18. Question 3 Post-test Survey Item.

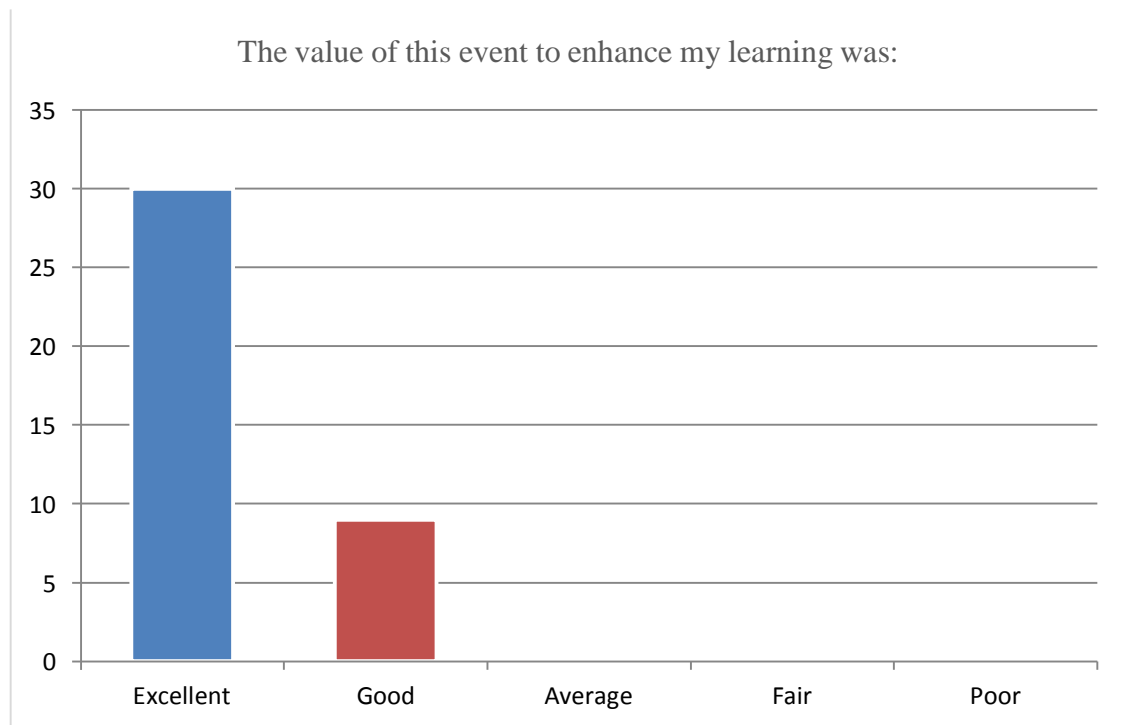


Figure 19. Question 4 Post-test Survey Item.

