Spring 2018

The lasting impact of Intraprofessional Education between dentists and dental hygienists

Kimber Satter
Eastern Washington University

The Lasting Impact of Intraprofessional Education Between Dentists and Dental Hygienists

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

Kimber Satter, RDH, BSDH, MSDH

Spring 2018

Major Professor:

Sarah Jackson, RDH, MSDH

ii

THESIS OF KIMBER SATTER APPROVED BY

DATE 4/26/18
SARAH JACKSON, RDH, MSDH, GRADUATE STUDY COMMITTEE

DATE 4/26/18
ARTHUR C. DIMARCO, DMD, EWU RIDE DIRECTOR, GRADUATE STUDY COMMITTEE

DATE 4/26/18
PAMELA R. NAGASAWA, PHD, GRADUATE STUDY COMMITTEE

MASTER'S THESIS

In presenting this thesis in partial fulfillment of the requirements for a master's degree at Eastern Washington University, I agree that the JFK Library shall make copies freely available for inspection. I further agree that copying of this project in whole or in part is allowable only for scholarly purposes. It is understood, however, that any copying or publication of this thesis for commercial purposes, or for financial gain, shall not be allowed without my written permission.

Signature Kimber E H Sattler

Date 4-27-2018

Human Subjects Approvals

HS-5437

OGRD - SHW 210

Application for Exempt Research
EWU Institutional Review Board for Human Subjects Research

DEC 15 2017

Return this form, signed + 2 copies (3 total) to the Office of Grant and Research Development, 210 Showalter (SHW)

Rec'd - Grants Office

Principal Investigator (PI): Kimber Satter Title: Graduate Student Department: Dental Hygiene Address: 502 E Boone MSC 1124 Spokane, WA 99258 Phone number: (360) 903-5745 E-mail: kgraef22@ewu.edu	*If PI is a student, complete this section:* Responsible Project Investigator (RPI) *(faculty/staff sponsor)*: Sarah Jackson Department: Dental Hygiene Campus address/Mail stop: 310 N Riverpoint Blvd., Suite 160 Spokane, WA 99202 Phone number: (509) 828-1299 E-mail: sarah.jackson@ewu.edu

Project Title: **The Impact of Intraprofessional Education Between Dentists and Dental Hygienists**

For students only: Is this research being done to meet a course, thesis or other academic requirement? ☒ Yes ☐ No
If yes, please specify: Master's thesis
If not, why is it being done?

Project anticipated starting date: January 15, 2018 Anticipated termination date: February 15, 2018

Funding: ☒ Non-funded ☐ Internal funding ☐ External funding
Funding agency (if applicable):
Grant or Contract Number:

Check the type of exemption applicable to the project using the "Exemption Decision Aid" on the next page:
☒ 1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ None

Rationale for exemption. Why should this project be exempt? This project should be exempt as it examines alumni attitudes towards intraprofessional education in a survey form and does not include any of 12 twelve conditions that exclude an exemption.

Please state the purpose and methodology of the research:

Purpose

The goal of this study is to explore dentist's perceptions of the importance of Intraprofessional education (IntraPE) with dental hygiene (DH) students, and their attitudes towards teamwork and understanding the roles and responsibilities of the DH. This study focuses on the IntraPE between University of Washington (UW) dental students and EWU DH students. Since IntraPE is a form of shared learning, use of the Interprofessional Education Collaborative (IPEC) Core Competencies for Collaborative Practice will provide the framework for the research questions of this exploratory study (IPEC, 2016b). This research seeks to evaluate how well the Regional Initiative in Dental Education (RIDE) program meets these core competencies in practice.

Research Questions

- Do dentists who participated in the RIDE program understand their role and responsibilities related to the DH better than dentists who had no formal IntraPE with DH students?
- Do RIDE dentists perceive there are better teamwork dynamics with their dental hygienists compared to non-RIDE dentists, due to their IntraPE experience with DH students?

Methodology

Upon consent, participants will individually complete an online demographic questionnaire including open-ended qualitative questions, and a questionnaire adapted from the Modified Readiness for Interprofessional Learning Scale (RIPLS), here called the IntraPE attitudes questionnaire, administered through SurveyMonkey®. Participants will be asked about professional respect, understanding others' roles, collaboration, and teamwork.

Variables.

The independent variables are: participation in the UW RIDE program, the year of graduating from the UWSOD, participation in additional SL activities, and previous career as a DH. The PI seeks to measure if there is a specific impact the RIDE program has that differs from the traditional UWSOD curriculum and if there is a long-term impact of dentists having IntraPE with DH. The dependent variables are the scores from the IntraPE attitudes questionnaire. This will measure attitudes towards roles and responsibilities and teamwork based on the two IPEC Competencies of Roles and Responsibilities and Teams and Teamwork (IPEC, 2016b).

Application for Exempt Research
EWU Institutional Review Board for Human Subjects Research

Instruments. The PI will use questionnaires to gather quantitative and demographic information. The PI used existing research as described in the literature review to choose a reliable and valid instrument.

Demographic questionnaire. A demographic questionnaire will provide descriptive statistics for the target population. This includes gender, year of graduation from the UWSOD, RIDE participation, years of clinical experience, previous career as a DH, and other IntraPE or IPE experiences. See Appendix B.

The IntraPE attitudes questionnaire. This is based on the subscales in the Modified RIPLS, a 19 item survey with four subscales using a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5) (McFadyen et al., 2005). The Modified RIPLS is an instrument proven to be reliable and valid for evaluating IPE (McFadyen, Webster, Maclaren, 2006) and has been used to evaluate IntraPE in multiple studies (Brame, Mitchell, Wilder, & Sams, 2015; Brooks & Gorman, 2017; Reeson, Walker-Gleaves, & Ellis, 2015). The Modified RIPLS was adapted for this study with language changed to be specific to dental education and the number of questions reduced to 12 at the request of the UWSOD. See Appendix C. An expert panel evaluated the adapted modified RIPLS to ensure validity. The panel included six professors and dentists at the University of Washington School of Dentistry (UWSOD), the Associate Dean for Academic Affairs at the UWSOD, the EWU dental hygiene graduate faculty, and one EWU dentist.

Describe the procedures: what specifically will subjects do? If data are anonymous, describe the data gathering procedure for insuring anonymity.

Participants will be e-mailed to request their participation in this online survey. The questionnaires were created on the PI's personal laptop using Microsoft Word©. Per the request of the Associate Dean for Academic Affairs at the UWSOD, two URLs of the same survey will be created on SurveyMonkey®, one will be sent to RIDE alumni and one will be sent to non-RIDE alumni. The survey will be disseminated with permission of the UWSOD, and e-mailed to participants through Dr. Pamela Nagasawa. Dr. Nagasawa is the RIDE Director of Education and Evaluation and an assistant professor in the School of Medicine at University of Washington. Participants will be provided an informed consent document (Appendix A) via email along with the survey link (Non-RIDE link: https://www.surveymonkey.com/r/WYQQ53F; RIDE link: https://www.surveymonkey.com/r/W22K369

All information regarding this study will be kept on the PI's personal password-protected computer. Anonymity will be ensured to all participants by the PI utilizing anonymous response settings on SurveyMonkey®. All participants have the freedom to withdraw from the study at any point of their own desire without notice or consequence. To incentivize participation in this study, the PI will offer a $100 Amazon gift card to be given to one participant randomly selected upon completion of the questionnaire implementation using numbergenerator.org. If participants would like to be included in the gift card selection, they will be asked to provide their e-mail address. This will be a question that is separate from the questionnaire. There will be two reminder e-mails to encourage participation, one week and two weeks following the initial e-mail. The survey will be open for three weeks.

The PI will utilize an encrypted thumb drive exclusively used for study content and data. The PI will share secure documents with a statistician for statistical analysis. Direct access to survey questionnaire results will be available to Nathan Skuza, statistician and assistant professor at EWU, and Dr. Pamela Nagasawa, thesis committee member and faculty in the UWSOD.

Attach all surveys, questionnaires, cover letters, information sheets, etc. (including required IRB contact information
Appendix A: Consent Letter
Appendix B: Demographic Questionnaire
Appendix C: IntraPE Attitudes Survey
None-RIDE link: https://www.surveymonkey.com/r/WYQQ53F
RIDE link: https://www.surveymonkey.com/r/W22K369

Application for Exempt Research

EWU Institutional Review Board for Human Subjects Research

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: Kimber Ed Satter Date: 12-11-17

Submit page 1 of this original, signed + 2 copies (3 total) to the Office of Grant and Research Development, 210 Showalter (510W)

Recommendations and Action:	Date	Approve/Disapprove
RPI Signature: *(Needed only if PI is a student)*	12-12-17	(A) D
IRB Rep. or Dept. Chair **Print & Sign**: *(Needed if PI is a student OR for faculty PI if required by department)*	12-12-17	(A) D
IRB Signature:	1/10/18	(A) D
☑ Subject to the following conditions: as amended on 1/10/18		
Approved from: 1/10/18 to 1/9/19		

Abstract

Purpose: The Regional Initiatives in Dental Education (RIDE) program at the University of Washington (UW) allows first year dental students to take courses with Eastern Washington University dental hygiene (DH) students. This study was conducted to see if the RIDE program is effective as an Intraprofessional Education (IntraPE) program in improving dentists' attitudes towards teamwork and understanding the roles and responsibilities of the DH.

Methods: UW School of Dentistry alumni from 2012-2017 were invited to participate in this study. Attitudes towards teamwork and roles and responsibilities were assessed using two online surveys: a demographic survey containing open-ended questions, and a quantitative survey containing 12 Likert scale questions. RIDE and non-RIDE participant responses were compared and tested for statistical significance.

Results: There were 26 (54.2%) RIDE alumni respondents and 51 (14.1%) non-RIDE alumni respondents for a total of 77 responses. RIDE alumni had IntraPE experiences whereas non-RIDE may or may not have had IntraPE as a formal part of their curriculum. While the majority of RIDE participants (61.5%) agreed or strongly agreed that IntraPE was useful overall and improved attitudes towards teamwork, there were no statistically significant differences between RIDE and non-RIDE. There was statistical significance (p = .014) in responses for understanding of roles and responsibilities between the RIDE (mean = 3.39) and non-RIDE (mean = 3.69). Responses to open-ended questions suggest

largely positive attitudes towards IntraPE for RIDE alumni, including teamwork and roles and responsibilities. The largest percentage of responses from non-RIDE participants (*n* = 20, 47%) shows they think formal IntraPE curriculum would have benefited their education while in dental school. Other studies show clinical IntraPE is the best way to improve understanding of roles and responsibilities between health professionals.

Conclusion: The quantitative data shows inconclusive evidence that the RIDE program is effective in improving attitudes towards teamwork and roles and responsibilities when compared to non-RIDE dentists. More research is needed to determine how to improve attitudes towards teamwork. This study supports the RIDE curriculum change in 2015 to primarily clinical IntraPE with DH students to help dentists understand roles and responsibilities of the DH.

Acknowledgements

First, I want to acknowledge my thesis committee. To my thesis chair, Sarah Jackson, for her feedback and encouragement throughout this process. Dr. DiMarco, your positivity and enthusiasm for this research was so heartening when I needed it. Pam Nagasawa, I could not have successfully implemented this research without your navigation and guidance. I am grateful to you all.

I am truly thankful to my husband and partner, Drew, who was an equal co-parent to our beautiful twin boys so I could get away and work to my heart's content. Bishop and Brady, I did this for you! A debt of gratitude to all the folks at Revel 77, where I spent countless hours sipping on Kaiti's exquisitely crafted lattes while researching, reading, and writing. Finally, I want to thank my mom, Missy Graef, who was the driving force behind my decision to pursue a Master's in the first place. Mom, thank you for your never-ending love, encouragement, cheer, and always having my best interests at heart.

Table of Contents

List of Figures

Figures

List of Tables

Tables

Introduction/Literature Review

Introduction to the Research Question

Healthcare systems around the world are under pressure to transition from an isolated provider delivery method to interprofessional delivery (Khalili, Hall, & DeLuca, 2014). Even though many health professions were conceived from within other health professions (i.e. dental hygiene from dentistry, or nursing from medicine) there has been a tendency to separate the education of professionals within these fields (Alfano, 2012). In response to the shifting demands of providing healthcare, there has been a re-envisioning of how healthcare providers should be educated. The World Health Organization (WHO) has called for healthcare providers to be prepared for a collaborative, practice-ready workforce. There is a need for further research in the field of intraprofessional education (IntraPE) in dentistry (Formicola et al., 2012).

The definition of IntraPE is learning between students belonging to different disciplines within the same profession (i.e. dentists and dental hygienists, or physical therapists and physical therapy assistants) (Bainbridge & Nasmith, 2011), and is the primary focus of this research. In the emerging field of interprofessional study, there is still much misalignment and interchangeable use of different terms to describe common concepts (Thistlethwaite & Moran, 2010), so for the sake of clarity in this document, the terms interprofessional (IPE) and shared learning also need to be defined. The term IPE means students from different disciplines being educated together (WHO, 2010) and in this document encompasses the terms interprofessional, multi-professional, and

interdisciplinary as it pertains to healthcare professional programs. Since some IPE and IntraPE studies come to the same conclusions, the term shared learning will cover both IPE and IntraPE when a generalization is appropriate.

In 2008, the American Dental Education Association (ADEA) House of Delegates outlined competencies necessary for the graduating general dentist, including the need for intraprofessional collaboration with members of the dental team. Competencies state: "2.2: Practice within one's scope of competence and consult with or refer to professional colleagues when indicated," and "4.2: Participate with dental team members and other health care professionals in the management and health promotion for all patients" (ADEA House of Delegates, 2008, p. 824). There was a call from ADEA (2008) to change dental education and innovate curricula to develop these competencies. One way to fulfill competencies 2.2 and 4.2 is to incorporate IntraPE between dental and dental hygienist (DH) students.

In multiple studies IntraPE has been shown to significantly improve the understanding of shared care between dental and DH students (Brame, Mitchell, Wilder, & Sams, 2015; Ritchie, Dann, & Ford, 2013; Stolberg, Bilich, & Heidel, 2012). Recent research proves that IntraPE creates a better understanding of roles and responsibilities between healthcare providers (Evans, Henderson, & Johnson, 2010; Jones, Karydis, & Hottel, 2017; Leisnert, Karlsson, Franklin, Lindh, & Wretlind, 2012; Reeson, Walker-Gleaves, & Ellis, 2015; Ritchie et al., 2013; Stolberg, et al. 2012), and improves teams and teamwork (Brame et al., 2015; Brooks & Gorman, 2017; Ross, Turner, & Ibbetson, 2009). To evaluate current dental school educational activities, a survey of 62 dental schools in the U.S. and Canada showed IntraPE between dental and DH programs was

available at only half of the responding dental schools. (Formicola et al., 2012). In a 2015 study done by Furgeson, Kinney, Gwozdek, Wilder and Inglehard, only 28% of DH programs reported collaboration with dental programs. As previously stated, there is a call for further research on IntraPE in dentistry, and the acknowledgement that IntraPE and IPE programs should have similar goals and program outcomes (Formicola et al., 2012).

An IntraPE program is currently taking place between the University of Washington (UW) School of Dentistry and Eastern Washington University (EWU) DH program. The program is called Regional Initiatives in Dental Education (RIDE) and is the focus of this research. Established in 2008, the RIDE program allows eight dental students to complete their first year of dental school at EWU in Spokane, Wash., engaging in a range of shared learning activities with the UW Medical School, and IntraPE with EWU DH students (University of Washington, 2018a). The RIDE program curriculum has evolved since its implementation, with varying degrees of IntraPE opportunities between the dental and DH students (A. DiMarco, personal communication, July 27, 2017). There is a need for research that examines the shared learning effects of the RIDE program (P. Nagasawa, personal communication, June 27, 2017). Students in the RIDE program have IPE experiences with UW medical students, and all UW School of Dentistry (UWSOD) students have IPE with UW medical, physician assistant, public health, nutrition, nursing, and pharmacy students. However, this study evaluated the lasting impact of the unique learning activities the RIDE program has as IntraPE between dental and DH students. This theoretical framework supports the need to:

1. Explore if the IntraPE intervention between dental and DH students results in a gained understanding of shared patient care and teamwork.
2. Evaluate the outcomes of IntraPE for dentists beyond their educational career.
3. Evaluate dentists' attitudes towards IntraPE regarding understanding of roles and responsibilities.

Regional Initiatives in Dental Education (RIDE). The vast majority of dentists in Washington state practice in urban areas (Washington State Dental Association, 2013). Research done by the Washington State Dental Association (WSDA) and the UW surveyed all active dental licenses in 2007 and found the largest shortage of dentists in rural areas: only 13% of full-time general practice dentists and 20% of part-time general practice dentists are located in rural areas (Washington State Department of Health, 2007). The number of dentist to population ratio in 2007 is shown in Figure 1.

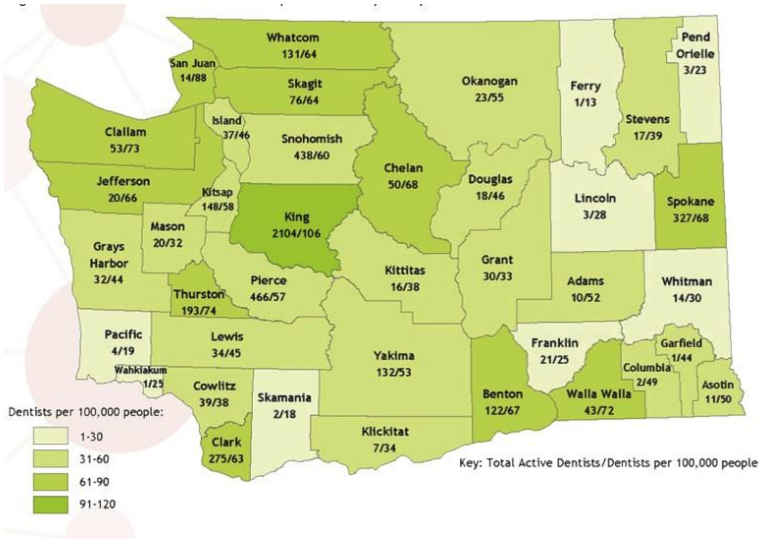

Figure 1. Washington number of dentists and dentist: population ratio (Washington State Dental Association, 2013).

More than 1 million residents in Washington live where there are not enough dentists to adequately serve the population (Kaiser Family Foundation, 2017). In Washington, 10 - 14.9% of the population, or 139 geographic regions, are in a Dental Health Professional Shortage Area (HSPA) (National Conference of State Legislators, 2014; U.S. Department of Health & Human Services, 2017). A Dental HSPA is defined as an area where there is a dentist to population ratio of 1 to 5,000 or less (Ryan, 2016). According to the Kaiser Family Foundation (2017). Washington is rated 19th out of the United States (US) and its territories in Dental HSPA regions. At least 179 additional dental practitioners would be required to remove WA from the qualification of being an HPSA. Figure 2 shows current HSPAs in Washington, shown lowest (non-shaded) to highest (darkly shaded).