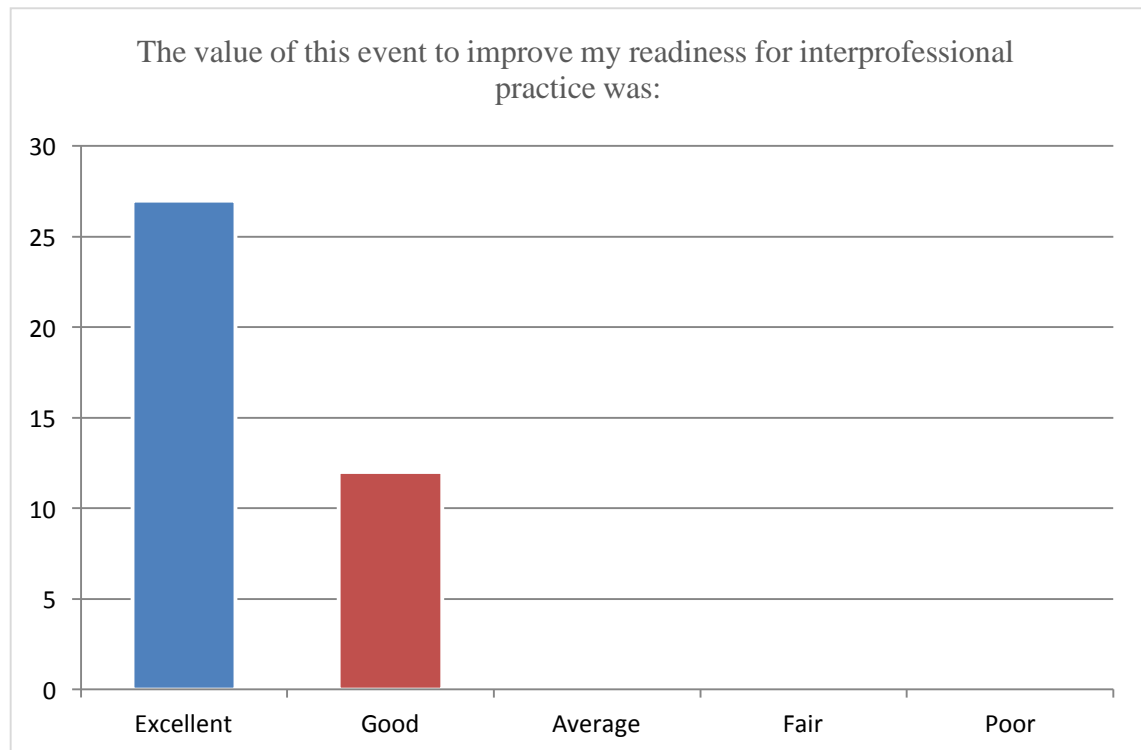


Figure 20. Question 5 Post-test Survey Item.

The final question to this post-test survey asked for participants' comments and any recommendation they have for the future IPE workshop. A variety of responses included the following:

- “Wish we had an IPE class”
- “Please keep doing this. The Vets and students all seemed to benefit from this experience”
- “Have other professions watch the dental hygiene students in their clinic”
- “Longer time devoted to interprofessional discussion”
- It went pretty smoothly. The other professions do a lot and it was awesome to interact with them”
- “Would have love to have more time to check in with dental hygiene about their screening”
- “More clarification of the day would be nice”

Comments were not thematically organized due to a limited number of responses to the open-ended question. Many participants chose not to answer the question. Due to data received from the 5-point Likert-scale, it can be concluded that the majority of students enjoyed the IPE workshop, felt their team was effective in providing care, and felt it was valuable to their learning and readiness for interprofessional practice.

## **Discussion**

### **Summary of Major Findings**

Comparison of the pre- and post-test RIPLS survey using quantitative analysis demonstrated an improvement in participants' attitudes and perceptions toward IPE with implementation of the student-led Vets Day IPE Workshop. Statistical significance was found with pre- and post-test scores analysis and, more specifically, in all four RIPLS subscales: teamwork and collaboration, negative professional identity, positive professional identity, and roles and responsibility. Demographic factors made no statistically significant impact on participants' experiences, attitudes, or perceptions toward IPE. Qualitative analysis revealed major themes in the participants' appreciation of observation of screenings, importance of teamwork in healthcare settings, importance of preparation including the orientation, and their interest in learning more about other professions. Participants had a positive response to the student-led aspect of the Vets Day IPE Workshop and overall experience, which supports previous studies implementing student-led IPE (Cooper et al., 2009; George et al., 2017; and Grant et al., 2011).

### **Discussion**

Results of this study show a significance increase in positive attitudes and perceptions toward IPE implementing a student-led approach to a community service project. The modified RIPLS pre- and post-test survey results indicate overall students' readiness for interprofessional learning and the Vets Day IPE Workshop was successful in improving attitudes and perceptions of IPE.

**Demographics.** The study included four of the health science programs out of the eight invited, so participation was not as representative of the various programs. However, it was recognized through discussion at the orientation and debrief session students were more engaged due to being in smaller groups and having less disciplines participate. During the orientation, student discussions at tables with more than four students appeared to be less engaged than those talking one-on-one or in smaller groups. Additionally, veteran patients may have benefited from a smaller number of students participating in the IPE workshop due to a history of post-traumatic stress disorder (PTSD) or feeling overwhelmed by the number of people surrounding the patient. Smaller IPE teams and incorporating four or less disciplines in IPE experiences provide students with better learning experiences and teamwork.

Demographics revealed all but one participant was female, which may be related to a lack of participation from programs in Dental (RIDE), Pharmacy, Physical Therapy, and Public Health programs as many of these programs a higher number of males enrolled. A sample representative of more assorted team members including programs, gender and age would be beneficial in future research regarding IPE and the student-led approach. Results of this study indicate IPE is appropriate to be introduced at any time during the students' education, and their year of study had no impact on their pre- and post-test results.

**RIPLS survey.** The modified RIPLS survey was beneficial in determining variance in pre- and post-test results of participants and analyzing data for IP learning, which supports data collected from previous studies utilizing the RIPLS survey (Sullivan et al., 2015 and Gunaldo et al., 2015). Participants' pre-test results showed an average



high baseline for data, but statistical significance was found when comparing this to the post-test results. Scores indicated participants show a readiness for interprofessional learning, and the Vets Day IPE Workshop was successful in improving attitudes and perceptions toward IPE.

Based on the results of the RIPLS pre- and post-test survey and qualitative data student-led IPE experience impacted students' attitudes and perceptions towards the roles of other health professions, the perceptions of interprofessional collaboration, and the appreciation of teamwork in an academic setting. The Vets Day IPE Workshop was effective in creating a positive atmosphere for student-led IPE learning and improving students' experiences with IPE based on statistical analysis. Furthermore, incorporation of IPE into academic settings, thus encouraging use of IP collaboration in all healthcare settings, has the potential to reach the *Triple Aim* goals of improving population health, reducing cost per capita, and improving care and patient experiences (Institute for Healthcare Improvement, 2017). The student-led approach to IPE is a beneficial option for pedagogy in healthcare education.

**IPEC.** The IPEC core competencies interprofessional communication and teamwork were explored by organization of RIPLS items within each competency (see Figures 11 and 12). Due to data revealing statistical significance of improvement in scores for each RIPLS subscale and the overall mean improvement in the total change of RIPLS score, it can be inferred that both IPEC competencies were met through the Vets Day IPE Workshop. This can be concluded due to the fact that attitudes and perceptions toward each subscale improved on average. Meeting IPEC core competencies through an IPE experience is important as many health science programs have accreditation

standards requiring IPE experiences. As healthcare changes and further recognizes the importance of IPE in reaching the goals of the *Triple Aim*, these competencies may be used to enforce accreditation standards and help programs construct specific IPE experiences to meet these guidelines.

**IPE delivery modes.** A variety of delivery modes of IPE can be used to enhance the experience and reach different learning styles. The Vets Day IPE Workshop showed improvement in attitudes, perceptions, and readiness for interprofessional (IP) learning by incorporating practice-based learning, action-based learning, and observation-based learning all within a service-learning opportunity. Results support previous studies implementing a variety of IPE delivery modes and yielding positive responses from students regarding their learning experience (Allen & Smego, 2010; Barr, 2011; Buff et al., 2015; Cooper et al., 2009; Freeth et al., 2005; George et al., 2017; Grant et al., 2011; Sullivan et al., 2015). Additionally, qualitative data enriched this study by providing thoughtful responses from participants regarding being appreciative of these IPE delivery modes. Students were especially vocal about observation-based learning and service-learning in that they felt these differed from previous IPE experiences they have participated in. Future IPE workshops can benefit students by incorporating a variety of delivery modes to encourage participation, thus encouraging IP collaboration in their future careers. This research study took the positive aspects of the studies discussed in the literature review implementing various IPE delivery modes, the RIPLS instrument, and student-led approach and put them into one study. This study showed that incorporation of these elements changes students' attitudes and perceptions toward IPE.

The results of this study show educators IPE should be delivered in a variety of adult learning strategies. Incorporation of multiple IPE delivery modes should be used to reach the different learning styles of students. Results also show the student-led approach to be an effective way to improve students' attitudes and perceptions of IPE. Students enjoy learning from each other and through discussions from the qualitative data collected, students get more out of their IPE experiences when they are the leaders. Future implementers of IPE should consider using the student-led approach to allow students to explore their professions more in-depth and use their independence to their benefit and a growing experience. Instructor facilitation can be used to enrich student experiences by providing guidance if needed. A shift toward positive attitudes and perceptions toward IPE has the potential to change healthcare by moving toward reaching the goals of the *Triple Aim*. A smoother transition from academia to practice settings will facilitate in better delivery of care to patients. Better interprofessional collaboration will change the delivery of healthcare by providing more patient-centered care, thus moving toward a healthier population.