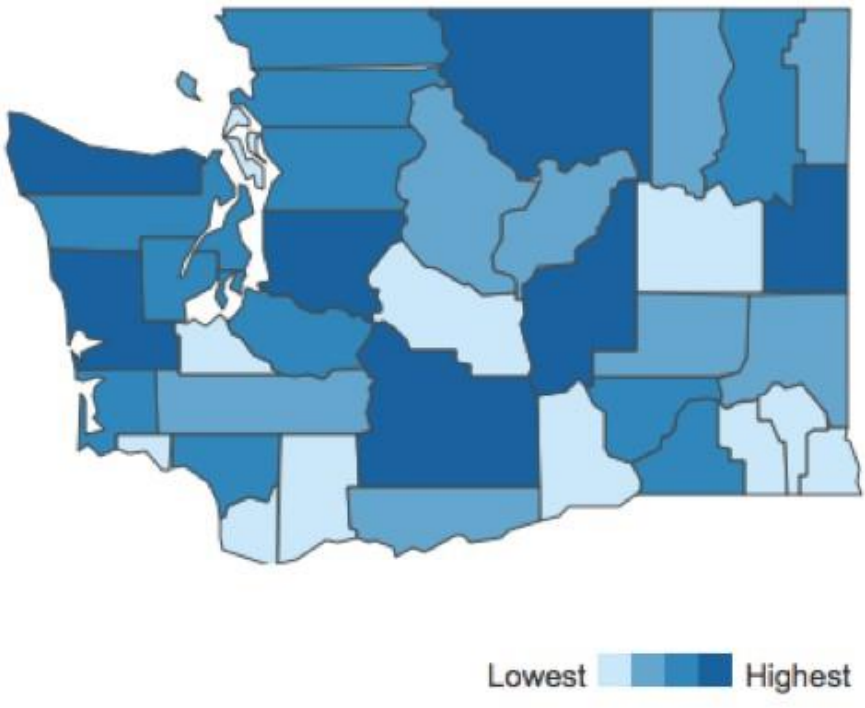

Figure 2. Health Professional Shortage Areas by Geographic Area – Washington (U.S. Department of Health and Human Services [HHS], 2017).

In response to the need for an increased number of dentists in rural and or/underserved areas of eastern Washington, the UW created the RIDE program. Dental shortages in rural areas is addressed by the RIDE program "by [providing] access to high-quality, publicly funded dental education to states and regions in the Northwest in order to develop dentists who will…serve the needs of rural and underserved communities," (University of Washington, 2018a, para. 2). Students in the RIDE program partner with a variety of health professional programs including WWAMI universities (Washington, Wyoming, Alaska, Montana, and Idaho) and EWU. The RIDE mission statement incorporates shared learning, stating that a goal of RIDE is to, "Promote innovative, inter-professional educational experiences for dental students to foster a team approach to healthcare" (University of Washington, 2018a, para. 8). According to the Interprofessional Education Collaborative (IPEC) (2011a), RIDE as an IntraPE program should synthesize teamwork, improve comprehension of different roles of healthcare professionals, acknowledge and respect ideas of other professionals, and enhance the ability to tolerate differences between dental and DH students (Brame et al., 2015; Brooks & Gorman, 2017; Evans et al., 2010; Leisnert et al., 2012; Reeson et al., 2015; Stolberg et al., 2012).

Statement of the Problem

There are existing studies regarding dental and allied dental (DH, dental assisting, or dental laboratory technician) students' attitudes towards IntraPE while they are actively involved in their programs (Brame et al., 2015; Czarnecki, Kloostra, Boynton, Inglehart, & Habil, 2014; Evans et al., 2010; Formicola et al., 2012; Hawkes, Nunney, & Lindqvist, 2013; Jones et al., 2017; Ko, Bailey-Kloch, & Kim, 2014; Stolberg et al.,

2012). A comprehensive review of the literature demonstrates a lack of research regarding the attitudes that shared learning participants, particularly IntraPE students, carry with them when they are practicing healthcare professionals. There has been a call to conduct longitudinal follow-up studies to evaluate shared learning outcomes (Abu-Rish et al., 2012; Nasser Al Harthy, Subhi, Tuppal, & Reñosa, 2015). There appears to be insufficient research with licensed dentists who participated in IntraPE that evaluates their attitudes in regards to understanding of roles and responsibilities, and teamwork. In addition, there is a need for research involving the UW RIDE program as an IntraPE with DH students.

This study explored dentists' perceptions of the importance of IntraPE with DH, and their attitudes towards teamwork and understanding the roles and responsibilities of the DH. This study focused on the IntraPE between UW dental students and EWU DH students. Since IntraPE is a form of shared learning, use of the IPEC Core Competencies for Collaborative Practice provided the framework for the research questions of this exploratory study (IPEC, 2016b). This research evaluated how well the RIDE program meets these core competencies in practice. Therefore, the research questions were:

- Do dentists who participated in the RIDE program understand their role and responsibilities related to the DH better than dentists who had no formal IntraPE with DH students?
- Do RIDE dentists perceive there are better teamwork dynamics with their dental hygienists compared to non-RIDE dentists, due to their IntraPE experience with DH students?

The Principal Investigator (PI) hypothesized that graduates of the UW School of Dentistry who participated in the RIDE program perceive they have a clearer understanding of the roles and responsibilities of the DH and perceive they work more collaboratively as a dental team compared to dentists who did not have the RIDE experience. Dental students who train with DH students initially report positive attitudes regarding IntraPE (Brame et al., 2015; Jones et al., 2017; Leisnert et al., 2012; Stolberg et al., 2012), and there is an opportunity to research if those positive attitudes translate into clinical practice post-graduation.

Overview of Research

Studies in professional journals suggest shared learning is beneficial in helping dental students become more effective as team members and that it can support a better understanding of the different roles they play on a healthcare team (Alfano, 2012; Brame et al., 2015; Czarnecki et al., 2014; Evans et al., 2010; Formicola et al., 2012; Stolberg et al., 2012; Wright, Hawkes, Baker, & Lindqvist, 2012). There is currently a global call to improve and increase shared learning among healthcare professionals from national and international organizations, such as the WHO, the National Center for Interprofessional Practice and Education (NCIPE), the Institute of Medicine (IOM), and the IPEC (University of Washington, 2017).

Dental education and IntraPE. The American Dental Education Association (ADEA) has had active involvement in the foundation and continuation of the IPEC. The ADEA President and CEO, Dr. Rick Valachovic is also the founding and acting President of IPEC (IPEC, 2017). Dr. Valachovic is an advocate for shared learning; he stated that his mantra as the President and CEO of ADEA has been “the relentless pursuit of

strategic alliances," and that has continued in his encouragement of shared learning and involvement in the IPEC (Valachovic, 2014, para. 18).

Recognized by the U.S. Department of Education, the American Dental Association Commission on Dental Accreditation (CODA) is a specialized accrediting agency with the purpose to "…serve the public by establishing, maintaining, and applying standards that ensure the quality and continuous improvement of dental and dental-related education and reflect the evolving practice of dentistry" (CODA, 2015, p. 5). The CODA standards specify the minimum acceptable requirements for dental and dental-related programs. In reviewing CODA curriculum standards for dental schools, it is important to distinguish that CODA requires IPE between dental students and healthcare professionals from other disciplines (CODA, 2015). Standard 2-19 states:

> Students should understand the roles of members of the health care team and have educational experiences, particularly clinical experiences, that involve working with other healthcare professional students and practitioners. Students should have educational experiences in which they coordinate patient care within the healthcare system relevant to dentistry. (CODA, 2015, p. 28)

While IntraPE between dental and dental allied students does not fulfill that CODA requirement (A. DiMarco, personal communication, July 27, 2017), it has been shown to have positive outcomes (Brame et al., 2015; Formicola et al., 2012; Jones et al., 2017; Stolberg et al., 2012). In a study done by Brame et al. (2015) when dental and allied dental students were asked if there was a need for shared learning, the responses were unanimously in favor of it. One DH student stated,

> I believe that the integrated learning is a very positive thing…we're going to be working together…so I can see where [dentists and dental assistants] are coming from in terms of their job role and my job role, how we integrate together, how we work together (Brame et al., 2015, p. 619)

The positive impact of IntraPE between dental and DH students is supported in research by Jones et al. (2017) at the College of Dentistry at the University of Tennessee Health Science Center. A pilot program was developed for clinical IntraPE between senior dental and DH students ($N = 58$). The goals of the study were to assess the effectiveness of the program based on student expectations and satisfaction along with patient satisfaction. The student participants received a classroom orientation prior to the clinical IntraPE. In the dental clinic, DH students were randomly paired with dental students whose patients required scaling and root planing, prophylaxis, or periodontal maintenance. Together, the dental and DH students reviewed the patient's medical history, periodontal diagnosis, and treatment plan, and then the DH student independently performed all required services. The dental and DH students then reviewed treatment outcomes and evaluation of findings and rated student expectations and satisfaction with the training from 1 (minimum satisfaction) to 5 (maximum satisfaction) (Jones et al., 2017). Of the student participants, 100% of DH students ($n = 27$) and 57% of dental students ($n = 51$) completed both the pretest and posttest surveys. All respondents had high expectations of IntraPE with DH students having higher expectations ($p < .001$). It was found that while both groups of students had high expectations of the program and understood its value, the two groups had different levels of expectation that resulted in

gaps between expectations and satisfaction. In all categories, there was no statistical significance in satisfaction between dental and DH students.

While statistically insignificant, the DH students were less satisfied than the dental students with all clinical experiences that involved periodontal procedures. In this study, the dental students often left the operatory after introducing the DH student to their patient and discussing the treatment plan, only returning once periodontal procedures had been completed. This difference in DH and dental expectations could be partially explained because of the common perception that the DH is more qualified to offer periodontal treatment with minimal involvement by the dentist (Jones et al., 2017).

Teamwork in dentistry has gained support in recent years, resulting in growing recognition of the contributions of all members of a team to the treatment of patients (Ross et al., 2009). In an IntraPE study done by Ritchie et al. (2013), dental and DH students had a significantly better understanding of shared care among a dental team compared to students who did not have prior IntraPE experiences. Stolberg et al. (2012) concluded IntraPE involving dental teams provided students the opportunity to grow in clinical skills, improve time management, and gain insight into how allied dental professionals can interact with a dentist.

Brame et al. (2015) at the University of North Carolina (UNC) at Chapel Hill School of Dentistry surveyed dental, DH, and dental assisting (DA) students ($N = 247$) using smaller focus groups and an adapted Modified Readiness for Interprofessional Learning Survey (RIPLS) (Brame et al., 2015). The RIPLS is a survey that was originally designed to evaluate three sub-scales of shared learning: collaboration and teamwork, professional identity, and roles and responsibilities (Parsell & Bligh, 1999). This

Modified version of the RIPLS is a questionnaire consisting of 19 Likert scale items and has been shown to have reasonable internal consistency and test-retest reliability (McFadyen et al., 2005; McFadyen, Webster, & Maclaren, 2006) (Appendix A). In the Brame et al. (2015) study, the Modified RIPLS was adapted to include language specific to dental professionals. Upon completion of the adapted Modified RIPLS, all participants felt IntraPE would facilitate being a more effective oral healthcare team member, 94% (n = 160) agreed patients ultimately would benefit from interprofessional care and 70% (n = 116) agreed it is important for dental, DH and DA students to learn together. One statistically significant ($p < 0.05$) difference between the groups of students was the DH felt more strongly about IntraPE than dental or DA students. In addition, 54% (n = 91) ($p < 0.0001$) of participants agreed the function of an allied team member (DH, DA) is to provide support for the dentist. The majority of these responses were from the dental and DA students (n = 76), while DH students generally disagreed (n = 15). Overall, the authors suggest three main themes emerged from this research. First, there is a need for increased communication among dental and dental allied students. Second, improved intraprofessional communication would also improve the quality of patient care. Third, these students still had a limited understanding of one another's roles (Brame et al., 2015).

Limitations to IntraPE in dental education. Dental schools face unique challenges in implementing IntraPE. Unlike doctors or nurses, most dentists do not participate in hospital-based practice which is the basis for most shared learning activities at this time (Gordon, Barreveld, Donoff, & Kulich, 2016). Research done by Formicola et al. (2012) surveying dental schools in the US and Canada and their use of

IntraPE showed great opportunity for collaboration between dental and dental hygiene programs. Their research highlighted current limitations to dental IntraPE, including crowded curricula and course schedules, lack of leadership support in health sciences centers, lack of willing and trained faculty, and even a lack of support from students (Formicola et al., 2012). Since few dental, DH, and DA programs are housed together, few students are provided the opportunity to experience IntraPE (Brame et al., 2015). A focus is needed regarding team competencies between allied dental health professionals; if relationships among dental professionals are not strong, dentistry may not be able to expand to IPE with other disciplines (Formicola et al., 2012; Gordon et al., 2016).

Effective IntraPE can be undermined by a lack of understanding of one another's roles, poor communication, and poorly coordinated teamwork. In research done by Jones et al. (2017) involving DH and dental students in a clinical IntraPE experience, DH students had significantly higher expectations ($p < .001$) than the dental students. This difference in expectations resulted in greater gaps between DH students' satisfaction with the intervention. Jones et al. (2017) suggest this difference in expectations between DH and dental students could be from underlying misconceptions and stereotypes held by the two professions. It is evident from currently available studies that there remains a consistently small number of students who are unsure or disagree with statements regarding teamwork and the understanding of other professionals' roles and responsibilities following IntraPE (Brame et al., 2015; Formicola et al., 2012; Reeson et al., 2015; Ross et al., 2009).

Ross et al. (2005) surveyed final year dental students ($N = 358$) in the United Kingdom regarding their experience with IntraPE and their knowledge of the clinical

roles of dental professionals. Students who had prior IntraPE with dental allied students tended to be positive regarding their experience specifically related to learning about the roles of team members, although a significant minority were not. The survey found no relationship between the dental students' previous IntraPE training and their knowledge of the clinical abilities and responsibilities of other dental professionals. Additionally, there was no evidence that previous IntraPE influenced dental students' attitudes about what they thought were appropriate clinical roles of DH. A number of participants in this survey felt expanding roles of DH may "undermine the dental profession and take treatment away from dentists" (Ross et al., 2009, p. 167). These views do not correlate with current clinical standards and present a definite limitation to the success of dental IntraPE programs.

The IPEC core competencies. With the WHO (2010) calling for healthcare providers to be interprofessional, a need was present for collaboration between different disciplines to help guide curricula development (IPEC, 2017). In 2009, six national education associations of health professions (American Dental Education Association, American Association of Colleges of Nursing, American Association of Colleges of Osteopathic Medicine, American Association of Colleges of Pharmacy, Association of American Medical Colleges, and Association of Schools and Programs of Public Health) formed a privately funded collaborative group to promote shared learning called the IPEC, later expanding to include fourteen more educational associations. By expanding its membership, IPEC was able to create and maintain a set of competencies encouraging interprofessional collaboration and interactive learning across the healthcare field (IPEC, 2016a). The ADEA House of Delegate (2008) Competencies for General Dentists

encourage collaboration in IntraPE as well, stating that graduating dentists should participate with dental team members to promote the health of all patients.

In 2011, the IPEC executive council released two reports, "Team Based Competencies: Building a Shared Foundation for Education and Clinical Practice" (IPEC Expert Panel, 2011b) and "Core Competencies for Interprofessional Collaborative Practice" (IPEC Expert Panel, 2011a). These reports identify a common set of competencies that allow for fundamental shared learning opportunities and help prepare future clinicians for team-based care (IPEC Expert Panel, 2011a). Other organizations have created competencies to evaluate shared learning programs, including the IOM (Greiner & Knebel, 2003), and the Accreditation Council on Graduate Medical Education (IPEC Expert Panel, 2011a), with the IPEC Core Competencies as the most widely accepted.

In 2016, the IPEC updated their Core Competencies for Interprofessional Collaborative Practice (IPEC, 2016b). The IPEC expert panel believes that educating health professionals in silos is no longer acceptable; students must be prepared to give patients collaborative, coordinated care as a part of a greater team (IPEC Expert Panel, 2011a). With Interprofessional Collaboration as the IPEC central domain, four core competencies were established to incorporate into healthcare education: 1) values/ethics for interprofessional practice; 2) roles and responsibilities; 3) interprofessional communication; 4) team and teamwork (IPEC, 2016b). Figure 3 shows the IPEC Core Competencies and their description.

Competency Domain	General Competency Statement
1. Values/Ethics for Interprofessional Practice	**VE:** Work with individuals or other professions to maintain a climate of mutual respect and shared values.
2. Roles/Responsibilities	**RR:** Use the knowledge of one's own roles and those of other professions to appropriately assess and address the healthcare needs of patients and to promote and advance the health of populations
3. Interprofessional Communication	**CC:** Communicate with patients, families, communities, and professionals in health and other fields in a responsive and responsible manner that supports a team approach to the promotion and maintenance of health and the prevention and treatment of disease.
4.Teams and Teamwork	**TT:** Apply relationship-building values and the principles of team dynamics to perform effectively in different team roles to plan, deliver and evaluate patient-/population-centered care and population health programs and policies that are safe, timely, efficient, effective, and equitable.

Figure 3. Interprofessional Collaborative Practice Competency Domains (IPEC, 2016b).

The studies described in the following sections are a combination of Inter- and IntraPE. The IPE research applies to the background of knowledge regarding shared learning, and the IPEC Core Competencies provide a framework for evaluating shared learning effectiveness. The proposed research has two primary goals based upon the research questions: to evaluate the effectiveness of IntraPE overall and in the domains of teamwork and roles and responsibilities. These two categories directly correspond with two of the four domains of the IPEC Core Competencies.

Roles and responsibilities. Learning how to be an interprofessional healthcare provider involves having an understanding of how professional roles and responsibilities differ from and complement each other in patient-centered care. This domain calls for recognizing limits of professional expertise and the need for cooperation, coordination, and collaboration across health professions to promote health and treat illness (IPEC, 2016b). Figure 4 shows the IPEC Competencies for this domain.

Core Competency 2: Roles and Responsibilities. Use the knowledge of one's own role and those of other professions to appropriately assess and address the healthcare needs of patients and populations served	
RR1	Communicate one's role and responsibilities clearly to patients, families, community members, and other professionals.
RR2	Recognize one's limitations in skills, knowledge, and abilities.
RR3	Engage diverse professionals who complement one's own professional expertise, as well as associated resources, to develop strategies to meet health and healthcare needs or patients and populations.
RR4	Explain the roles and responsibilities of other care providers and how the team works together to provide care, promote health, and prevent disease.
RR5	Use the full scope of knowledge, skills, and abilities of professionals from health and other fields to provide care that is safe, timely, efficient, effective, and equitable.
RR6	Communicate with team members to clarify each member's responsibility in executing components of a treatment plan or public health intervention.
RR7	Forge interdependent relationships with other professions within and outside of the health system to improve care and advance learning.
RR8	Engage in continuous professional and interprofessional development to enhance team performance and collaboration.
RR9	Use unique and complementary abilities of all members of the team to optimize health and patient care.
RR10	Describe how professionals in health and other fields can collaborate and integrate clinical care and public health interventions to optimize population health.

Figure 4. IPEC Core Competency 2: Roles and Responsibilities Sub-Competencies (IPEC, 2016b).

Some research has found there is a misunderstanding of the roles and responsibilities that healthcare team members play in patient care (Brame et al., 2015). It is critical for healthcare professionals to understand their role and the roles and responsibilities of other team members. This allows the dental team to function effectively and efficiently, and give the best quality patient care (ADEA House of Delegates, 2008). After shared learning, students can recognize the limits of their professional expertise and know how to collaborate and cooperate across health professions (IPEC Expert Panel, 2011a). Healthcare students must recognize and value their personal contribution to a healthcare team. With sufficient self-knowledge,

individuals can trust and respect the contributions of their colleagues in a team setting (ADEA House of Delegates, 2008; Mickan & Rodger, 2000).

Studies have shown IntraPE can improve attitudes towards the roles and responsibilities of healthcare students in the same discipline (Brame et al., 2015; Brooks & Gorman, 2017; Leisnert et al., 2012; Reeson et al., 2015; Stolberg et al., 2012). One example is research by Brooks and Gorman (2017) studying doctor of physical therapist students (DPT) and physical therapy assistant students (PTA). In this study (N = 54), senior PTA (n = 18) and freshman DPT (n = 36) students interacted in a classroom setting. A combined lecture introduced DPT professional practice to the students. Students were then randomly assigned to groups with three to four DPT students and one to two PTA students. Each group was given a professional practice topic to research and present on at the end of the semester (Brooks & Gorman, 2017). Students evaluated the semester-long IntraPE experience by doing a pre-posttest of the Modified RIPLS, the Interdisciplinary Education Perception Scale (IEPS), and a performance evaluation.

Prior to the intervention, PTA students scored higher than DPT students in understanding the assumed roles and responsibilities of their colleagues. It is implied the reason for this high score is that the PTA students were in their final year of their professional program, and therefore had greater knowledge of professional identity (Brooks & Gorman, 2017). In the posttest, the PTA student scores for the roles and responsibilities were lower than DPT students' scores. This suggests the learning activity blurred the lines between assumed roles or hierarchy of responsibilities. It is suggested that this blurring of roles is what helped the PTA and DPT students work together as effective teammates (Brooks & Gorman, 2017).

In IntraPE research, dental and dental laboratory technician students were paired together in clinical and didactic courses and worked together to create permanent and removable oral prosthetics for patients (Evans et al., 2010). The students used journals to reflect on their interactions with their colleagues and patients. Anecdotal evidence from these journals suggests both groups of students felt they had a better understanding of the role each profession plays in patient care following IntraPE. It is suggested through anecdotal evidence that dental students might acquire more respect for the dental technician's knowledge, skills, and professionalism through an IntraPE program (Evans et al., 2010). Other research involving dental and dental technician students showed IntraPE gave students the opportunity to develop their own professional role (Reeson et al., 2015). "It is the willingness of a professional to learn about other professional roles that leads to a broadening and enrichment of the knowledge required to collaborate with other team members in providing effective healthcare" (Reeson et al., 2015, p. 98).

Healthcare students who work in clinical teams together also have a greater respect for each other's roles. Following an IntraPE experience involving a complete dental team (dental students, DH, and DA), one DH student stated, "it was amazing learning how the different dental professionals function. It gave me a greater respect for each professional" (Stolberg et al., 2012, p. 228). This resulting positive attitude has been found in multiple studies (Horsburgh et al., 2001; Jacobsen & Lindqvist, 2009; Ritchie et al., 2013).

On the contrary, some studies indicate there are existing limitations in regards to shared learning and its ability to enhance the understanding of roles and responsibilities (Czarnecki et al., 2014; Rosenfield, Oandasan, & Reeves, 2011). In one example, IPE

was introduced to first and second-year health disciplines (*N* = 1200: dental, medical, social work, occupational therapy, and pharmacy) in the form of a three-hour seminar (Rosenfield et al., 2011). The seminar included guest speakers and skits to demonstrate appropriate interprofessional communication necessary for patient care. Following the seminar, focus groups were formed and students were asked questions relating to their IPE experience (*n* = 35). Students generally felt IPE had value and merit for their professional education, including potential use for tapping into the expertise of different healthcare professions. However, they would have preferred smaller and more intimate IPE with realistic and relevant case scenarios (Rosenfield et al., 2011). In research done by Czarnecki et al. (2014) between healthcare students (*N* = 79: *n* = 40 dental students, *n* = 33 nursing students, *n* = 6 pediatric dental residents), some students were found to have decreased Modified RIPLS scores in roles and responsibilities following their IPE clinical rotations. It was suggested IPE should emphasize the integration of role-related experiences to challenge students to consider the importance of learning more about these issues (Czarnecki et al., 2014).

Teams and teamwork. The fourth IPEC core competency focuses on teamwork: encouraging students to learn about other professions and better understand how they fit into a clinical team to provide the best patient care (IPEC, 2016b). Teamwork is at the center of shared learning. Working in teams involves sharing one's expertise with others and giving up some professional autonomy to gain improved outcomes (IPEC Expert Panel, 2011a). This is critical for a dental team to promote the health of all patients (ADEA House of Delegates, 2008). To deliver patient-driven care, healthcare providers

should apply relationship-building values to perform effectively in different team settings (IPEC, 2016b). See Figure 5.

Core Competency 4: Teams and Teamwork. Apply relationship building values and the principles of team dynamics to perform effectively in different team roles to plan and deliver patient-/population-centered care that is safe, timely, efficient, effective, and equitable.	
TT1	Describe the process of team development and the roles and practices of effective teams.
TT2	Develop consensus on the ethical principles to guide all aspects of team work.
TT3	Engage health and other professionals in shared patient-centered and population-focused problem-solving.
TT4	Integrate the knowledge and experience of health and other professions to inform health and care decisions, while respecting the patient and community values and priorities/preferences for care.
TT5	Apply leadership practices that support collaborative practice and team effectiveness.
TT6	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.
TT7	Share accountability with other professions, patients, and communities for outcomes relevant to prevention and health care.
TT8	Reflect on individual and team performance for individual, as well as team, performance and improvement.
TT9	Use process improvement strategies to increase the effectiveness of interprofessional teamwork and team-based services, programs, and policies.
TT10	Use available evidence to inform effective teamwork and team-based practices.
TT11	Perform effectively on teams and in different team roles in a variety of settings.

Figure 5. IPEC Core Competency: Teams and Teamwork Sub-Competencies (IPEC, 2016b).

Several studies support the IPEC competency of teams and teamwork in IntraPE, proving that it enhances teamwork among healthcare professionals (Brame et al., 2015; Leisnert et al., 2012; Stolberg et al., 2012). In a study by Brame et al. (2015) at the University of North Carolina (UNC) at Chapel Hill School of Dentistry, the attitudes towards IntraPE of the dental, DH, and DA students (N = 247) were studied using an adapted version of the Modified RIPLS. Most respondents (n = 160, 94%) agreed that

IntraPE would help them become more effective members of an oral healthcare team in the areas of respect among team members and communication (Brame et al., 2015).

Research shows student participants in shared learning feel positive about the benefits of working on a team (Brooks & Gorman, 2017; Czarnecki et al., 2014; Horsburgh et al., 2001; Reeson et al., 2015). In research by Czarnecki et al. (2014) (N = 79), in which nursing students (n = 33) participated in hospital clinical rotations with dental students (n = 40) and pediatric dental residents (n = 6), nursing students showed significantly higher Modified RIPLS scores related to teamwork and collaboration following their rotation. This research suggests positive learning experiences can increase students' readiness for further shared learning.

Similarly, Reeson et al. (2015) found that IntraPE with dental (n = 75) and dental technician students (n = 25) learning together had the potential to facilitate positive attitudes towards teamwork. Students worked together in a hospital setting making partial and full dentures for patients. Upon completing the Modified RIPLS, 97% of students agreed they felt they were a part of a team stating they were making decisions as a group, listening to each other's point of view, and establishing enhanced communication with their patients. Brooks and Gorman (2017) found similar results between DPT (n = 36) and PTA (n = 18) students following an IntraPE lecture and group project. Students generally had a high regard for teamwork and collaboration, with a high average pretest score (4.48) and a significant increase (4.65) in average scores in the posttest (p = .004) (Brooks & Gorman, 2017). Some student comments included, "We accomplished everything we wanted to as a group" and "Wonderful collaboration. This was a good group to be [in]" (Brooks & Gorman, 2017, p. 12).

Using the original RIPLS, researchers at the University of Auckland decided to assess beginning medical, nursing, and pharmacy students for readiness for IPE prior to their IPE course (Horsburgh et al., 2001). Of the sample (N = 180), there was overwhelming support for shared learning to create a more effective healthcare team (n = 154) and agreement that patients would benefit from healthcare students learning together (n = 165). Participants acknowledged teamworking skills are an essential component of their learning and IPE could improve working relationships among healthcare professionals (Horsburgh et al., 2001).

Professors at Malmo University in Sweden sought to discover if a stronger emphasis on teamwork between dental and DH students could increase knowledge of their respective future professions (Leisnert et al., 2012). Their project introduced a one-year IntraPE curriculum intervention that included three professional and student-led seminars, team-based patient care with presentations of the treatment outcomes, and web-based case studies. The dental and DH students (N = 58, n = 34 dental, n = 24 DH) were surveyed at the start and end of the project.

Following the curriculum intervention, both groups of students felt that treating shared patients should be a permanent part of their education, with DH students giving higher scores than dental students (Leisnert et al., 2012). The research was framed by a pre-test at the beginning of the academic year and post-test at the end that mapped students' understanding of DH competencies and clinical abilities to see if there was a change after the curriculum intervention. The results from this showed all students had a better understanding of DH competencies, with dental students feeling the questionnaires and intervention contributed to their increased knowledge. It is suggested since the dental

students had greater initial gaps in knowledge of DH competencies, they had more to learn and thus found the questionnaire more valuable (Leisnert et al., 2012).

***Clinical rotations*.** For healthcare providers to develop collaborative skills, students need opportunities to spend time together in a meaningful way (Hall, 2005). Interactive learning methods must be utilized in shared learning so students learn with, from, and about one another (Brame et al., 2015; Nisbet, Lee, Kumar, Thistlethwaite, & Dunston, 2011). There is a general consensus students working in clinical teams is one of the most effective ways to implement shared learning with some research suggesting sharing clinical training is more effective than joint attendance in teaching sessions (Brame et al., 2015; Czarnecki et al., 2014; Nisbet et al., 2011; Ross et al., 2009).

Students who meet and work with students from another profession develop positive interprofessional attitudes (Jacobsen & Lindqvist, 2009). Students are more likely to learn about each other's roles and how they fit into a team through hands-on experiences in collaborative work. Studies examining the association between clinical rotations and shared learning have resulted in positive findings (Czarnecki et al., 2014; Hawkes et al., 2013; Jacobsen & Lindqvist, 2009; Reeson et al., 2015; Stolberg et al., 2012). A 2014 study by Czarnecki et al., paired nursing (n = 33) and dental students (n = 40) with pediatric dental residents (n = 6) on healthcare teams in both didactic courses and clinical rotations in a hospital setting. The nursing students' knowledge regarding oral health, performing oral health services, and diagnosing oral diseases increased significantly after the rotation ($p < .001$). In addition, dental students improved their attitudes in the importance of nurses engaging in caries risk assessment and recognition (Czarnecki et al., 2014). Clinical shared learning interactions provide students with the

opportunity to expand their knowledge and better understand their role as healthcare providers. After an IntraPE experience among dental and dental laboratory technician students, most students recognized they had developed their own professional identity by being involved in patient care and learning how to work as a part of a team (Reeson et al., 2015).

IntraPE research conducted by Stolberg et al. at EWU in 2012 involving dental, DH, and DA students also supports this theory. Over a five-year period, the EWU DH program partnered with the UW School of Dentistry and the Spokane Community College (SCC) DA program to create, what they called, a Dental Team Experience (DTE) (Stolberg et al., 2012). The mission and goals of DTE included: increase the efficiency of the team, provide an opportunity for all team members to work together, appreciate the complexities of dental practice, and provide quality care to patients. Dental, DH and DA student orientation to the DTE program included training in conflict management and team building. Each year, three dental, five DH, and eight DA students were selected to participate. Once the three-week clinical rotations began, all students were asked to evaluate the whole team each week regarding communication, trust, organization, and conflict resolution skills. Additionally, a program evaluation took place at the end of clinical rotations.

The results of these evaluations show the dental students gained a true understanding of the abilities of both the DH and DA, and DH gained knowledge of how to work with dentists and DA (Stolberg et al., 2012). Student participants expressed DTE was more valuable as a growth experience than a full quarter at school and it was the highlight of their school careers. Participants unanimously would recommend the

experience to others. As a result of their IntraPE experience, these respondents had growth in team management skills as well as communication between patients and team members (Stolberg et al., 2012).

Research was done at the Tokyo Medical and Dental University to develop an IntraPE and IPE training program where DH students trained medical and dental students about oral care for older adults using patient simulation ($N = 184$) (Otsuka et al., 2016). The DH participants ($n = 22$) received a one-hour lecture on oral care for older adults and created a lesson plan. Then each DH student trained medical ($n = 110$) and dental ($n = 52$) students in groups of four to five using multiple methods of teaching: a simulated patient and peer support joint practice. This allowed medical and dental students to experience being both the practitioner and the patient (Otsuka et al., 2016).

All students were asked to complete a questionnaire following the experience. Medical students reported they had a greater understanding of the methods and significance of oral health care for older adult patients more deeply than dental students ($p < .05$), which could suggest medical students gained more from the SL experience than dental students (Otsuka et al., 2016). All DH participants felt positive (strongly agree, agree, or somewhat agree) this practice was useful and interesting (Otsuka et al., 2016).

Studies have shown students have well-established attitudes and prejudices regarding their own and other healthcare professions which can influence their attitudes towards other professionals (Hawkes et al., 2013; Jones et al., 2017). Participation in SL helps students perceive individuals in other professions as being more caring. Hawkes et al. (2013) used the Attitudes to Health Professionals Questionnaire (AHPQ) at the beginning and end of a seven-week IPE experience to establish a baseline and compare

results (N = 76: n = 28 pharmacy, n = 33 medical, n = 15 nursing). Reflective statements were submitted by the participants after their rotation and their statements were analyzed for common words and phrases. All student groups perceived the three professions as being more caring following their rotation, and all professions saw a statistically significant ($p < .01$) increase in how caring they were perceived to be by all students.

Another study supporting this conclusion was conducted by Jacobsen and Lundqvist in 2009. Occupational therapy, physiotherapy, medical, and nursing students (N = 162) participated in a two-week IPE program in a hospital setting, where the AHPQ was administered at the beginning and end of their clinical rotations. Students viewed all professionals as more "caring" after their two-week IPE.

> …students' view towards [other] professions are more similar after [their] stay in [IPE] with the smallest changes observed when assessing students' view of their own profession group. This suggests that [IPE] provides a learning environment where the students begin to see members of other professions as more like members of their own profession in respect…to caring (Jacobsen & Lundqvist, 2009, p. 249).

In addition to the IntraPE and IPE studies done by Hawkes et al. (2013), Stolberg et al. (2012), and Czarnecki et al. (2014), Jacobsen & Lundqvist (2009) found students perceived others healthcare professionals to be just as caring as people in their own profession after experiencing shared learning. This suggests when shared learning is implemented, students may gain a heightened understanding of their colleagues and grow in empathy and understanding of their professional responsibilities.

Limitations to SL. In a literature review done by Reeves, Perrier, Goldman, Freeth, and Zwarenstein (2013), it was suggested that although there is a range of positive outcomes from shared learning, there is not yet sufficient evidence of the impact of shared learning on professional practice and healthcare outcomes. Existing barriers inhibit the effectiveness of SL between healthcare students (Evans, Henderson, & Johnson, 2012; Reeson et al., 2015; Ross et al., 2009). These barriers include interdisciplinary stereotypes, rivalry, professional identity, university support, and curriculum development (Gilbert, 2005).

Curricular differences. With each discipline program already having a full course curriculum with clinical rotations, conflicting academic calendars can offer few opportunities for SL (Ajjawi, Barton, Dennis, & Rees, 2017; Formicola et al., 2012; Nisbet et al., 2011). In a literature review of 83 articles detailing SL programs worldwide, the most reported barrier was scheduling (n = 39; 47%) (Abu-Rish et al., 2012). In addition to scheduling conflicts, student participants in IntraPE have expressed concern that IntraPE could overload their already busy schedules (Brame et al., 2015). Structural changes need to be made within universities, and curriculum changes within departments, to include SL as a part of the evaluation and assessment of student learning within their discipline (Brame et al., 2015; Gilbert, 2005).

Professional identity. A number of studies have found professional identity is a barrier to effective shared learning (Abu-Rish et al., 2012; Brame et al., 2015; Evans et al., 2010; Formicola et al., 2012; Gilbert, 2005; Hall, 2005; Horsburgh et al., 2001; Nisbet et al., 2011; Reeves et al., 2013). Upon entering a discipline program, students are very concerned with developing a clear sense of themselves within their discipline

(Gilbert, 2005). Expecting students to work collaboratively with other disciplines before they have developed a sense of a professional identity may be counterproductive to learning (Abu-Rish et al., 2012; Horsburgh et al., 2001).

Interprofessional team members may have overlapping obligations and therefore must share in varying degrees of responsibilities with other healthcare providers (Hall, 2005). This can lead to "role-blurring," defined as the tendency for professional roles to overlap and become indistinct when there is a shared body of knowledge between different disciplines (Sims, Hewitt, & Harris, 2015). Early on in a student's discipline program, role-blurring can lead to confusion to where one's practice boundaries begin and end. Gilbert (2005) suggests that to prevent this confusion, the best time to immerse students in SL is in the year in which they graduate from their professional program. By this time, students have experienced an adequate amount of clinical cases to be confident in their professional identity, and therefore understand what is within and out of their scope of practice.

Conversely, it has been suggested that providing shared learning opportunities early in healthcare professionals' education is more effective, as this allows students to learn with other healthcare professionals before they become isolated in their own field (Hall, 2005). "…Providing interventions early in the professional's education [would] serve to build bridges between neophytes before the walls of their silos become too thick and high that reaching across the professions becomes too difficult" (Hall, 2005, p. 194). Students come from different social and cultural backgrounds, with a variety of educational experiences, and the more consultation and communication is embedded in IntraPE studies, the more likely graduates continue these good habits in their professional

lives (Evans et al., 2010). At this time, there is not sufficient research to fully support either early or later intervention of shared learning opportunities.