When comparing prior research to this study, it was found that community service events and clinical settings are effective in providing successful IPE experiences. Sullivan et al., (2015) utilized a fall prevention clinic and George et al., (2017) a student-led outreach clinic, both yielding statistically significant results in the attitudes and perceptions toward IPE and student learning. This aligns with the results of this study as it was a community service event providing care to veterans. Community service and clinical settings can be used to facilitate IPE events utilizing a variety of IPE delivery modes.

Gunaldo et al., (2015) used the RIPLS instrument to assess students before and after taking an IPE elective course and results showed a significance difference in RIPLS scores in only the Roles and Responsibility RIPLS subscale. Due to the Vets Day IPE workshop yielding statistically significant results in all four RIPLS subscales, this study suggests a major impact of effective IPE comes from the service-learning and the student-led approach to IPE.

**Future implementation of IPE.** For educators, this study shows effective ways to implement IPE to better reach students and encourage participation of programs to better support and develop interprofessional collaboration. Student benefits from IPE experiences include, but are not limited to the readiness and openness to interprofessional collaboration as a practicing healthcare professional, networking experiences and lifelong learning, and the understanding of the importance of the collaborative approach to healthcare. Results of this research study indicate the student-led approach as an effective way to provide beneficial IPE experiences for students. A guide to the best practices of delivering IPE is shown in *Figure 21*.

<b>Future Framework: Best Practices to Delivering Effective IPE</b>
<b>Identify an IPE leader for the college</b> <ul style="list-style-type: none"> <li>- Advocate for students</li> <li>- Encourage and support IPE to move forward in better interprofessional collaboration</li> <li>- Identifying an IPE leader for each program within the college may be necessary</li> <li>- Offer a variety of events that interest students throughout the school year</li> </ul>
<b>Develop IPE page/website for the college</b> <ul style="list-style-type: none"> <li>- Easier sign-up for IPE</li> <li>- Access to a variety of IPE opportunities available to accommodate student schedules</li> <li>- Market the different types of IPE to interest students and aid in more participation</li> <li>- Provide online orientations to IPE events if necessary</li> <li>- Display IPEC competencies met from IPE experience</li> </ul>

<b>Use more than one IPE Delivery Mode</b> <ul style="list-style-type: none"> <li>- Practice-based learning</li> <li>- Action-based learning</li> <li>- Observation-based learning</li> <li>- Service-learning</li> <li>- Simulation-based learning</li> <li>- Standardized patient learning</li> </ul>
<b>Use the student-led IPE approach</b> <ul style="list-style-type: none"> <li>- Instructors provide guidance and facilitate only if necessary</li> <li>- Students teach each other through conversing, observation, etc.</li> <li>- Students love having the independence</li> </ul>
<b>Limit the number of disciplines and size of groups if possible</b> <ul style="list-style-type: none"> <li>- Try to limit groups to four students for better engagement</li> <li>- A wide range of disciplines involved may limit learning about the roles and responsibilities of each profession. Limiting this may be beneficial.</li> </ul>

*Figure 21.* Future Framework. Best Practices to Delivering Effective IPE.

### **Limitations**

Although this study offers more insight and data to literature, the study is not exclusive of limitations. Data was collected from a small sample size and was limited with the number of programs involved and a set number of veteran patients (12) was used in this study. This limited the number of participant spots available, however unfilled spots were present. The unequal distribution of representative disciplines is considered a limitation, as a much higher number of dental hygiene students participated in comparison to other programs. Many students received IPE credit for their specific program for attending the Vets Day IPE Workshop. Dental hygiene students were affiliated with the PI through their program, which may have impacted the sample size and overall experience. With that said, all students were informed that responses were confidential, meaning the PI did not know who answered each pre- and post-test, and dental hygiene students were not shown to have statistically significant variance in their

RIPLS scores. Participants were encouraged to answer honestly. All limitations could be considered and improved in future research.