Some studies have found IntraPE students express concern in a hierarchy of providers (Brame et al., 2015; Evans et al., 2010; Hall, 2005; Jones et al., 2017). The results from the study done by Brame, et al. (2015) among dental and dental allied students (N = 247, n = 160 dental, n = 65 DH, n = 22 DA) found DH students, in particular, were concerned that IntraPE in the form of simulated dental offices could set up too much of a hierarchy and potentially jeopardize learning. The DH students expressed they would want to be sure all participants in the IntraPE experience are adequately prepared to perform the role for which they are being trained and that all students should receive equal treatment (Brame et al., 2015).

Faculty training. The lack of suitably trained professors and clinical staff present a challenge to implementation of shared learning (Abu-Rish et al., 2012; Formicola et al., 2012; Nisbet et al., 2011). It has been indicated some universities are remiss in valuing and helping faculty develop the experience they need to adequately implement and advance shared learning (Brame et al., 2015; Hall, 2005; Nisbet et al., 2011). If faculty are not properly trained to teach IntraPE, they can unintentionally pass along negative stereotypes to their students (Abu-Rish et al., 2012; Brame et al., 2015). This is particularly important as early on in education, students tend to adopt their professional identity and attitudes towards other health care professionals by observing those around them (Khalili et al., 2014).

One factor impacting the lack of faculty advancement and involvement in SL is faculty demands and workload. The responsibilities and workload of DH professors show

one discipline's demands on their faculty. In a survey of DH professors (N = 114) in the US by Collins, Zinskie, Keskula and Thompson (2007), the average workweek for a DH professor was 50.5 hours, with 46.9 hours spent on paid activities and 3.6 hours spent on unpaid activities. Outside of teaching, their responsibilities included professional presentations, research, institutional service activities, and curriculum development. Teaching and institutional service activities are often not rewarded for promotion and tenure consideration, making professors less motivated to participate in those activities (Collins, Zinskie, Keskula, & Thompson, 2007), and with current teacher to student ratios, teaching loads, and contact hours, it is challenging to find the time to develop shared learning (Gilbert, 2005).

Dental and DH education. In order to better understand the difference in roles that DH and dentists have, it is first important to distinguish the differences in DH and dental education and scope of practice. All dental and dental allied education programs in the US must be accredited by the CODA.

Commission on Dental Accreditation. There has been increasingly more attention towards SL in education for dental programs since July 1, 2013, when CODA added two standards related to SL. These standards state: "The dental school **must** show evidence of interaction with other components of the higher education, health care education and/or health care delivery systems" (CODA, 2015, Standard 1-9, p. 22) and, "graduates **must** be competent in communicating and collaborating with other members of the health care team to facilitate the provision of health care (CODA, 2015, Standard 2-19, p. 28). Dental programs must provide educational opportunities that emphasize evidence-based practice and collaborations with colleagues and other health professionals

(Brame et al., 2015; CODA, 2015). For DH curriculum, however, while CODA standards allude to IPE, they do not explicitly include it (Furgeson & Inglehart, 2017; CODA, 2015b, Standard 2-15). There has been a call from researchers for surveys and studies to focus on whether the courses currently being offered at dental schools meet the established criteria for SL (Formicola et al., 2012). Consequently, a review of dental and DH education is necessary to review how shared learning is being implemented.

Education and licensure: DH. Dental nurses, later named dental hygienists by Dr. Alfred Fones, have been providing prophylaxis to prevent oral disease since the 1880s (Milling, 2010). Dr. Fones established the first DH program in Connecticut, and that class became the first to become licensed to practice. Many dentists in Connecticut at the time, concerned that DH licensure could lead to expanded functions, amended the dental practice laws to create the Connecticut Dental Practice Act that included the regulation of DH (Milling, 2010).

DH applicants must have completed multiple science prerequisites, which include a year of chemistry, anatomy and physiology with lab, nutrition, microbiology (American Dental Association, 2018). At EWU, in addition to science courses, potential DH students must have completed General Education Core Requirements, which include English, psychology, sociology, interpersonal communication, computer literacy, and culture and gender diversity. EWU DH applicants must also have 20 hours of documented observation, volunteer, or paid employment in a dental office prior to applying (Eastern Washington University, 2018).

The role of the DH has changed over the years. Today, the registered DH must successfully complete a national written board examination and state or regional clinical

examinations. The DH is a primary care oral health professional who, having graduated from a CODA accredited DH program at a higher education institution, is licensed to provide education, assessment, research, administrative, preventive, and therapeutic services to support oral and overall health (American Dental Hygienists' Association [ADHA], 2016). The educational path for a DH is outlined in Figure 6. As this research involves the DH program at EWU, research will focus on the Bachelor of Science in Dental Hygiene educational path.

Dental hygiene educational path: 4-year academic program	
Four-year academic program in an undergraduate educational environment	Two+ years of college (one to two years of pre-requisite course work followed by two years of professional courses)
National Board Dental Hygiene Examination successfully passed	
Clinical/written examination as required by region of state successfully passed	
Licensure granted by state board of dentistry	

Figure 6. Educational Path for Entry into the Profession (ADHA, 2016).

Clinical practice: DH. According to the ADHA, "Dental hygiene is the science and practice of recognition, prevention, and treatment of oral disease and conditions as an integral component of total health" (ADHA, 2016, p. 4). The DH provides a variety of services to promote their patient's health. This includes patient screening procedures for oral cancer, reviewing health history and oral health conditions, removing hard and soft deposits from all surfaces of teeth, educating patients about oral hygiene strategies to maintain oral health, and nutritional counseling (ADHA, 2016). The DH works in partnership with other members of the dental team. Dentists and DH bring their distinct roles together and practice as colleagues in a collaborative environment to provide optimum oral health care to the public (ADHA, 2016).

Supervision: DH. The clinical abilities of a DH vary based on state laws. This proposed research focuses on the laws in Washington state. Nationally there are six different levels of supervision by a dentist under which a DH performs services. In Washington, three of those levels of supervision are practiced: 1) Direct Supervision, where a dentist must be physically present; 2) General supervision, where a dentist must authorize the procedure but does not have to be physically present; and 3) Direct access supervision, where a DH can perform procedures they determine to be appropriate without authorization from a dentist (ADHA, 2017a). A DH in Washington can perform the following services under direct supervision: administer nitrous oxide, place and remove periodontal dressings, place, carve, finish and adjust occlusion of composite and amalgam restorations, and remove sutures. Under general supervision, a DH can take dental radiographs, administer topical and local anesthetic, and take study cast impressions. With direct access supervision, a DH can provide prophylaxis, give fluoride treatments, perform root planing and soft tissue curettage, and place pit and fissure sealants (ADHA, 2017a).

Dental education and licensure. Dentistry is one of the oldest medical professions, dating back to 7000 B.C., but the first dental college was not established until 1840 (ADEA, 2017). The first dental practice act in the US was enacted in Alabama in 1841, leading to the eventual creation of the American Dental Association (ADA) in 1859 (ADA, 2017a; ADEA, 2017). Today, a dentist provides preventive and restorative care to aid in oral and overall patient health. There are nine options for dental specialties (ADEA, 2017), however, this literature review focuses solely on general dentistry.

Current dental school applicants are expected to have completed two semesters (three quarters) of biology, general chemistry, organic chemistry, and physics (ADEA, 2017). In addition, applicants must take the standardized Dental Admission Test (DAT) and should show participation in community service, dental job shadowing, and showcase leadership (ADEA, 2017). To become a licensed dentist, students must receive a Doctor of Dental Surgery (DDS) or Doctor of Dental Medicine (DMD) degree from an accredited university, pass Parts I and II of the written National Board Dental Examinations, and meet state and regional board of dentistry clinical examination requirements (ADA, 2017c). This proposed study focuses specifically on the dental program at the UW.

Dental practice. One of the key differences between a dentist and a DH is the dentist's legal capability to diagnose appropriate treatment. Dentists in Washington diagnose and treat problems regarding patients' oral health conditions, including the teeth and gums, in contrast to the DH whose scope of practice does not include the diagnosis of disease (Bureau of Labor Statistics, 2016). Dentists typically remove decay from teeth and fill cavities, repair and remove teeth, administer dental anesthetics, prescribe antibiotics and other medications, create models and take measurements for dental appliances, and examine the teeth, gums, and jaw to diagnose problems (Bureau of Labor Statistics, 2016). A dentist in clinical practice also oversees administrative tasks and supervises DH, DA, receptionists, and dental laboratory technicians (Bureau of Labor Statistics, 2016).

RIDE curriculum. The RIDE program began in fall 2008 with IntraPE courses with EWU DH students. At that time, RIDE students had two lecture courses with DH

students, Introduction to Clinical Dentistry and Periodontology. Introduction to Clinical Dentistry was taken by DH and RIDE students in the first term of their respective professional programs. In this course, RIDE students attended several class sessions with DH students and worked on case studies and class activities together (S. Jackson, personal communication, Sept 20, 2017). Periodontology was taken in the second term of the first year by RIDE students and second term of the second year by DH students. In the course, each RIDE student was divided into a group with six DH students where they worked together on case studies, researching periodontal disease pathogens, and giving presentations (L. Bilich, personal communication, October 9, 2017). Dr. Art DiMarco, the director of the RIDE program, has managed the curriculum since the program began. The RIDE schedule at that time did not allow for collaborative clinical experiences between the students, and the only clinical IntraPE that occurred were two required shadowing occurrences where RIDE students observed DH students while they were treating patients with periodontal disease (A. DiMarco, personal communication, July 27, 2017).

The RIDE program progressed with this curriculum until the 2015-2016 academic year when a new curriculum was introduced. This current curriculum incorporates IPE in the form of foundational science classes with UW medical students, and twice yearly patient interview sessions with medical residents at the Spokane Teaching Health Clinic (A. DiMarco, personal communication, October 30, 2017). These curriculum requirements consume a significant amount of the RIDE students' classroom time and there was no longer time for classroom IntraPE with EWU DH students. RIDE students now have a separate Periodontology course and Dental Foundations course. However,

while the classroom time has decreased with the current curriculum, the clinical time was enhanced. RIDE students now actively participate in four clinic sessions with EWU DH students instead of simply observing. These clinic sessions include activities for the RIDE students such as health history review, oral cancer screenings, periodontal charting, dental assisting, rinsing and suction, placing a rubber dam, and evaluating radiographs (A. DiMarco, personal communication, July 27, 2017). These four clinic sessions consist of the same clinical experiences with two sessions as a part of the Dental Foundations course and the other two through Periodontology (A. DiMarco, personal communication, October 30, 2017). The changes in first year RIDE curriculum related to IntraPE with DH students is shown in Figure 7.

2008 - 2015 (original curriculum)	**2015 to present (current curriculum)**
Classroom Introduction to Clinical Dentistry Periodontology	**Classroom** None
Clinic Two shadowing sessions with DH students	**Clinic** Four collaborative sessions with DH students

Figure 7. Comparison of original and current RIDE first-year curriculum with DH students.

Students in the RIDE program complete their second and third years of dental education at the UW campus in Seattle with other UW dental students. During their second year, RIDE students have a 4-week Rural Underserved Opportunities Program (RUOP) rotation in which students live in a rural or underserved community in WA working alongside local dentists to serve these communities (A. DiMarco, personal communication, October 27, 2017; UW Medicine, n.d.). The RIDE students spend approximately half of their fourth year of dental school in Seattle and the other half

returning to the RUOP for clinical rotations (A. DiMarco, personal communication, October 27, 2017; University of Washington, 2018a).

University of Washington School of Dentistry shared learning. To comply with CODA standards for IPE, all UWSOD students participate in a course called Foundations of Interprofessional Education in their third year of dental school (A. Kim, personal communication, September 13, 2017). Students who graduated in 2014 or after participated in this course. This IPE course is described as follows:

> Students will deepen their understanding of the roles of members of the interprofessional healthcare team, by communicating and co-learning, and collaborating with other health professional students and practitioners in the provision of team based care and patient education (UW School of Dentistry, 2017, para. 1).

This IPE course includes over 600 students from the following disciplines at UW: dental, medicine, physician assistants, nutrition and public health, nursing, and pharmacy (University of Washington, 2018b). Over the course of one academic year, students from these healthcare disciplines are divided into small interprofessional teams with whom they meet with three times. Students are given information ahead of time to prepare, and they work together in their interprofessional teams to develop a foundational understanding of other professional's education, roles, and skills (A. Kim, personal communication, September 13, 2017; University of Washington, 2018b). As previously described, dental students learning with other health care students, whether in their field or outside of the field, has been shown to improve attitudes towards teamwork (Brame et al., 2015; Czarnecki et al., 2014; Otsuka et al., 2016; Reeson et al., 2015) and roles and

responsibilities (Jones et al., 2017; Leisnert et al., 2012; Stolberg et al., 2012). Although there has been no research on the UW IPE course to this point, UWSOD students who participated in the course may show improved attitudes towards teamwork and roles and responsibilities from their involvement.

Summary

Current research shows shared learning is very beneficial to healthcare students in helping them understand the roles and responsibilities of healthcare professionals (Evans et al., 2010; Jacobsen & Lindqvist, 2009; Reeson et al., 2015; Ritchie et al., 2013; Stolberg et al., 2012) and preparing these providers to be efficient parts of a healthcare team (Brame et al., 2015; Czarnecki et al., 2014; Reeson et al., 2015). A limited number of students continued to possess a lack of understanding of the IPEC core competencies following their SL experiences, especially roles and responsibilities (Brame et al., 2015; Formicola et al., 2012; Reeson et al., 2015; Ross et al., 2009). It appears that SL is making significant positive changes to the group dynamic of healthcare professionals and their efficacy in providing collaborative care.

In accordance with the CODA (2015) and the WHO (2010) recommendations, the expected outcomes of the UW RIDE program as an IntraPE program would be to synthesize teamwork, improve comprehension of different roles of healthcare professionals, improve communication, acknowledge and respect ideas of other professionals, and enhance the ability to tolerate differences. There is a current need for research regarding RIDE students and their attitudes towards their IntraPE education, and a need for longitudinal studies evaluating the effectiveness of IntraPE in shaping attitudes. Because IntraPE alumni attitudes have not been widely studied, there is an

opportunity to research that population to gain a better understanding of how IntraPE experiences can shape long-term practice.

Methodology

Research Method or Design

The PI assessed the lasting effects of IntraPE among RIDE dentists using a mixed-methods approach. The RIDE and non-RIDE alumni attitudes towards DH and IntraPE with DH were measured and compared to each other. Upon consent, participants individually completed an online demographic survey including open-ended questions, and a survey adapted from the Modified RIPLS, here called the IntraPE attitudes questionnaire, administered through SurveyMonkey®. Participants were asked about professional respect, understanding others' roles, collaboration, and teamwork. A questionnaire provides an easy way for participants to partake in the research and provided anonymity for them to be honest with their answers. Quantitative descriptive data and open-ended thematic attitudinal data from surveys provided the framework for this case study research.

Procedures

Human subjects protection/informed consent. The survey was disseminated with permission of the UWSOD, and sent to participants through Dr. Pamela Nagasawa. Dr. Nagasawa is the RIDE, Director of Education and Evaluation and an assistant professor in the School of Medicine. Participants were provided an informed consent document (Appendix E). All information regarding this study was kept on the PI's personal password-protected computer. Anonymity was ensured to all participants by the PI utilizing anonymous response settings on SurveyMonkey®. There was an exception to

anonymity for those who self-identified to be included in a $100 Amazon gift-card drawing. The data analysis did not identify any individuals. All participants had the freedom to withdraw from the study at any point of their own desire without notice or consequence.

The PI was a graduate student at EWU and in order to fulfill EWU IRB requirements, approval by the EWU Institutional Review Board (IRB) was required prior to initiating the proposed research. According to the University of Washington (UW), IRB approval was dependent on EWU IRB approval. See Appendix B for correspondence between Dr. Nagasawa and Leah Miller, the Team Operations Lead for IRB at UW. The PI requested an expedited review of this study based on EWU human subjects' protocols.

Sample source, plan, sample size, description of setting. A stratified convenience sample was used for this study for pragmatic purposes. The target population was UWSOD alumni dentists who graduated from 2012-2017. RIDE dentists, depending on the year they entered into the RIDE program, had clinical and/or classroom IntraPE experience with EWU DH students during their first year of dental school (A. DiMarco, personal communication, July 27, 2017).

In the demographics section of this study's survey, students were asked the year they graduated from the UWSOD program to communicate the level of experience the individual had with shared learning. Factors that influenced results for shared learning include: RIDE clinic experience with DH students, RIDE classroom experience with DH students, RUOP rotations, and the IPE course (DENTCL 605). As the IPE course began in 2013 for junior UWSOD students, only respondents who graduated in 2014 or later

may have been influenced by this course (P. Nagasawa, personal communication, July 27, 2017). The inclusion criteria for this study was that dentists participating must have graduated in 2012-2017 from the UWSOD.

Variables.

Independent variable. The independent variables were: participation in the UW RIDE program, the year of graduating from the UWSOD, participation in additional SL activities, and previous career as a DH. The PI sought to measure if there is a specific impact the RIDE program has that differs from the traditional UWSOD curriculum and if there is a long-term impact of dentists having IntraPE with DH.

Dependent variable. The dependent variables were the scores from the 12 items adapted Modified RIPLS. Items 5-11 measured attitudes towards roles and responsibilities, and items 1-3 and 12 measured attitudes towards teamwork. These items are based on the two IPEC Competencies of Roles and Responsibilities and Teams and Teamwork (IPEC, 2016b).

Instruments. The PI used surveys to gather quantitative and demographic information. The PI used existing research as described in the literature review to choose a reliable and valid instrument.

Demographic survey. The PI designed a demographic survey that was integrated to provide descriptive statistics for the target population. Descriptive items included gender, year of graduation from the UWSOD, RIDE participation, years of clinical experience, previous career as a DH, and other IntraPE or IPE experiences. See Appendix D.

The IntraPE attitudes survey. The survey in this study is based on the subscales in the Modified RIPLS, a 19 item survey with four subscales using a 5-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5) (McFadyen et al., 2005). The Modified RIPLS is an instrument proven to be reliable and valid for evaluating IPE (McFadyen, Webster, Maclaren, 2006) and has been used to evaluate IntraPE in multiple studies (Brame et al., 2015; Brooks & Gorman, 2017; Reeson et al., 2015).

The Modified RIPLS is based on the original design by Parsell and Bligh (1999) with revisions made by McFadyen et al. (2005). See Appendix A. The research questions in this proposed study evaluated dentists' perceptions of their understanding of roles and responsibilities and teamwork. To assess these attitudes towards IntraPE, a survey was developed adapted from the concepts in the Modified RIPLS particularly pertaining to roles and responsibilities and teamwork (Appendix C). These individual categories were scored, and a total score from the survey was used to show the overall benefit of IntraPE implementation. The subscales of teamwork and roles and responsibilities correspond directly with the two IPEC Core Competencies that provide the framework for this study: roles and responsibilities, and teams and teamwork (IPEC, 2016b). Figures 8 and 9 demonstrate how the Modified RIPLS corresponds to these IPEC Core Competencies and how the Modified RIPLS was adapted for this study.