### **Recommendations/Suggestions for Future Research**

The debrief session revealed the desire of participants for observation of hands-on activities for each profession, specifically for the dental hygiene profession and occupational therapy profession. Creating a workshop that highlights the roles and responsibilities of each profession through show-and-tell and hand-on learning is encouraged to impact the experiences, thus changing the attitudes and perceptions of IP collaboration. Hands-on learning may provide students with more experience rather than only observing. An example of this type of this student-led learning would be dental hygiene students teaching other student professions how to do oral cancer screenings with each profession providing a screening after being instructed. Inclusion of a variety of IPE delivery modes for workshops may enrich student experiences.

Although the orientation in this study did not show a change in results based on attendance, qualitative results revealed students felt the orientation attendance affected their team performance. Exploring orientation options may be beneficial for future IPE. Online orientation is an option rather than a face-to-face orientation and may alleviate barriers to IPE such as scheduling. Randomly assigning participants to one of the following, for better analysis of the orientation impact: face-to-face orientation, online orientation module, and no orientation to act as a control may garner valuable data. This may further determine if an orientation is necessary in workshops for community service projects like the Vets Day IPE Workshop.

### Conclusion

The results of this study show a student-led approach to IPE through a community service project is beneficial in improving student attitudes and perceptions of IPE. The Vets Day IPE Workshop was effective in significantly improving post-test RIPLS scores indicating a positive shift in perceptions of IP collaboration and readiness for IP learning. Data reveals the benefits of utilizing the student-led approach in reaching the IPEC competencies interprofessional communication and teamwork, which in turn increases the likelihood of the healthcare goal of the *Triple Aim*. Study findings support the effectiveness of a variety of IPE delivery modes, the student-led method, and the use of the RIPLS survey in determining readiness for IP learning. The study also indicates the demographics of students has no direct correlation. Regardless of the program of study, age, gender, year of study, prior IPE experience, prior degree, and orientation attendance, results of the RIPLS survey show no variance. All professions had a significant improvement after implementation of the IPE workshop. IPE may be introduced at any time during education to be effective in preparing students for IP collaboration beyond academia.

The future of interprofessional collaboration and improved healthcare starts with a better delivery of IPE. This research study has explored the opportunities and successful techniques to improve students' IPE experiences through the student-led approach, use of several IPE delivery modes, and a framework for future delivery of successful IPE. An increase in interprofessional collaboration leads to patient-centered care, which will aid in moving toward reaching the *Triple Aim* goals. This study enriches the future of IPE and

healthcare by identifying effective IPE methods and features that may interfere with the success these experiences.



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**Appendices****Appendix A**

<b>Identification # _____</b> <b>Pre-Test Questionnaire</b> <b>Demographic Items</b>					
Program of Study: <input type="checkbox"/> Dental <input type="checkbox"/> Dental Hygiene <input type="checkbox"/> Communication Sciences and Disorders/Speech and Hearing Sciences <input type="checkbox"/> Health Services Administration <input type="checkbox"/> Occupational Therapy <input type="checkbox"/> Pharmacy <input type="checkbox"/> Public Health	Year of Study (in your program): <input type="checkbox"/> 1 <sup>st</sup> <input type="checkbox"/> 2 <sup>nd</sup> <input type="checkbox"/> 3 <sup>rd</sup> <input type="checkbox"/> 4 <sup>th</sup>  Do you have any prior IPE experience? <input type="checkbox"/> No <input type="checkbox"/> Yes, explain: _____ _____ _____  Do you have any other health professions degree or experience? <input type="checkbox"/> No <input type="checkbox"/> Yes, explain: _____ _____ _____			Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female  Age: <input type="checkbox"/> 18-24 <input type="checkbox"/> 25-34 <input type="checkbox"/> 35-44 <input type="checkbox"/> 45-54 <input type="checkbox"/> 55+	
<p align="center"><b>Readiness for Interprofessional Learning Scale (RIPLS)</b>            Adapted from A.K McFadyen et al. (2005)</p> <p align="center">Please circle the response that best fits how you feel about the following statements below.</p> <p align="center">1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree or Disagree, 4 = Agree, 5 = Strongly Agree</p>					
	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
1. Learning with other students will help me become a more effective member of a health care team	1	2	3	4	5