Domain 2 Roles and Responsibilities	RR: Use the knowledge of one's own role and those of other professions to appropriately assess and address the healthcare needs of the patient and populations served	Modified RIPLS Item	Adapted Modified RIPLS Item
RR1	Communicate one's role and responsibilities clearly to patients, families, and other professionals	1, 3, 9, 13, 18	8, 9, 11
RR2	Recognize one's limitations in skills, knowledge, and abilities	1, 2, 3, 6, 9, 10, 11, 13, 15, 19	1, 4, 5, 8, 9, 10, 11
RR3	Forge interdependent relationships with other professions to improve care and advance learning	1, 2, 3, 4, 8, 10, 11, 13, 14, 15, 17	1, 3, 4, 6, 7, 8, 9
RR4	Use unique and complementary abilities of all members of the team to optimize patient care	1, 2, 3, 4, 15, 16	1, 7, 8, 9

Figure 8. Modified RIPLS subscales to assess IPEC Core Competencies for IPE: Roles and Responsibilities (IPEC, 2016b).

Domain 4 Teams and Teamwork	TT: Apply relationship-building values and the principles of team dynamics to perform effectively in different team roles to plan and deliver patient-/population-centered care that is safe, timely, efficient, effective, and equitable.	Modified RIPLS Item	Adapted Modified RIPLS Item
TT3	Engage other health professionals – appropriate to the specific care situation – in shared patient-centered problem solving	1, 2, 3, 14, 15, 16, 17	1, 6, 8
TT4	Integrate the knowledge and experience of other professions – appropriate to the specific care situation – to inform care decisions, while respecting patient and community values and priorities/preferences to care	1, 2, 3, 4, 13, 16	1, 7, 8, 12
TT7	Share accountability with other professions, patients, and communities for outcomes relevant to prevention and health care	3, 6, 7, 8, 9, 13, 16, 17	2, 3, 6, 8, 10, 11, 12
TT11	Perform effectively on teams and in different team roles in a variety of settings	1, 3, 5, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17	2, 3, 4, 6, 8, 11, 12

Figure 9. Modified RIPLS subscales to assess IPEC Core Competencies for IPE: Teams and Teamwork (IPEC, 2016b).

Equipment. The PI's password protected personal laptop was used for the creation of all documents and instruments, and for data input and analysis via connection

to SPSS statistical analysis software through the EWU Virtual Lab. The PI obtained a SurveyMonkey® account to construct the demographic and IntraPE attitudes surveys. The PI use their password protected laptop exclusively for study content and data. The PI shared secure documents with a statistician for statistical analysis. Direct access to survey results was available to Nathan Skuza, statistician and assistant professor at EWU, and Dr. Pamela Nagasawa, thesis committee member and faculty in the UWSOD.

Steps to implementation. Following IRB approval by EWU and UW, the PI implemented the study. The steps to implementation took into consideration the time constraints of participants and faculty involved.

Step 1: Communicate with faculty. The PI worked closely with Dr. Nagasawa to facilitate the online survey. Dr. Nagasawa gained access to the alumni e-mail list by working with Dr. Sara Gordon, Associate Dean for Academic Affairs at the UWSOD. Dr. Nagasawa disseminated the survey URLs for the PI.

Step 2: Preparation and validation of surveys. Working with Dr. Nagasawa, the PI developed an IntraPE attitudes survey. An expert panel evaluated this survey to ensure content validity. The panel included six professors and dentists UWSOD, the Associate Dean for Academic Affairs at the UWSOD, the EWU dental hygiene graduate faculty, and one EWU dentist. After the adapted survey was validated, the PI used the SurveyMonkey® account to create two electronic surveys featuring the demographic and IntraPE attitudes survey, with one link for RIDE alumni and a separate link for non-RIDE alumni based on the needs of Dr. Gordon.

Step 3: Implementation of surveys. Participants were e-mailed to request their participation in the proposed research and provided with the link to the survey. They

were contacted via blind carbon copy (bcc) to maintain e-mail privacy and anonymity. To incentivize participation in this study, the PI offered a $100 Amazon gift card to be given to one participant randomly selected upon completion of the survey implementation. If participants chose to be included in the gift card selection, they were asked to provide their e-mail address in a question separate from the survey. Participants were sent a reminder e-mail one week after the initial e-mail is sent, and another email two weeks after. There was a one-month window in which the survey was open on SurveyMonkey®.

Summary

The intervention for this study consisted of a target population of USWOD graduates and RIDE program graduates from 2011-2017. The PI collected quantitative data and open-ended responses to compare the two groups using a demographic survey and a survey adapted from the concepts of the Modified RIPLS that used the IPEC Core Competencies to establish participant attitudes towards roles and responsibilities and teamwork, specifically towards dental hygienists. Using data collected from this study, the PI attempted to show that dentists who have had previous IntraPE with DH students perceive to have a higher respect for and understanding of the role of a DH, and have a more positive attitude towards teamwork in their clinical practice and careers when compared against dentists who did not experience DH IntraPE.

Results

Description of Sample

A convenience sample of UWSOD alumni (*N* = 409) were asked to participate in this study. RIDE alumni (*n* = 48) and non-RIDE alumni (*n* = 361) were e-mailed initially to supply the survey link and request their participation. Of the population initially contacted (*N* = 409), there were 90 responses (*n* = 90, 22.0%). Of the 90 responses, 12 were omitted due to incomplete survey responses. One response was thought to be a duplicate as there was a repeat e-mail address used to answer the question about involvement in the $100 gift card drawing. Due to incomplete or redundant data, 77 of the 90 responses (*n* = 77, 85.5%) were considered valid for data analysis: 26 RIDE responses (*n* = 26, 54.2%) and 51 non-RIDE responses (*n* = 51, 14.1%). See Figure 10 for a summary of participant inclusion and exclusion.

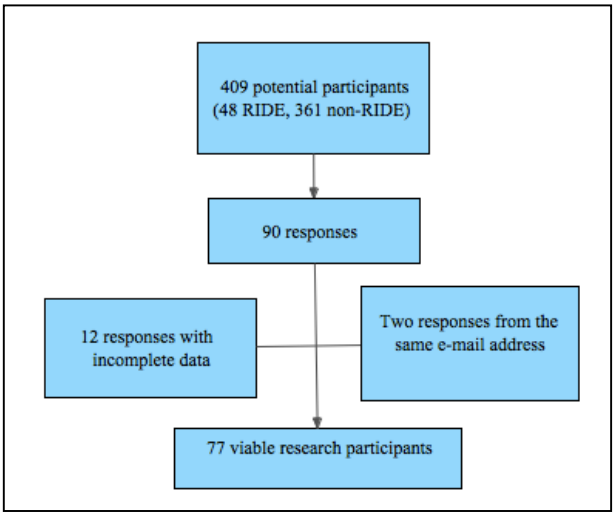

Figure 10. Inclusion and exclusion criteria for study participation.

Demographics. The majority of participants identified as men (*n* = 41, 53.8%). Of the participants, 18 graduated from dental school prior to 2014 (*n* = 18), and 59

graduated in 2014 or after (*n* = 59). Two participants identified former careers as DH before going to dental school. Table 3.1 shows a summary of participants' demographic information. The number of participants who identified IntraPE with DH students while in dental school was 37 (*n* = 37, 48.1%). Considering the number of RIDE respondents (*n* = 26), this data shows that 11 non-RIDE respondents identified having IntraPE with DH students. Given that the UW non-RIDE curriculum includes IPE but not IntraPE, some participants may have misunderstood the item and answered based on their IPE experiences.

The demographic survey included yes or no questions leading to two open-ended and questions and one Likert scale item. If participants identified they had experienced IntraPE with DH students, they were asked to describe the experience, and on a Likert scale rate how IntraPE contributed to a positive working environment in their first years of clinical practice. If participants identified they did not experience IntraPE with DH students, they were asked to identify on a Likert scale if they think their education would have benefited from formal IntraPE.

Table 1

Demographic Characteristics of Respondents

Demographic characteristics	*n*	%
RIDE	26	34.6%
Non-RIDE	49	65.4%
Gender		
Male	41	53.8%
Female	35	44.9%
Prefer not to answer	1	1.3%
Year of graduation		
2012	8	10.4%
2013	10	13.0%
2014	11	14.3%
2015	16	20.8%
2016	16	20.8%
2017	16	20.8%
Former DH		
Yes	2	2.6%
No	75	97.4%
IntraPE with DH while in dental school (both RIDE and non-RIDE)		
Yes	37	48.1%
No	40	51.9%

Statistical Analysis. The IntraPE attitudes survey and demographic survey was used to analyze the IPEC Core Competencies of roles and responsibilities and teamwork, in addition to overall IntraPE attitudes. Using these subscales and comparing the two groups of respondents (RIDE and non-RIDE dentists), inferential and descriptive statistics tests in SPSS Version 24 analyzed the responses. Quantitative data from the IntraPE attitudes survey was gathered for both RIDE and non-RIDE groups. The scores from the adapted Modified RIPLS were evaluated for responses for individual items, on each subscale, and for the entire scale. In the IntraPE attitudes survey, items 1, 2, 3, and 12 pertain to the subscale of teamwork, and items 5-11 relate to roles and responsibilities.

All items were analyzed together to gather general attitudes about IntraPE. All quantitative items were on a Likert scale where 5 = Strongly Agree and 1 = Strongly Disagree. T-tests tested for differences between the RIDE and non-RIDE dentists. Table 2 shows the mean aggregate responses for the three subscales. Table 3 shows the average responses to each item between RIDE and non-RIDE respondents. Thematic data was collected using open-ended questions to assess respondent's attitudes towards IntraPE with DH in dental school.

Table 2

RIDE and non-RIDE descriptive statistics by subscale

Subscale	RIDE (sd)	Non-RIDE (sd)	*p*-value
Aggregate Teamwork (Items 1-3, 12)	4.35 (.73)	4.48 (.47)	.400
Aggregate Roles and responsibilities (Items 5-11)	3.39* (.62)	3.69* (.44)	.014*
Aggregate Overall IntraPE attitudes (All items)	3.73 (.59)	3.95 (.39)	.091

Note. The Roles and responsibilities subscale shows statistical significance (p = .014) in the difference of answers between RIDE and non-RIDE. *p <.05

Table 3

Descriptive statistics for RIDE and non-RIDE respondents

Item	RIDE (sd)	Non-RIDE (sd)	*p*-value
1. Patients benefit when dentists and dental hygienists work together to solve patient problems.	4.38 (.80)	4.54 (.50)	.347
2. Dentists and dental hygienists should learn team-working skills.	4.46 (.76)	4.51 (.61)	.764
3. Dentists and dental hygienists need to trust and respect each other.	4.69 (.84)	4.63 (.63)	.704
4. Dental students should learn with dental hygiene students.	3.65 (.94)	3.65 (.99)	.977
5. Dentists have more knowledge and skills than dental hygienists.	4.00 (.87)	4.04 (.87)	.854
6. The primary function of a dental hygienist is to provide support and assistance to the dentist.	2.88 (.99)	3.02 (1.03)	.584
My perception of shared learning with dental hygiene students during dental school is that it can…			
7. …improve working relationships between dentists and dental hygienists after graduation.	3.69 (1.0)	4.10 (.64)	.070
8… increase a dentist's ability to understand clinical problems.	3.04 (.10)	3.34 (.96)	.158
9. … increase a dental hygienist's ability to understand clinical problems.	3.50* (.95)	4.12* (.55)	.004*
10. … help dentists to think positively about dental hygienists.	3.61 (1.06)	3.92 (.66)	.187
11. …. help dentists understand their own clinical limitations.	2.96 (1.22)	3.29 (1.01)	.205
12. … help both professionals work more effectively as a team.	3.85 (1.1)	4.24 (.62)	.099

Note. Item #9 shows statistical significance (p = .004) in the difference of answers between RIDE and non-RIDE. *p <.05

Summary of first research question. "Do dentists who participated in the RIDE program understand their role and responsibilities related to the DH better than dentists who had no formal IntraPE with DH students?" Items 5-11 from the adapted Modified RIPLS applied to this research question. One RIDE respondent did not answer item 6, otherwise all responses were complete. For RIDE and non-RIDE respondents, the greatest percentage of responses (65.4%) fell between 4 (Agree) and 3 (Neutral). Aggregate RIDE average responses were 3.39 with a median 3.5 of and a mode of 2.86. For the aggregate of non-RIDE responses, the mean response was 3.69 with a median and mode of 3.57. Independent *t*-tests were applied to compare the mean responses to these items. The average response for RIDE respondents related to roles and responsibilities was 3.39 and the non-RIDE response average was 3.69. The mean difference between the two groups was 0.31, with non-RIDE respondents identifying more strongly that IntraPE with DH students improves the understanding of the roles and responsibilities of dentists and dental hygienists ($t = 2.508$, df = 75, $p = 0.14$). See Table 4 for results in mean responses between RIDE and non-RIDE and statistical significance.

Table 4

Roles and responsibilities questions and descriptive statistics

Item	RIDE mean (sd)	Non-RIDE mean (sd)	*p*-value
5. Dentists have more knowledge and skills than dental hygienists.	4.00 (.87)	4.04 (.87)	.854
6. The primary function of a dental hygienist is to provide support and assistance to the dentist.	2.88 (.99)	3.02 (1.03)	.584
My perception of shared learning with dental hygiene students during dental school is that it can…			
7....improve working relationships between dentists and dental hygienists after graduation.	3.69 (1.02)	4.10 (.64)	.070
8…. increase a dentist's ability to understand clinical problems.	3.04 (1.00)	3.34 (.96)	.158
9…. increase a dental hygienist's ability to understand clinical problems.	*3.50 (.95)	*4.12 (.55)	*.004
10…. help dentists to think positively about dental hygienists.	3.61 (1.06)	3.92 (.66)	.187
11….. help dentists understand their own clinical limitations.	2.96 (1.22)	3.29 (1.01)	.205
Aggregate Roles and Responsibilities	***3.39 (.62)**	***3.69 (.44)**	***.014**

Note: Item #9 (p = .004) and the roles and responsibilities aggregate responses (p = .014) show statistical significance in the difference of answers between RIDE and non-RIDE. *p <.05

The only item pertaining to roles and responsibilities that presented statistically significant differences between RIDE and non-RIDE responses was #9 that stated: My perception of shared learning with dental hygiene students during dental school is that it can increase a dental hygienist's ability to understand clinical problems. The RIDE alumni responses generally rated this statement lower than non-RIDE; the mean response for RIDE was 3.50 (between Agree and Neutral), with a non-RIDE mean response of 4.12 (Agree) (t = 3.065, df = 33.905, p = .004). See Figure 11 for a comparison of RIDE and non-RIDE responses to item #9.

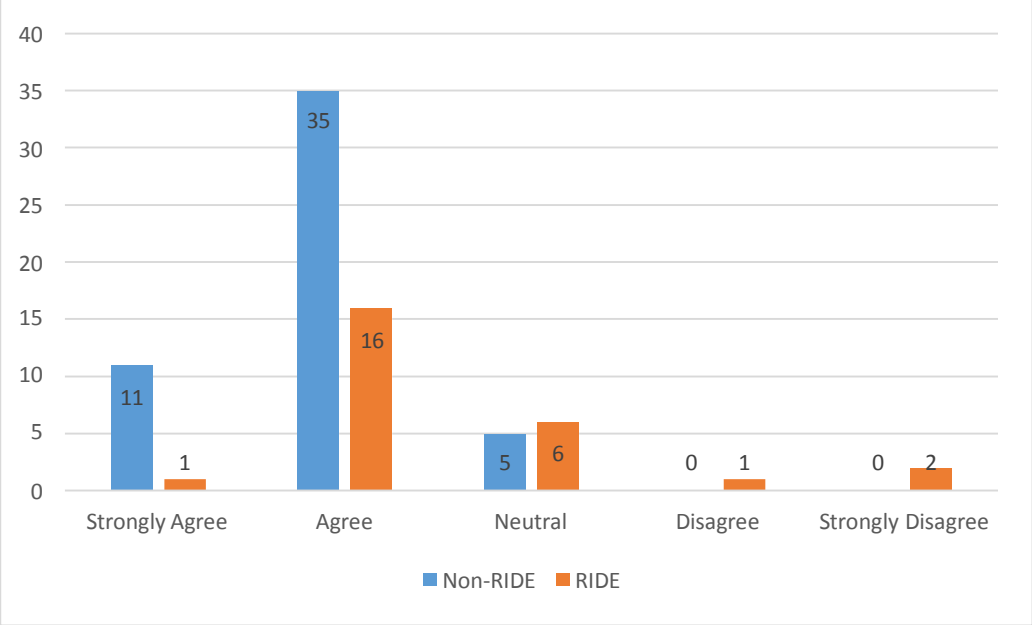

Figure 11. Frequencies and distribution Item #9: My perception of shared learning with dental hygiene students during dental school is that it can increase a dental hygienist's ability to understand clinical problems.

Summary of second research question. "Do RIDE dentists perceive there are better teamwork dynamics with their dental hygienists compared to non-RIDE dentists, due to their IntraPE experience with DH students?" Items 1-3 and 12 in the survey correspond to this construct. The responses between RIDE and non-RIDE respondents were compared to each other using independent *t*-tests. Of the RIDE respondents, 61.5% Agreed (4) or Strongly Agreed (5) they have positive attitudes towards teamwork with their DH, however, their perceptions were not statistically significant compared to the non-RIDE responses (t = .980, df = 75, p = .330, two-tailed). The aggregate mean response for RIDE was 4.34 with a median and mode of 4.75. The aggregate mean for non-RIDE respondents was 4.48 with a median of 4.5 and a mode of 4.75. See Table 5 for differences between RIDE and non-RIDE responses related to teamwork.

Table 5

Teamwork items and descriptive statistics

~~Item~~	RIDE mean (sd)	Non-RIDE mean (sd)	*p*-value
1. Patients benefit when dentists and dental hygienists work together to solve patient problems	4.38 (.80)	4.54 (.50)	.347
2. Dentists and dental hygienists should learn team-working skills	4.46 (.76)	4.51 (.61)	.764
3. Dentists and dental hygienists need to trust and respect each other	4.69 (.84)	4.63 (.63)	.704
My perception of shared learning with dental hygiene students during dental school is that it can…			
12....helps both professionals work more effectively as a team	3.85 (1.08)	4.24 (.62)	.099
Aggregate Teamwork	**4.35 (.73)**	**4.48 (.47)**	**.400**

Demographics and impact on IntraPE attitudes. No RIDE respondents and two non-RIDE respondents (*n* = 2, 3.9%) identified they had a career as a DH before becoming a dentist. There was a difference in responses when comparing the non-RIDE former DH to non-RIDE dentists without DH experiences: 3.25 to 4.47 for teamwork, 3.29 to 3.60 for roles and responsibilities, and 3.25 and 3.89 for overall IntraPE attitudes, respectively. Although there was a difference in responses between dentists who were or were not former DH, because of the small number (*n* = 2) of former DH, the statistical significance is not valid or generalizable. Independent *t*-tests showed there was statistical significance pertaining to attitudes towards teamwork and overall IntraPE attitudes (teamwork *t* = 4.447, df = 49, *p* = .000, two-tailed; roles and responsibilities *t* = 1.338, df = 49, sig = .187; overall IntraPE attitudes *t* = 2.791, df = 49, *p* = .007).