2. Patients would ultimately benefit if health care students worked together to understand clinical problems	1	2	3	4	5
3. Shared learning with other health care students will increase my ability to understand clinical problems	1	2	3	4	5
4. Learning with health care students before qualification would improve relationships after qualification	1	2	3	4	5
5. Communication skills should be learned with other health care students	1	2	3	4	5
6. Shared learning will help me to think positively about other professionals	1	2	3	4	5
7. For small group learning to work, students need to trust and respect each other	1	2	3	4	5
8. Team-working skills are essential for all health care students to learn	1	2	3	4	5
9. Shared learning will help me to understand my own limitations	1	2	3	4	5
10. I don't want to waste my time learning with other health care students	1	2	3	4	5
11. It is not necessary for undergraduate health care students to learn together	1	2	3	4	5
12. Clinical problem-solving skills can only be learned with students from my own department	1	2	3	4	5
13. Shared learning with other health care students will help me to	1	2	3	4	5

communicate better with patients and other professionals					
14. I would welcome the opportunity to work on small-group projects with other health care students	1	2	3	4	5
15. Shared learning will help me to clarify the nature of patient problems	1	2	3	4	5
16. Shared learning before qualifications will help me become a better team worker	1	2	3	4	5
17. The function of nurses and therapists is mainly to provide support for doctors	1	2	3	4	5
18. I'm not sure what my professional role will be	1	2	3	4	5
19. I have to acquire much more knowledge and skills than other health care students	1	2	3	4	5

## Appendix B

### Post-Test Questionnaire

<b>Identification # _____</b>					
<b>Readiness for Interprofessional Learning Scale (RIPLS)</b> Adapted from A.K McFadyen et al. (2005)					
Please circle the response that best fits how you feel about the following statements below. 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree or Disagree, 4 = Agree, 5 = Strongly Agree					
	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
1. Learning with other students will help me become a more effective member of a health care team	1	2	3	4	5
2. Patients would ultimately benefit if health care students worked together to understand clinical problems	1	2	3	4	5
3. Shared learning with other health care students will increase my ability to understand clinical problems	1	2	3	4	5
4. Learning with health care students before qualification would improve relationships after qualification	1	2	3	4	5
5. Communication skills should be learned with other health care students	1	2	3	4	5
6. Shared learning will help me to think positively about other professionals	1	2	3	4	5

7. For small group learning to work, students need to trust and respect each other	1	2	3	4	5
8. Team-working skills are essential for all health care students to learn	1	2	3	4	5
9. Shared learning will help me to understand my own limitations	1	2	3	4	5
10. I don't want to waste my time learning with other health care students	1	2	3	4	5
11. It is not necessary for undergraduate health care students to learn together	1	2	3	4	5
12. Clinical problem-solving skills can only be learned with students from my own department	1	2	3	4	5
13. Shared learning with other health care students will help me to communicate better with patients and other professionals	1	2	3	4	5
14. I would welcome the opportunity to work on small-group projects with other health care students	1	2	3	4	5
15. Shared learning will help me to clarify the nature of patient problems	1	2	3	4	5
16. Shared learning before qualifications will help me become a better team worker	1	2	3	4	5
17. The function of nurses and therapists is mainly to provide support for doctors	1	2	3	4	5

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 18. I'm not sure what my professional role will be                                   | 1 | 2 | 3 | 4 | 5 |
| 19. I have to acquire much more knowledge and skills than other health care students | 1 | 2 | 3 | 4 | 5 |

### Qualitative Post-IPE Survey Items

Answer each of the following items by circling the level of agreement to each statement. Follow this with a written example to support your response.

- How skilled was your team at creating a climate of mutual respect and shared values within the team?

Excellent      Good      Average      Fair      Poor

Example:

- How effective was your team at using the knowledge and roles of each professional to identify and address the needs of the Veteran?

Excellent      Good      Average      Fair      Poor

Example:

- The communication strategies used by my team to improve team function were:

Excellent      Good      Average      Fair      Poor

Example:

- The value of this event to enhance my learning was:

Excellent      Good      Average      Fair      Poor

- The value of this event to improve my readiness for interprofessional practice was:

Excellent      Good      Average      Fair      Poor

- Comments: (Is there anything you would change about the experience?)

## **Appendix C**

### **Recruitment Letter**

Dear Vets Day IPE 2018 Workshop Student Members,

My name is Lindsay Doerschuk, and I am currently enrolled as a Master of Science in Dental Hygiene student at Eastern Washington University (EWU). I am working with my thesis chair, Professor Merri Jones, on my thesis study. My thesis topic is interprofessional education, and the title of my study is “Exploring Student-Led Interprofessional Education through a Community Service Project.”