Examining the graduation year would determine if student participation in the UW IPE course (DENTCL 605) had an impact on their attitudes towards IntraPE. Those

who graduated in 2014 or after would have participated in the IPE course. A few RIDE respondents graduated between 2012-2013 (n = 8, 30.8%), and 18 graduated in 2014 or after (n = 18, 69.2%). For RIDE respondents, the year of graduation did not have statistical significance for teamwork (t = 1.029, df = 24, p = .314), roles and responsibilities (t = .741, df = 24, p = .466), or overall IntraPE attitudes (t = 1.016, df = 24, p = .320). For non-RIDE respondents, the year of graduation also did not have statistical significance for teamwork (t = .228, df = 49, p = .821), roles and responsibilities (t = -.492, df = 49, p = 6.25), or overall IntraPE attitudes (t = -.277, df = 49, p = .783).

Thematic attitudes from open-ended responses. Thematic analysis was used to identify prominent themes from open-ended questions in the demographic survey. Once themes were identified, they were analyzed quantitatively by finding the frequency with which these themes appeared in the sample. Respondents were asked whether or not they participated in IntraPE with DH students while in dental school. If they responded yes, they were asked two open-ended questions and one Likert scale item. The open ended questions were as follows: a) Please describe the IntraPE learning experience, and b) Please describe how these learning experience(s) impacted and translated into your working relationship with dental hygienists in real-life practice.

RIDE responses. All 26 RIDE respondents except for one identified they had IntraPE with DH students during their first year of dental school. There was one RIDE student who had a slightly different curricular experience, and therefore was not included in IntraPE with EWU DH students (P. Nagasawa, personal communication, March 13, 2018). For the question “Please describe the IntraPE learning experience,” 24 of the 26

RIDE alumni responded (92%). Of those responses, 77% (*n* = 20) described classroom interaction, 33% (*n* = 8) identified some type of clinical experience, and 8% (*n* = 2) described working on an IntraPE team project. Clinical interaction mostly reported observing third year DH students and assisting them. These responses are consistent with the first-year RIDE curriculum from 2008-2014. Some examples of responses for the type of IntraPE experienced is described in Table 3.6.

Table 6

RIDE responses describing IntraPE with DH students

Thematic Category	Responses
Classroom experiences (*n* = 20, 77%)	"We had certain joint classes during dental school with Eastern Washington University Dental Hygiene students." "Took intro to clinical dentistry and perio with dental hygiene students." "We had classes during our first year with year 1, 2, and 3 level hygiene students." "Worked on an intraprofessional project with a hygienist in my group."
Clinical Experiences (*n* = 8, 33%)	"I believe the only time we were with hygiene was when we were in clinic learning to probe." "Assisting dental hygienists during the first year of dental school" "I had my first clinical experiences in a predominantly hygiene-oriented clinic, taught sometimes even by third-year hygienists (students) themselves."

Respondents were then asked to describe how IntraPE learning experiences translated into working relationships with DH in real-life practice. A total of 21 out of the 26 RIDE respondents (81%) gave responses to this question, and 17 (81%) of these comments reflected satisfaction with the IntraPE RIDE experience. The majority of these

were positive responses and fell into four main categories: teamwork (*n* = 8, 38%), roles and responsibilities (*n* = 6, 29%), improved relationship with DH (*n* = 8, 38%), and patient benefits (*n* = 3, 14%). There were some negative responses, with five respondents (24%) describing IntraPE did not impact their attitudes towards the DH. One respondent commented that the IntraPE experience was too early in both dental and DH student education to have an impact, and another respondent commented that early combined learning is best. Thematic analysis of these responses is shown in Table 7.

Relationship between RIDE and thematic responses. The RIDE respondents who identified having IntraPE with DH students were asked if the experience contributed to positive working team dynamics with DH in practice. The mean response was 3.72, with a median of 4.00 and mode 4.00. The distribution of responses, and comparison to non-RIDE responses, is shown in Figure 12. The greatest number of RIDE respondents (*n* = 12, 48%) Agreed (4) that IntraPE with DH positively affected their working team dynamic after school, with the next largest group being Neutral (3) (*n* = 8, 31%).

Table 7

RIDE Thematic Analysis

Thematic Category	Key terms	Responses
Positive aspects	Teamwork (*n* = 8, 38%)	"This has helped shape who I want to be in the team." "It gave me a better understanding of their training and education process as well as how this translates to their role on the dental team."
	Roles and responsibilities (*n* = 6, 29%)	"Learn alongside people who we would someday work beside. This allowed us to understand what they learn and know." "It helped to look at dentistry from a hygienist [sic] point of view." "My experience with this course with hygienists helped understand their knowledge base, which was more extensive than I had expected." "I respect the profession and the effort and learning that occurs during their education." "It was helpful to see the training the dental hygienists receive, because it allowed me to better understand their scope of practice and knowledge. I have a lot of respect of the amount of work hygienists have to do…" "It was valuable in getting perspective and insights from those in different disciplines within dentistry."
	Improved relationship (*n* = 8, 38%)	"Most noticeably my experience made me start to appreciate the relationship between hygienist and dentist and made me more observant of the professionals around me." "This experience translated into a more trusting relationship at the post-graduate level with hygienists." "Able to quickly develop a flow with my hygienist after dental school because I was able to better understand what the breadth of their training was and what they expect from their partner dentist…It made more of a team dynamic in the workplace as opposed to I'm the dentist and you work for me."
	Patient benefits (*n* = 3, 14%)	"It has always been my feeling that when we collaborate to come up with the best treatment we both feel the patient will need then the patients will end up with the best results."
Negative Aspects	Not useful (*n* = 5, 24%)	"(IntraPE) didn't at all." "Not at all" I don't think they (IntraPE with DH) impacted my current real life relationship."
	Too early to impact (*n* = 1, 5%)	"Unfortunately, the experience did not impact/translate into very much. Neither dental students or hygiene students knew enough about anything to really value the experience."
	No real-life application (*n* = 1, 5%)	"I have not worked with dental hygienists in real life practice."

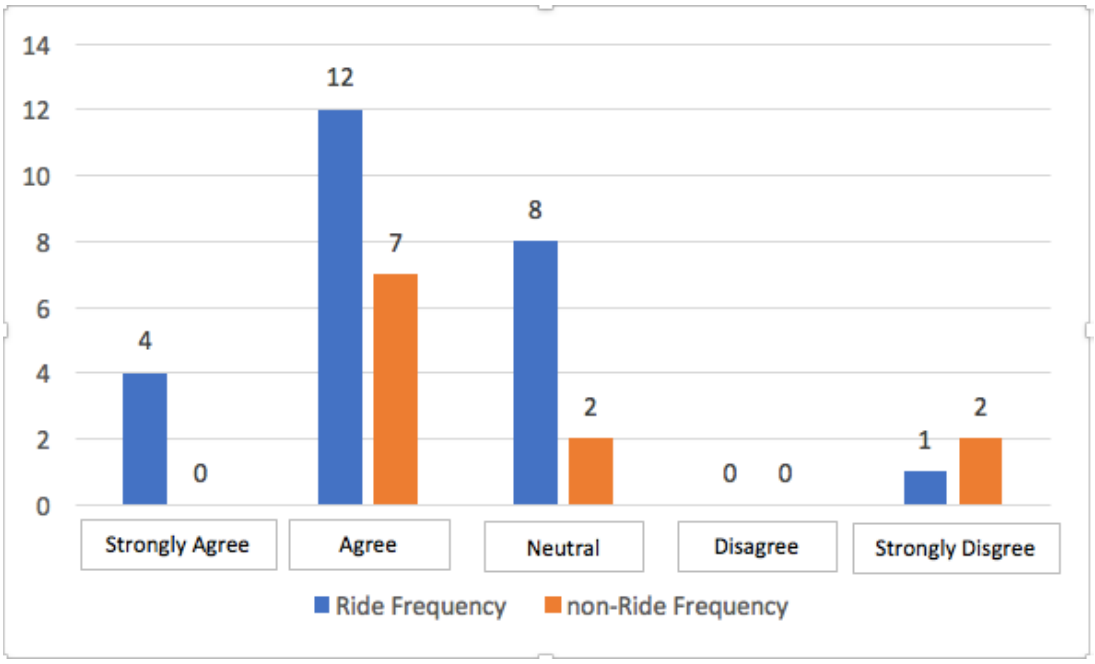

Figure 12. Frequencies and distribution: Intraprofessional learning with dental hygienists contributed to a positive working team dynamic in my first years of practice.

Non-RIDE responses. There were some non-RIDE respondents who identified they had IntraPE with DH while in dental school (*n* = 12, 24%). The common themes among the type of described IntraPE experience was through classroom interactions (*n* = 3, 25%), service learning (*n* = 2, 17%), and clinical rotations (*n* = 2, 17%). One participant (*n* = 1, 8%) commented they were taught classes by DH. Three respondents (*n* = 3, 25%) who did not identify the type of IntraPE they experienced commented that the experience was a "complete waste of time, no one discussed dental," and that IntraPE had "no impact whatsoever." Since these responses did not describe the type of IntraPE they experienced, these results cannot be specifically applied to IntraPE with DH students.

Thematic analysis of responses to the second question, asking respondents to describe how IntraPE impacted and translated into working relationships with DH, are

shown in Table 3.8. There were 11 (22%) non-RIDE responses recorded for this question. The three main themes of positive aspects were teamwork (*n* = 3, 27%), roles and responsibilities (*n*= 4, 36%), improved relationship with DH (*n* = 4, 36%), and overall IntraPE attitudes (*n* = 1, 9%). The negative and "Not useful" responses (*n* = 4, 36%) were from respondents who did not identify the type of IntraPE experience they had. One respondent commented, "It was interesting to see how other professionals would look at a medical patient, but usually they did not incorporate much for the dentists to do." They may have been referring to IPE, not IntraPE, and therefore their responses may not accurately represent IntraPE attitudes.

Table 8

Non-RIDE Thematic Analysis

Thematic Category	Key terms	Responses
Positive aspects	Teamwork (*n* = 3, 27%)	"To always listen and get input from all your team members. It widens your perspective on the matter." "We were all students together, so I got to see them as equals, not as a boss."
	Roles and responsibilities (*n* = 4, 36%)	"I better appreciate where they are coming from, how thorough their training can be, how capable and knowledgeable they are, and how valued their hand skills should be!" "More respect for hygienists and the work they do."
	Improved relationship (*n* = 4, 36%)	"Further reinforces our collegial and collaborative relationship." "Gave me respect and perspective of that profession."
	Overall IntraPE attitudes (*n* = 1, 9%)	"It was very enriching and I would like to see more of it incorporated into our curriculum."
Negative Aspects	Not useful (*n* = 4, 36%)	"Waste of time. No one discussed dental." "No impact whatsoever."
	Roles and responsibilities (*n* = 1, 9%)	"Hygienists at my sight [*sic]* were calling gingivitis w/2-3mm pockets periodontitis. They treatment planned SRPs instead of prophies at times."

Of those non-RIDE respondents who identified they had experienced IntraPE during dental school, they were asked to respond to a Likert scale item: Intraprofessional education with dental hygienists contributed to a positive working team dynamic in my first years of practice. There were 11 (22%) respondents to this question with a mean response of 3.72, a median of 4.00 and mode of 4.00.

If non-RIDE respondents identified they had not had IntraPE with DH during dental school, they were asked to respond to the following Likert scale item: Do you think it would have benefited your educational experience to have intraprofessional learning with dental hygiene students? This item gained 43 responses (n = 43, 77%) with a mean of 3.7, median 4.00 and mode 4.00. The frequency and distribution of these responses is shown in Figure 13. The largest percentage of responses (n = 20, 47%) shows that respondents Agreed (4) that IntraPE would have benefited their educational experience in dental school and 14 (n = 14, 33%) were Neutral (3).

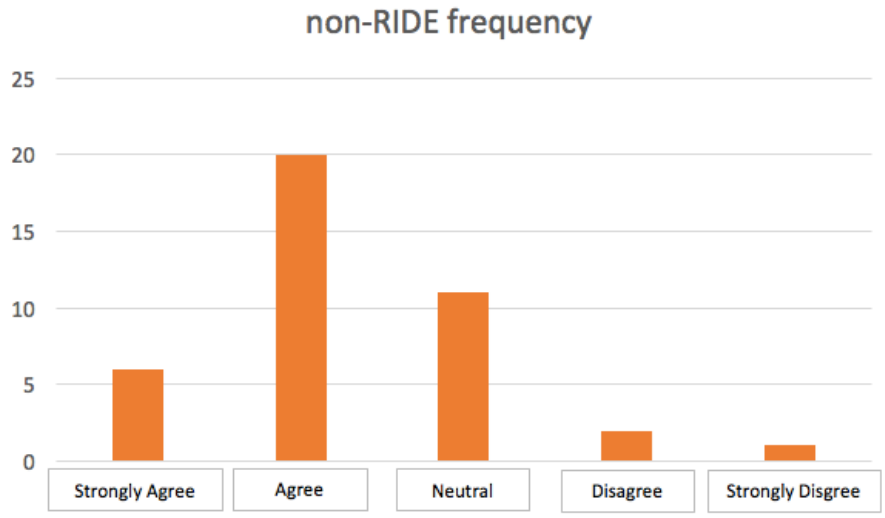

Figure 13. Frequency Distribution: Do you think it would have benefited your educational experience to have intraprofessional learning with dental hygiene students?

Discussion

Summary of Major Findings

This study sought to find if there is a difference in attitudes between dentists who participated in the UW RIDE program and those who did not regarding teamwork with the DH and understanding their roles and responsibilities. Using both quantitative and open-ended questions, information was gathered about these attitudes. Results from the IntraPE attitudes survey showed similar scores between RIDE and non-RIDE respondents, with the mean scores for all subscales being somewhat lower among RIDE respondents. The findings of this study were:

- While the majority of RIDE participants agreed or strongly agreed IntraPE was useful overall and improved attitudes towards teamwork, there were no statistically significant differences between RIDE and non-RIDE.
- There was a statistically significant difference between RIDE and non-RIDE (p = .014) regarding attitudes towards roles and responsibilities.
- Open-ended responses showed generally positive thematic evidence towards IntraPE, with many RIDE respondents feeing it enhanced their education and non-RIDE expressing they wished they had formal IntraPE in their dental school curriculum.

Based on this study, it can be suggested the RIDE program helps improve perceived attitudes towards teamwork; however, the RIDE IntraPE experience has mixed results in helping dentists understand the roles and responsibilities of a DH. This aligns

with other research, suggesting that IntraPE and IPE improves attitudes towards teamwork (Brame et al., 2015; Brooks & Gorman, 2017; Curran, Sharpe, Flynn, & Button, 2010; Stolberg et al., 2012), and that more needs to be done in these programs to teach students about the roles and responsibilities of other health professionals (Brame et al., 2015; Czarnecki et al., 2014).

Discussion

To further understand the outcomes of this study, data collected from the statistical tests mentioned above were analyzed and discussed in this section. This section is organized by the demographic data and the main subscales of this study: overall IntraPE attitudes, teamwork, and roles and responsibilities.

Demographic. The number of non-RIDE responses were limited compared to RIDE. One possible explanation for this is the personal relationship RIDE alumni have with Dr. Nagasawa, who disseminated the surveys. The RIDE alumni knowing Dr. Nagasawa personally and receiving an e-mail from her may have enhances to RIDE participation. There was no statistical significance between gender and IntraPE attitudes (p = .213).

Respondents were asked for their year of graduation to determine two things: how long they have been in clinical practice, and if they participated in the UW IPE course (DENTCL 605). There was no statistical significance (p = .386) between the year of graduation and attitudes towards IntraPE. This would imply the addition of the IPE course (DENTCL 605) to dental students' curriculum did not affect attitudes towards IntraPE. The IPE course involves students from other health professions and does not include DH students.

Research done by Nasser Al Harthy et al. (2015) surveying IPE student participants used the Modified RIPLS before, during, and 3-4 months after IPE. During IPE, RIPLS scores significantly increased for all participants, however student scores fell back to pre-test level 3-4 months after the IPE experience concluded. Since the RIDE respondents in this study completed their IntraPE intervention between four and nine years ago, it is possible that results do not show statistical significance between RIDE and non-RIDE because their levels have fallen back to pre-intervention level.

There was a statistically significant ($p < .05$) difference in responses of those who identified themselves as a former DH before becoming a dentist and attitudes towards teamwork ($p = .000$) and overall IntraPE attitudes ($p = .007$) with the former DH having lower rated responses. It is important to note there were only two former DH identified in this study, so these results are limited and lack validity. These results are surprising given that in other IntraPE studies, DH participants have even stronger attitudes towards teamwork than dental students (Brame et al., 2015). It is possible that there was a bias that was not addressed with a simple identification of whether someone was a previous DH, and adding another question to the demographic survey could help show why these attitude differences are revealed.

Teamwork. This study explored if the RIDE program's IntraPE with DH students is a way to help improve a dentist's attitudes toward teamwork after graduation. Based on the quantitative data alone, the answer would seem to be that there is little to no difference between dentists who participated in RIDE or not. Responses from RIDE students were, on average, in agreement (61.5%) that IntraPE with DH had a positive impact on teamwork with DH in real-life practice. None of the individual items in the

survey pertaining to teamwork had statistically significant answers between RIDE and non-RIDE respondents. One suggested reason for this type of response is offered by Jones et al. (2017). In their study between DH and dental student participants, DH students had higher expectations of the IntraPE program than dental students did, which resulted in different gaps between expectations and satisfaction with the program. Perhaps because RIDE students participated in IntraPE with DH students, while most non-RIDE respondents did not, the resulting gap in responses to teamwork is due to a difference in expectations of how influential IntraPE should be. As this study did not analyze expectations of IntraPE, it is impossible to know what that impact could be.

Even though the quantitative results were not statistically significant, the open-ended responses placed an emphasis on positive team dynamics in real-life practice as a direct result of IntraPE in the RIDE program. These findings are consistent with research by Curran et al. (2010), who found that while curriculum evaluations showed little change in student attitudes towards IPE, students generally had positive attitudes towards IPE. Similarly, in the study by Stolberg et al. (2012), dental students identified they had improved team management skills and communication with team members following IntraPE. In this study, one RIDE participant commented that IntraPE helped them quickly develop a flow with their DH, gain trust, and emphasize a team dynamic in the office. Another participant commented that they better understand DH training and education and that this translates to the dental team. Even the language of one comment suggests a more team-minded approach to dentistry: It allowed us to work alongside people who we would someday work *beside* (added emphasis). This allowed us to understand what we

learn and know. Another participate commented, "It made more of a team dynamic in the workplace as opposed to I'm the dentist and you work for me."