I would like to invite you to participate in this study. You are being asked to participate in this study because you are a member of the Vets Day 2018 IPE Workshop. The results of this study may provide an understanding of student-led interprofessional experiences, and aid in future development of IPE curriculum within health sciences disciplines.

Participating in my study includes completing a brief pre-test at the beginning of orientation to the Vets Day IPE 2018 Workshop and a post-test immediately following the workshop. The workshop also addresses practical for students in health professions programs to collaborate in student-led IPE teams. Participants will gain an understanding of interprofessional education, interprofessional communication, and roles and responsibilities in assessing and screening of veteran patients.

Participation is voluntary and the decision to not participate will in no way affect student's grades or academic status nor the opportunity to participate as a member of the Vets Day 2018 IPE teams. The data collected from this study will be kept confidential and only the research student and thesis chair will have access to the information. The identity of all participants will remain anonymous. All participants will be informed of study results. If you have any questions regarding this research study, please contact me at [lindsay.doerschuk@eagles.ewu.edu](mailto:lindsay.doerschuk@eagles.ewu.edu) or Professor Merri Jones at [merri.jones@ewu.edu](mailto:merri.jones@ewu.edu).

Sincerely,

Lindsay Doerschuk, RDH, BSDH, MSDH Candidate

## **Appendix D**

### **IP Team Verbal History**

#### **General**

1. What is your current living situation (e.g. house, apartment, assisted living, etc.)? Who do you live with (e.g. spouse/significant other, friend, family members, etc.)?
2. Would you say you have enough energy to do the activities that you want and/or need to do? YES / NO If not, what do you feel is the cause of your low energy?
3. Do you feel like you have a good balance between the work you have to do and the things you like to do during the day?

#### **Mobility**

4. Tell us about a typical day? (What types of activities do you typically do; household, yard, work outside home, exercise etc.)
5. Is there anything you unable to do now because of symptoms that you are having that you were previously where able to do? NO / YES
  - a. IF YES- please describe why or what is limiting you:

#### **Sleep Quality questions**

6. On a scale of 1-10 with 1 being “not important at all” and 10 being “extremely important”, how important is sleep to you? \_\_\_\_\_ How does your sleep quality affect your day?
7. During the past month, how many hours of actual sleep, on average, did you get each night? (This may be different than the number of hours you spend in bed)

8. Do you have any usual routines to help you get to sleep? YES / NO Do you feel like these routines are effective? YES/ NO

#### Hearing questions

9. Are you concerned about hearing loss in one or both ears?
10. Were you exposed to excessive noise while serving in the military?  
If YES, please describe:
- a. Are you currently exposed (work or recreation) to excessive noise?
- b. Do you listen to moderately loud sounds for extended periods of time?
11. Do you have any ringing, buzzing, humming sounds in your ears?  
If YES, please describe:

#### Spine Pain or Balance/ Fall questions

12. Do you have any aches or pains that are bothering you? YES / NO If YES, please describe the symptoms you are having?
- a. When did these symptoms begin (Date of Onset): \_\_\_\_\_
- b. Did anything specifically cause the symptoms you have been telling me about (MOI)? \_\_\_\_\_
13. Have your symptoms gotten worse, better, or remain unchanged since you first started noticing them? W / B/ NC If worse, why?
14. (IF Pain is an issue) makes the pain worse? What makes it better?
15. (IF balance) I understand you have had some problems with balance, can you tell me about these?
16. Have you fallen in the past year? YES/ NO
- a. If yes, how many times? \_\_\_\_\_
- b. Have you had treatment for this?