Roles and responsibilities. The roles and responsibilities category had the strongest statistical significance comparing RIDE to non-RIDE (p = .014). A study of IntraPE between dental, DH and dental assisting students by Brame et al. (2015) suggested that even after IntraPE, participants understood their own roles but still had a limited understanding of other team member's roles. Dental students in particular expressed they needed more interaction with other dental professionals during school to prepare them for practice (Brame et al., 2015). Studies have found that role-related experiences should be added into shared learning programs to challenge students to learn more about other's roles and responsibilities (Brame et al., 2015; Czarnecki et al., 2014). These results bring up several issues, including professional stereotypes, faculty training, and the different ways IntraPE can be implemented.

Professional identity. It has been suggested by Jones et al. (2017) that part of the limited understanding of roles and responsibilities comes from underlying professional stereotypes. Early on, students tend to adopt their professional identity and subsequent behaviors by observing the behaviors of others (Khalili et al., 2014). If faculty are not properly trained in IntraPE, they can potentially impress negative stereotypes and biases on their students (Brame et al., 2015). Universities have been remiss in helping faculty develop the experience they need to move shared learning forward (Hall, 2005). Without training, faculty members are not prepared to develop shared learning programs and bring multiple perspectives from different health professions into discussion (Abu-Rish et al., 2012). Multiple studies call for improved faculty training to improve shared learning

experiences for health care students to help students' understanding of roles and responsibilities (Abu-Rish et al., 2012; Furgeson & Inglehart, 2017; Hall, 2005; Hawkes et al., 2013; Khalili et al., 2014). This study did not explore what faculty training was involved in the RIDE program to support and promote the understanding of roles and responsibilities. Future research should examine the level of training faculty receive in order to successfully implement IntraPE between dental and DH students to help them understand one another's roles and responsibilities.

Lower scores for roles and responsibilities after IntraPE among healthcare students has occurred in other studies as well (Brooks & Gorman, 2017; Czarnecki et al., 2014). One study by Ross et al. (2009) found there was no relationship between previous IntraPE between dental and DH students and dental students having a better understanding of the clinical abilities and responsibilities of other dental professionals. It is suggested by Brooks and Gorman (2017) that IntraPE can cause role-blurring of professional identities between assumed roles and hierarchy of responsibilities. As professional identity has been found to be a main barrier to effective IntraPE, role blurring is an important concept to explore (Brame et al., 2015; Evans et al., 2010).

Role blurring can make team members feel they are under- or over-utilized if roles and responsibilities have not been clearly defined (Hall, 2005). Overlapping obligations can cause roles to overlap and become indistinct. Conversely, role blurring can enhance care by allowing workloads to be shared among health professionals and aid professional development by allowing team members to learn new knowledge and skills (Sims et al., 2015). Brooks and Gorman (2017) suggest that role blurring was what allowed their students to work well together as teams. As the Brooks and Gorman (2017)

study took place immediately following an IntraPE experience, and this study is years after IntraPE, it is difficult to say if role blurring played a part in these results. Additionally, since the RIDE respondents in this study were first year dental students when their IntraPE took place, it is possible the intervention occurred before they developed a sense of professional identity to understand the roles and responsibilities of other dental professionals.

There is a question of what the best timing is to implement shared learning. One participant in this study commented that the IntraPE part of RIDE happened too early in both the dental and DH students' educations. "Unfortunately, the experience did not impact/translate into very much. Neither dental students or hygiene students knew enough about anything to really value the experience." However, another RIDE respondent commented, "I believe that the best time to have such a combined learning experience is at the beginning of our educational journeys, before our educational pathways diverge." This returns to the question of professional identity and whether early or late curriculum intervention of IntraPE is optimal. There is research on both sides to support and dispute this idea.

When learners are educated in isolation of those in related professions, they graduate with a silo identity (Hall, 2005; Khalili et al., 2014). This type of silo identity created persistent negative stereotypes towards other professionals (Khalili et al., 2014). According to Hawkes et al. (2015), since students see each other as more similar to one another at the beginning of their studies compared to later, early IntraPE intervention would "exploit the lower level of prejudice, allowing more positive attitudes to develop" (p. e2). Although one RIDE response in our survey suggested they did not have enough

of a developed professional identity to benefit from IntraPE, the majority of and most current research supports early educational intervention of IntraPE or IPE (Abu-Rish et al., 2012; Hall, 2005; Hawkes et al., 2013; Khalili et al., 2014).

There was no statistical significance between RIDE (mean = 2.96) and non-RIDE (mean = 2.63) respondents when asked if IntraPE can improve a dentist's understanding of clinical problems (t = 1.426, df = 75, p = .158). However, there was a statistically significant difference between the groups when asked if IntraPE can help the DH improve their understanding of clinical problems (t = 3.065, df = 33.905, p = .004). On average, the RIDE responses were neutral (mean = 3.5), where non-RIDE students were more likely to agree (mean = 4.12). These responses show that while neither group thinks IntraPE helps dentists understand clinical problems, it is possible non-RIDE respondents think IntraPE would help a DH more. It can be suggested that participation in RIDE helped those dentists see that the DH is competent and more capable of solving clinical problems without needing additional help from a dentist compared to dentists who did not have those formal IntraPE interactions.

IntraPE intervention. The IntraPE curriculum RIDE alumni took part in was primarily in the classroom with limited clinical interaction. They had two lecture courses with DH students which included group projects and case studies, with the curriculum at that time allowing RIDE students to observe the DH students in clinic with no collaborative patient care experiences. While Brooks and Gorman (2017) found IntraPE can be provided effectively in a non-clinical classroom setting, other studies firmly support clinical shared learning as the superior method to help students understand the roles and responsibilities of other health professionals (Brame et al., 2015; Curran et al.,

2010; Czarnecki et al., 2014). Brame et al. (2015) found all allied dental students thought clinical integration of IntraPE should take priority over classroom, with dental students wanting to focus exclusively on clinical models for shared learning. In research by Curran et al. (2010), students favored face-to-face learning and the use of standardized patients for case studies.

Additional research is needed on clinical versus classroom interaction for IntraPE effectiveness. With the change of the RIDE curriculum starting in the 2015-2016 academic year, there is a greater emphasis on shared, collaborative clinical interaction with DH students and less classroom time. With consistent evidence that clinical experiences are more beneficial than classroom, it would be helpful to survey RIDE alumni once this current curriculum has been underway for several years.

Open-ended themes and attitudes. The quantitative results from this research show little to no relationship or statistical significance between RIDE and non-RIDE. When answering the open-ended questions, however, RIDE respondents had generally positive comments about IntraPE in teamwork, roles and responsibilities, professional relationships and improved patient care. In 81% (n = 17) of comments from RIDE alumni, they expressed positive attitudes about their IntraPE experience. Even some non-RIDE (n = 4, 36%) respondents commented that IntraPE can further reinforce collegial and collaborative relationships. One non-RIDE participant said they would like to see more IntraPE incorporated into their curriculum. These attitudes were also seen in research by Curran et al. (2010) who found that although students showed little change in their attitudes towards teamwork as a result of IPE introduction into curriculum, they reported generally positive attitudes towards IPE and teamwork.

It is important to distinguish that since this is a study of attitudes, individual personalities come into effect in regarding participant responses. Some people value different principles more highly than others. As one RIDE participant commented, "I am doubtful that inter-professional learning experiences will change the attitudes of the bad apples -- arrogant, money hungry dentists sneak into the profession and are everywhere." Another RIDE participant stated:

> …to me, the idea of health, interdependent, patient-focused working relationship between dentists and dental hygienists is common sense. However, I think the program experience factors tremendously into how I operate. Nothing like real interaction or experience to solidify a concept and make it more of who you are. So the learning experiences made the understanding concrete, and provided lots of day-to-day examples which, as with any relationship, made future work with hygienists that much more fluid.

This is an individual who already values patient-focused working relationships between DH and dentists, so IntraPE further enforced those values for them. For individuals who have different values, they may not reflect that IntraPE was as beneficial for them.

There may have been previous experiences, for both RIDE and non-RIDE dentists, that influenced their attitudes. One possible explanation showed itself in the open-ended responses. Some respondents reported that they have family members and/or friends who are DH, and having personal relationships with these DH and knowing their experiences gave the dentists greater empathy and understanding. The current body of research does not explore these attitudes. In future research, adding a question to the

demographic survey asking if the participant has close friends or family who is a DH could help explain these responses and attitudes.

Multiple responses from RIDE alumni identified IntraPE helped them understand the education and knowledge a DH has, show them what expectations they should have for a DH, and see dentistry from a different perspective. One respondent shared, "It gave me a greater appreciation for the depth of knowledge that DH acquire in their training. This has translated into a very collaborative and respectful relationship. The hygienists I work with are so valuable to our practice!" This is consistent with the study by Rosenfield et al. (2011), where students noted IPE could be useful for "tapping into the expertise of other professions" (p. 474).

Limitations

This study was limited by missing data, sample size, and research methods. Due to the nature of convenience sampling, results of this study cannot be generalized as it is unknown if this sample is representative of other IntraPE programs between dental and DH students. This study only surveyed dentists who were UWSOD alumni, and therefore cannot be generalized to all dental programs. In addition, the number of responses was relatively low. There were 90 responses (22%) out of a possible 409 which limits the ability to generalize the responses to all UWSOD alumni. The percentage of RIDE participation was higher at 54.2% (n = 26). Even with a good response from RIDE respondents, the RIDE program is specialized and unique, therefore, the results of this study cannot be generalized to other IntraPE dental programs.

Since all respondents in this study graduated before the implementation of the current RIDE curriculum in 2015, this study only shows the effectiveness of the original

IntraPE curriculum. The original curriculum involved more classroom attendance with DH students and less clinical time with more observation and less hands-on patient care. This allowed for analysis of classroom IntraPE, and did not show the potential benefits of more clinical interaction. Many studies have found that clinical IntraPE is more effective and beneficial for students than classroom learning (Brame et al., 2015; Czarnecki et al., 2014; Ross et al., 2009; Stolberg et al., 2012). Additionally, due to the implementation methods of the survey, respondents may have consisted of those who are most interested and engaged in IntraPE, making it difficult to generalize findings. There was an attempt to decrease this limitation and increase sample size by offering the $100 gift card drawing to incentivize participation.

The PI for this study was the person who was involved with coding the open-ended responses. This research was limited to one coder, and would have benefited from a greater number of coders to build a consensus on appropriate themes and ensure the themes support the quantitative findings. This is an important consideration for future research.

Recommendations/Suggestions for Future Research

Future studies evaluating the RIDE program may be able to determine if the current curriculum (more clinical interaction with DH) is more effective in improving attitudes towards roles and responsibilities than the original curriculum (primarily classroom IntraPE). Further study is needed to determine how the RIDE program can effectively improve attitudes towards teamwork. Currently, the research is divided on whether early or late IntraPE curriculum is ideal. Future research is needed to determine whether IntraPE should be incorporated in curriculum early, late, or early *and* late. The

RIDE program has early IntraPE with EWU DH students, and late IntraPE in the RUOP clinical rotations done later in dental school (A. DiMarco, personal communication, April 26, 2018). Future research could examine RIDE students' attitudes before IntraPE with DH at EWU, before RUOP rotations, and after to expand the current body of research.

Surveying students prior to their graduation, as a part of one of their courses for dental school, would likely increase the sample size and make results easier to generalize to the UWSOD. However, this study sought to learn if the RIDE program as an IntraPE had positive effects in real-life practice. Surveying graduates of other dental programs that included IntraPE with DH students will help to increase the body of research on this topic.

Questions could be added to the demographic survey to help explain potential bias behind participant responses. For example, asking dentists if they have close family members or friends who are DH could clarify positive attitudes towards DH. If a dentist identifies they had a previous career as a DH, asking them to describe their experience being a DH, if their attitudes towards teamwork and roles and responsibilities have changed since becoming a dentist, and how long their DH career was could all help describe how those attitudes could change.

This study surveyed dentists about their attitudes, but did not survey DH. Future research should also research the attitudes of DH see if their perceptions of teamwork and roles and responsibilities were effected by being involved with IntraPE. Different timing of survey implementation could be explored to include DH students in results. For example, sending a survey to dental and DH alumni one year following graduation could provide insight into the effectiveness of IntraPE in real-life practice.

Conclusions

Education models in healthcare education are moving more to collaborative, team-based care (IPEC, 2011b). It is important going forward for health programs to emphasize this curriculum to improve practitioner attitudes and patient outcomes. The importance of educating faculty to effectively implement IntraPE may produce improved results with students by helping reduce bias and stereotypes. The RIDE program implementing IntraPE early in dental school curriculum is supported by other studies as being successful in reducing education silos and improving teamwork with the DH.

The quantitative data from this study shows inconclusive results regarding the RIDE program's effectiveness to help dentists facilitate teamwork with their DH. Results also suggest a need to improve dental education on the roles and responsibilities of the DH. Open-ended responses from this study show largely positive attitudes towards IntraPE and positive outcomes as a result of the RIDE IntraPE curriculum. There is more research needed to help RIDE dentists understand the roles and responsibilities of the DH as a part of the dental team. With the current body of research supporting clinical IntraPE to improve understanding of roles and responsibilities, the change in the RIDE curriculum to more clinical experiences with DH creates potential for future improvement in the understanding of roles and responsibilities of RIDE participants.

With attitudes and responses from both RIDE and non-RIDE alumni largely supporting IntraPE with DH, it is the PI's recommendation that dental schools focus their attention on partnering with DH programs to implement IntraPE, specifically in the form

of clinical teams, standardized patients, and case studies. Since there are few dental schools housed with DH and DA programs (Brame et al., 2015), dental schools will need to seek out DH programs in neighboring cities to collaborate with and create a shared curriculum. Educators must create learning opportunities for students to practice in clinical teams so they can work effectively together and understand one another. This type of curriculum has the potential to positively impact the dental team, and in turn, improve patient care.

References

Abu-Rish, E., Kim, S., Choe, L., Varpio, L., Malki, E., White, A.,…Zierler, B. (2012). Current trends in interprofessional education of health sciences students: A literature review. *Journal of Interprofessional Care, 26*, 444-451. doi: 10.3109/13561820.2012.715604

Ajjawi, R., Barton, K., Dennis, A., Rees, C. (2017). Developing a national dental education strategy: Priorities, barriers and enablers. *BMJ Open, 7*, 1-12. doi: 10.1136/bmjopen-2016-013129

Alfano, M. (2012). Connecting dental education to other health professions. *Journal of Dental Education, 76*(1), 46-50.

American Dental Association (2017a). *ADA history timeline.* Retrieved from: http://www.ada.org/en/about-the-ada/ada-history-and-presidents-of-the-ada/ada-timeline

American Dental Association (2017b). *Dental hygienist.* Retrieved from: http://www.ada.org/en/education-careers/careers-in-dentistry/dental-team-careers/dental-hygienist

American Dental Association (2018). *Dental hygienist education and training requirements.* Retrieved from: https://www.ada.org/en/education-careers/careers-in-dentistry/dental-team-careers/dental-hygienist/education-training-requirements-dental-hygienist

American Dental Association (2017c). *Licensure for US dentists.* Retrieved from: http://www.ada.org/en/education-careers/licensure/state-dental-licensure-for-us-dentists

American Dental Education Association (2017). *GoDental.* Retrieved from: http://www.adea.org/godental/

American Dental Education Association House of Delegates (2008). Competencies for the new general dentist. *Journal of Dental Education, 72*(7), 823-826.

American Dental Hygienists' Association (2017a). *Dental hygiene standard practice act overview: Permitted functions and supervision levels by state.* Retrieved from: https://www.adha.org/resources-docs/7511_Permitted_Services_Supervision_Levels_by_State.pdf

American Dental Hygienists' Association (2016). *Standards for clinical dental hygiene practice.* Access Supplement.

American Dental Hygienists' Association (2017b). *Timeline.* Retrieved from: http://www.adha.org/timeline

Bainbridge, L., & Nasmith, L. (2011). Inter and intra-professional collaborative patient-centred care in postgraduate medical education. *Members of the FMEC Consortium.*

Brame, J., Mitchell, S., Wilder, R., & Sams, L. (2015). Dental and allied dental students' attitudes towards and perceptions of intraprofessional education. *Journal of Dental Education, 79*(6), 616-625.

Brooks, S., & Gorman, R. (2017). A physical therapist and physical therapist assistant learning activity to examine student collaboration and collaboration readiness: An

interprofessional educational process. *The Internet Journal of Allied Health Sciences and Practice, 15*(1), 1-19.

Bureau of Labor Statistics (2016). *Dentists*. Occupational Outlook Handbook, U.S. Department of Labor. Retrieved from: https://www.bls.gov/ooh/healthcare/mobile/dentists.htm

Collins, M.A., Zinskie, C.D., Keskula, D.R., Thompson, A.Z. (2007. Institutional responsibilities and workload of faculty in baccalaureate dental hygiene programs. *Journal of Dental Education, 71*(11), 1403-1413.

Commission on Dental Accreditation (2015). *Accreditation standards for dental education programs.* Chicago, IL: Commission on Dental Accreditation.

Curran, V.R., Sharpe, D., Flynn, K., & Button, P. (2010). A longitudinal study of the effect of an interprofessional education curriculum on student satisfaction and attitudes towards interprofessional teamwork and education. *Journal of Interprofessional Care, 24*(1). 41-52.

Czarnecki, G.A., Kloostra, S.J., Boynton, J.R., & Inglehart, M.R. (2014). Nursing and dental students' and pediatric dentistry residents' responses to experiences with interprofessional education. *Journal of Dental Education, 78*(9). 1301-1312.

Eastern Washington University (2018). *Dental hygiene: Prerequisite requirements.* Retrieved from: https://www.ewu.edu/chsph/programs/dental-hygiene/bachelor-of-science-in-dental-hygiene--entry-level/prerequisite-requirements

Eastern Washington University (2017). *Dental hygiene.* Retrieved from: https://www.ewu.edu/chsph/programs/dental-hygiene/bachelor-of-science-in- dental-hygiene--entry-level

Evans, J., Henderson, A., & Johnson, N. (2010). The future of education and training in dental technology: designing a dental curriculum that facilitates teamwork across the oral health professions. *British Dental Journal, 208*(5), 227-230.

Evans, J., Henderson, A., & Johnson, N. (2012). Interprofessional learning enhances knowledge of roles but is less able to shift attitudes: A case study from dental education [Abstract]. *European Journal of Dental Education, 16*(4), 239-245.

Formicola, A.J., Andrieu, S.C., Buchanan, J.A., Childs, J.C., Gibbs, N., Inglehart, M.R., Kalenderian, E., Pyles, M.A., D'Abreu, K., Evans, L. (2012). Interprofessional education in U.S. and Canadian dental schools: An ADEA team study group report. *Journal of Dental Education, 76*(9), 1250-1268.