### Appendix E

#### IPE Team Sequence of Events 2018

1. IPE Check in at HSB Quad 110A **15 minutes prior** to scheduled IPE team time and HH intake.
  - a. Pick up clipboard with schedule
  - b. Determine which two students will be completing the health history (One DH student and one student from another discipline).
2. At the screening time, the senior dental hygiene student clinician will deliver the patient, HH, and med list to the IPE team. Informs IPE team to proceed to HH intake room.
  - a. At this time, the two team members taking the HH will proceed to the HH intake room and other members will go to the mirrored room to observe.
3. Two team members meet the patient in the history taking room.
  - a. The dental hygiene student and the student from one other discipline will stay in the treatment room to take the HH and IP history. All other students will leave to watch in the observation room.
4. After the HH is complete, the full IPE team will meet in the assigned collaboration room for 5-10 minutes to discuss the case
  - a. One assigned student will stay with the patient while the rest of the IPE team is discussing the case. The patient will be provided water and a magazine.
5. The screenings will be provided to the patient by the students within the discipline (Dental Hygiene, Speech/Hearing will provide the hearing screening) and answer any patient questions.
  - a. The rest of the IPE team will watch the screening in the observation room.
6. Once the screenings have been completed, one DH student will escort/dismiss the patient and thank them for their participation.
  - a. The IPE team screening is now complete.
  - b. Turn in clipboards and all documents to screening faculty. For privacy, do not keep ANY patient information.

**Curriculum Vita**  
**Lindsay Doerschuk, RDH, BSDH**

Simonds Dental Group  
22106 E Country Vista Dr.  
Liberty Lake, WA 99019  
509-294-7491  
[lindsayrdh@hotmail.com](mailto:lindsayrdh@hotmail.com)

**Graduate Education**

Master of Science in Dental Hygiene	May 2018
Eastern Washington University	
Cheney, Washington	

**Undergraduate Education**

Bachelor of Science in Dental Hygiene	June 2015
Eastern Washington University	
Cheney, Washington	

**Professional Clinical and Teaching Experience**

Clinical & Restorative Lab Instructor (part-time)	September 2015-Present
Department of Dental Hygiene	
Eastern Washington University	
Spokane, Washington	

Dental Hygienist (full-time)	January 2017-Present
Simonds Dental Group	
Dr. Ross Simonds & Dr. Cliff Cullings	
Liberty Lake, Washington	

Dental Hygienist (full-time)	July 2015-January 2017
Smile Source	

Dr. Eric Ellingsen & Dr. Jeff Henneberg  
Spokane, Washington

Temporary Dental Hygienist - Various Offices July 2015-Present

### **Professional Licensure and Certifications**

Washington State Registered Dental Hygienist	July 2015-Present
Washington State School Sealant and Varnish Endorsement	July 2015-Present
Healthcare Provider Certification in Basic Life Support/CPR/First Aid	July 2012-Present

### **Professional Affiliations/Memberships**

American Dental Education Association (ADEA)	August 2016-Present
American Dental Hygienists' Association (ADHA)	September 2012-Present
Washington State Dental Hygienists' Association (WSDHA)	September 2012-Present
Eastern Washington Dental Hygienists' Society (EWDHS)	September 2012-Present
-Delegate at WSDHA House of Delegates	October 2015

### **Scholarly Activities, Awards and Achievements**

International Federation of Dental Hygienists' Research Grant	January 2018
- Awarded \$1,200 grant for thesis research study	
Clarion National Case Competition at University of Minnesota	April 2015
-EWU Student Representative in interprofessional experience	
WSU/EWU Symposium	March 2014
-EWU student presentation " <i>Oral Health: A Correlation Between Periodontal Disease and Atherosclerotic Vascular Disease</i> "	
ADHA Annual Session Student Presentation	June 2013
-EWU representative presented " <i>Oral Health: A</i>	

*Correlation Between Periodontal Disease and  
Atherosclerotic Vascular Disease”*

**Community Service**

Smiles for Veteran’s Day at EWU -Volunteer Student Clinician	February 2018
Blessings Under the Bridge -Volunteered to prepare and serve food to the homeless in Spokane, WA	May 2016
Smiles for Veteran’s Day at EWU -Volunteer Clinical Instructor	February 2016
Smiles for Veteran’s Day at EWU -Volunteer Student Clinician	February 2015
Spokane Health District “Teeth Week” -Volunteer community oral health education	October 2014
Senior Smile Day -Volunteer community senior health care screenings	October 2014
Union Gospel Mission -Volunteer yard work and building clean up in Coeur d’Alene, ID	July 2014
World Relief Spokane -Presentation and demonstration of oral hygiene instruction	February 2014

**Professional References**

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Smile Source Spokane  
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Lead Clinical Dentist  
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