Furgeson, D., & Inglehart, M.R. (2017). Interprofessional education in dental hygiene programs and CODA standards: Dental hygiene program directors' perspectives. *The Journal of Dental Hygiene, 91*(2), 6-14.

Gilbert, J. (2005). Interprofessional learning and higher education structural barriers. *Journal of Interprofessional Care, 19*(1), 87-106. doi: 10.1080/13561820500067132

Gordon, S.C., & Donoff, R.B. (2016). Problems and solutions for interprofessional education in North American dental schools. *Dental Clinics of North America,* 811-824. doi: 0011-8532/16/$

Greiner, A.C., & Knebel, E. (2003). *Health professions education: A bridge to quality.* Washington, D.C.: The National Academies of Sciences.

Hall, P. (2005). Interprofessional teamwork: Professional cultures as barriers. *Journal of Interprofessional Care, 19*(1), 188-196. doi: 10.1080/13561820500081745

Hammer, D., Anderson, M.B, Brunson, W.D., Grus, C., Heun, L., Holtman, M.,…Gandy Frost, J. (2012). Defining and measuring construct of interprofessional professionalism. *Journal of Allied Health, 41*(2), 49-53.

Hawkes, G., Nunney, I., & Lindqvist, S. (2013). Caring for attitudes as a means of caring for patients - Improving medical, pharmacy and nursing students' attitudes to each other's professions by engaging them in interprofessional learning. *Medical Teacher,* e1-e7.

Horsburgh, M., Lamdin, R., Williamson, E. (2001). Multiprofessional learning: The attitudes of medical, nursing and pharmacy students to shared learning. *Medical Education, 35,* 876-883.

Interprofessional Education Collaborative. (2016a) *Interprofessional education collaborative announces expansion.* Retrieved from: https://nebula.wsimg.com/526457f846fbb60c0baed44008b0d890?AccessKeyId=DC06780E69ED19E2B3A5&disposition=0&alloworigin=1

Interprofessional Education Collaborative (2016b). *Core competencies for interprofessional collaborative practice: 2016 update.* Washington, D.C.: Interprofessional Education Collaborative.

Interprofessional Education Collaborative (2017). *What is interprofessional education (IPE)?* Retrieved from: https://www.ipecollaborative.org/about-ipec.html

Interprofessional Education Collaborative Expert Panel. (2011a). *Core competencies for interprofessional collaborative practice: Report of an expert panel.* Washington, D.C.: Interprofessional Education Collaborative.

Interprofessional Education Collaborative Expert Panel. (2011b). *Team-based competencies: Building a shared foundation for education and clinical practice.* Washington, D.C.: Interprofessional Education Collaborative.

Jacobsen, F., & Lindqvist, S. (2009). A two-week stay in an Interprofessional training unit changes students' attitudes to health professionals. *Journal of Interprofessional Care, 23*(3), 242-250.

Jones, V.E., Karydis, A., & Hottel, T.L. (2017). Dental and dental hygiene intraprofessional education: A pilot program and assessment of students' and patients' satisfaction. *Journal of Dental Education, 81*(10), 1203-1212.

Kaiser Family Foundation (2016, Dec 31). *Dental care health professional shortage areas*. Retrieved from https://www.kff.org/other/state-indicator/dental-care-health-professional-shortage-areas

Khalili, H., Hall, J., & DeLuca, S. (2014). Historical analysis of professionalism in western societies: implications for interprofessional education and collaborative practice. *Journal of Interprofessional Care, 28*(2), 92-97. doi:10.3109/13561820.2013.869197

Ko, J., Bailey-Kloch, M., Kim, K. (2014). Interprofessional experiences and attitudes towards interprofessional health care teams among health sciences students. *Social Work in Health Care*, *53*, 552-567. doi: 10.1080/00981389.2014.903884

Leisnert, L., Karlsson, M., Franklin, I., Lindh, L., Wretlind, K. (2012). Improving teamwork between students from two professional programmes in dental education. *European Journal of Dental Education, 5*, 17-26. doi: 10.1111/j.1600-0579.2011.00702.x

McFadyen, A.K., Webster, V.S., Maclaren, W.M. (2006). The test-retest reliability of a revised version of the readiness for interprofessional learning scale (RIPLS). *Journal of Interprofessional Care, 60*(6), 633-639. doi: 10.1080.13561820600991181

McFadyen A.K., Webster, V., Strachan, K., Figgins, E., Brown, E., Mckechnie, J. (2005). The readiness for interprofessional learning scale: A possible more stable sub-scale model for the original version of RIPLS. *Journal of Interprofessional Care, 19*(6), 595-603. doi: 10.1080/13561820500430157

Mickan, S., Rodgers, S. (2000). Characteristics of effective teams: A literature review. *Australian Health Review, 23*(3), 201-208.

Milling, L.A. (2010). A grand history: Sunstar Americas lead charge into future with a look back. *RDH,* 28-38.

Nasser Al Harthy, S., Al Subhi, N., Tuppal, C., & Reñosa, M.D. (2015). A systematic review of the selected evidences on the effectiveness of inter-professional education (IPE) in developing interprofessional learning environment. *Nurse Media Journal of Nursing, 5*(2). 76-87.

National Conference of State Legislators (2014). *Dental health professional shortage areas.* Retrieved from http://www.ncsl.org/research/health/dental-health-professional-shortage-areas.aspx

Nisbet, G., Lee, A., Kumar, K., Thistlethwaite, J., & Dunston, R. (2011). *A literature review: Overview of international and Australian developments in interprofessional health education (IPE).* Sydney, Australia: Centre for Research in Learning and Change, University of Technology.

Otsuka, H., Kondo, K., Ohara, Y., Yasuda, M., Kishimoto, N., Sunaga, M., … Shinada, K. (2016). An inter- and intraprofessional education program in which dental hygiene students instruct medical and dental students. *Journal of Dental Education, 80*(9), 1062-1070.

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

Reeves, S., Perrier, L., Goldman, J., Freeth, D., Zwarenstein, M. (2013). *Cochrane Database of Systematic Reviews, 4*(3), 1-47. doi: 10.1002/14651858.CD002213.pub3.

Ritchie, C., Dann, L., & Ford, P. (2013). Shared learning for oral health therapy and dental students: Enhanced understanding of roles and responsibilities through interprofessional education [Abstract]. *European Journal of Dental Education, 17*(1), 56-63.

Rosenfield, D., Oandasan, I., & Reeves, S. (2011). Perceptions versus reality: A qualitative study of students' expectations and experiences of interprofessional education. *Medical Eduction, 45*, 471-477.

Ross, M., Turner, S., & Ibbetson, J. (2009). The impact of teamworking on the knowledge and attitudes of final year dental students. *British Dental Journal, 206*(3), 163-167.

Ryan, M. (2016). Health Professional Shortage Areas and Scoring. *Health Resources and Service Administration.* Retrieved from

https://nhsc.hrsa.gov/corpsexperience/aboutus/nationaladvisorycouncil/meetingsummaries/06-2016-shortage-designation.pdf

Sims, S., Hewitt, G., & Harris, R. (2015). Evidence of collaboration, pooling of resources, learning and role blurring in interprofessional healthcare teams: A realist synthesis. *Journal of Interprofessional Care*, *29*(1), 20-25. doi: 10.3109/13561820.2014.939745

Steinberg, S. (2012). RIDE hits the road. *Dental Alumni News,* 30-34.

Stolberg, R., Bilich, L., & Heidel, M. (2012). Dental team experience (DTE): A five year experience. *The Journal of Dental Hygiene, 86*(3), 223-230.

Thistlethwaite, J., & Moran, M. (2010). Learning outcomes for interprofessional education (IPE): Literature review and synthesis. *Journal of Interprofessional Care*, *24*(5), 503-513. doi:10.3109/13561820.2010.483366

University of Washington (2018a). *RIDE: Mission and vision.* Retrieved from: https://dental.washington.edu/ride/missionvision/

University of Washington (2018b). *IPE opportunities at UW: Foundations in interprofessional practice*. Retrieved from: https://collaborate.uw.edu/ipe-at-uw/ipe_events_courses/

University of Washington (2017b). *Center for health sciences and interprofessional education, research and practice: National and international IPE organizations.* Retrieved from: http://collaborate.uw.edu/resources-and-publications/ipe-resources/national-and-international-ipe-organizations.html

U.S. Department of Health & Human Services (2016). *Shortage designation application and scoring process.* Retrieved from https://bhw.hrsa.gov/shortage-designation/application-scoring-process

U.S. Department of Health & Human Services (2017). [Graphic illustration currently defined HSPAs by discipline]. *Health Professional Shortage Areas by Geographic Area – Washington.* Retrieved from https://datawarehouse.hrsa.gov/topics/shortageAreas.aspx

UW Medicine (n.d.) *Rural underserved opportunities program.* Retrieved from https://depts.washington.edu/fammed/education/programs/ruop/

UW School of Dentistry (2017). *DENTCL 605: Foundations of interprofessional practice.* Retrieved from: https://dental.washington.edu/courses/dentcl-605/

Valachovic, R. (2009, May). Crossing the interprofessional divide [Blog]. Retrieved from: http://www.adea.org/uploadedFiles/ADEA/Content_Conversion_Final/about_adea/ADEA_CP_September_2009.pdf

Valachovic, R. (2014, July). Interprofessional collaboration benefits ADEA and its partners. [Blog]. Retrieved from: https://adeachartingprogress.wordpress.com/2014/07/15/interprofessional-collaboration-benefits-adea-and-its-partners/

Washington State Dental Association (2013). *2012 Dental workforce report.* Retrieved from: http://www.wsda.org/advocacy/reports/

Washington State Department of Health (2007). *Dental workforce.* Retrieved from: http://www.doh.wa.gov/portals/1/Documents/Pubs/160-001-OralHlthBurdenWorkforce.pdf

World Health Organization (2010). Framework for action on interprofessional education & collaborative practice.

Wright, A., Hawkes, G., Baker, B., & Lindqvist, S. (2012). Reflections and unprompted observations by healthcare students of an interprofessional shadowing visit. *Journal of Interprofessional Care*, (1356-1820), 1-7. doi:10.3109/13561820.2012.678507

Wright, A., & Lindqvist, S. (2008). The development, outline and evaluation of the second level of an interprofessional learning programme: Listening to the students. *Journal of Interprofessional Care*, *22*(5), 475–487.

Zeeni, N., Zeenny, R., Hasbini-Danawi, T., Asmar, N., Bassil, M., Nasser, S.,…Hoffart, N. (2016). Student perceptions towards interprofessional education: Findings from a longitudinal study based in a Middle Eastern university. *Journal of Interprofessional Care, 30*(2). 165-174.

Appendix A

Modified RIPLS

Please indicate the degree to which you agree or disagree with the statement by drawing a circle around the number of the response that best expresses your feeling.

The scale is as follows: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = 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 solve patient 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 to clarify the nature of patient problems	1	2	3	4	5
16.	Shared learning before qualification 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

E-mail corresdonce between Dr. Nagasawa and Leah Miller regarding UW IRB

From: Leah M. Miller <lemiller@uw.edu>
Sent: Tuesday, May 1, 2018 9:47 AM
To: Pamela Nagasawa
Subject: Re: TIME Sensitive - EWU Hygiene student - Master's thesis

Hi Pamela,

I agree with the information below.

Leah Miller
Team Operations Lead, IRB-D

From: Pamela Nagasawa <pnaga22@uw.edu>
Sent: Tuesday, May 1, 2018 11:36:34 AM
To: Leah M. Miller
Subject: TIME Sensitive - EWU Hygiene student - Master's thesis

Hello Leah,

Earlier correspondence indicated that a UW IRB was not needed for this EWU study, agreed upon between Leah Miller and Dr. Pamela Nagasawa (December 8, 2017 email string). For context, Dr. Nagasawa is on the thesis committee for a dental hygiene master's student at Eastern Washington University. In the earlier referenced correspondence UW was not considered a part of the research activities in that Dr. Nagasawa would not be involved in

- directly consenting subjects
- collecting data
- analysis of identifiable data

Dr. Nagasawa clarified and confirmed her roles that included the following:

Contacting alumni

- Initial contact with alumni will be through either myself or Dr. Sara Gordon, Assoc Dean for Academic Affairs
- I am helping to garner permission to use the UWSOD alumni email list. This is because the data will, in part, inform the curriculum (in addition to helping the student fulfill their master's requirements)

Data

There is possibility that I will be involved in the data itself - but for the purposes of curricular evaluative reasons. the only identifiable part will be distinguishing RIDE vs. nonRIDE

Thank you
Dr. Nagasawa

Pamela R. Nagasawa, Ph.D.
Assistant Professor
University of Washington
Dept. of Biomedical Informatics & Medical Education
Director of Education & Evaluation – RIDE , UW School of Dentistry
Box 357240
Seattle, WA 98195
206-543-2917

Appendix C

IntraPE attitudes questionnaire for RIDE/UWSOD Dentists – Highlighted area shows original questions from which these were adapted

Please indicate your perception of intraprofessional learning with dental hygiene students based on your experience(s) in the University of Washington School of Dentistry. This includes clinical and classroom experiences.
Please indicate the degree to which you agree or disagree with the statement by indicating the number of response that best expresses your feelings.
The scale is as follows: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

1.	Patients benefit when dentists and dental hygienists work together to solve patient problems (adapted from #2)	1	2	3	4	5
2.	Dentists and dental hygienists should learn team-working skills (adapted from #7)	1	2	3	4	5
3.	Dentists and dental hygienists need to trust and respect each other (adapted from #8)	1	2	3	4	5
4.	Dental students should learn with dental hygiene students (adapted from #11)	1	2	3	4	5
5.	Dentists have more knowledge and skills than dental hygienists (adapted from #19)	1	2	3	4	5
6.	The primary function of dental hygienists is to provide support and assistance to the dentist (adapted from #17)	1	2	3	4	5
	My perception of intraprofessional education with dental hygienists during dental school is that it…					
7.	…improves working relationships between dentists and dental hygienists after graduation (adapted from #4)	1	2	3	4	5
8.	… increases a dentist's ability to understand clinical problems (adapted from #3)	1	2	3	4	5
9.	… increases a dental hygienist's ability to understand clinical problems (adapted from #3)	1	2	3	4	5
10.	… helps dentists to think positively about dental hygienists (adapted from #6)	1	2	3	4	5
11.	… helps dentists understand their own clinical limitations (adapted from #9)	1	2	3	4	5
12.	… helps both professionals work more effectively as a team (adapted from #16)	1	2	3	4	5

Appendix D

Demographic Questionnaire

The Lasting Impact of Intraprofessional Education Between Dentists and Dental Hygienists

Demographic Questionnaire

Please answer the following demographic questions to the best of your ability. Responses will remain anonymous.

1. What is your gender?
    a. Female
    b. Male
    c. Other
    d. Prefer not to answer
2. What year did you graduate from the UW School of Dentistry?
    a. 2012
    b. 2013
    c. 2014
    d. 2015
    e. 2016
    f. 2017
    g. Prefer not to answer
3. Have you ever worked as a dental hygienist?
    a. Yes
    b. No
        i. If Yes: How many years?_____.
4. While in dental school, did you participate in intraprofessional education (experiences in which you were educated with dental hygiene students), including classroom or clinical experiences?
    a. Yes
        i. Please describe the intraprofessional learning experience.
        ii. Please describe how these learning experience(s) impacted and translated into your working relationship with dental hygienists in real-life practice.
        iii. Intraprofessional education with dental hygienists contributed to a positive working team dynamic in my first years of practice (scaled response where 1 is Strongly Disagree and 5 is Strongly Agree)
    b. No
        i. Do you think it would have benefited your educational experience to have intraprofessional learning with dental hygiene students? (scaled response where 1 is Strongly Disagree and 5 is Strongly Agree)
5. Did you experience any other intraprofessional education experiences in your time at UWSOD?

6. Would you like to participate in the drawing for the $100 Amazon gift card? If so, please provide your e-mail address here:

Appendix E

Informed Consent Statement

UW School of Dentistry Alumni,

My name is Kimber Satter, and I am currently pursuing a Master of Science in Dental Hygiene degree from Eastern Washington University. For my thesis, I am conducting research on the effectiveness of shared learning, **specifically intraprofessional education between dentists and dental hygienists during dental school.** The results of this study will, in part, also inform the University of Washington Dental School's curriculum.

This research study consists of two questionnaires, a demographic survey and an attitude survey towards intraprofessional education measured on a rating scale. An example of a demographic question is: What year did you graduate from the UW School of Dentistry? An example of an attitudes question is: Patients benefit when dentists and dental hygienists work together to solve patient problems (where 1 is Strongly Disagree and 5 is Strongly Agree).

If you choose to participate in this research study, your consent is implied when you access the questionnaires and answer all or part of the questions. You will be consenting to the use of your anonymous data for research and publication purposes. As anonymous, this data will not be linked to you in any way. **Your responses will not be identifiable.**

You are under no obligation to participate. However, **as an incentive for participation, there will be a drawing for one participant to win a $100 gift card to Amazon**. In order to be eligible for the Amazon gift card, you will have the opportunity in the demographic questionnaire to share your e-mail address. If you choose to provide your e-mail address and participate in the drawing, I will only know that you participated in the survey not how you responded to it. The question in the survey asking for your e-mail address will be separated from the data, and the e-mail addresses will not correlate to the data. All information will be kept confidential or anonymous secure on my password protected computer.

Your participation in this research study is voluntary, and you may opt out of the surveys at any time. You also may skip any questions you are uncomfortable answering. This study constitutes less than minimal risks to participants. Any risks associated with the study do not exceed those encountered in daily life.

If you have any questions or concerns about this survey please contact myself (contact information below), or my thesis advisor Sarah Jackson, RDH, MS at 509-828-1299, sarah.jackson@ewu.edu; or the department chair at EWU Ann O'Kelley Wetmore, RDH MSDH, 509.828.132, awetmore@ewu.edu. If you have any concerns about your rights as a participant in this research or any complaints you wish to make, you may contact Ruth Galm, Human Protections Administrator at Eastern Washington University 509-359-7971, rgalm@ewu.edu.

Thank you,
Kimber Satter, RDH, BSDH
Email: kgraef22@ewu.edu
Cell phone: (360) 903-5745

Curriculum Vitae

Kimber Satter, RDH, BSDH

502 E Boone MSC 1128
Spokane, WA 99258
(360) 903-5745
kgsatter@gmail.com

310 N Riverpoint Blvd., Suite 160
Spokane, WA 99202
(509) 828-1300
kgraef22@ewu.edu

Education

2018	Master of Science in Dental Hygiene Eastern Washington University Spokane, WA
2010	Bachelor of Science in Dental Hygiene Eastern Washington University Cheney, WA

Academic Experience

January 2017- May 2017	Graduate Teaching Practicum "Dental Hygiene Capstone" BSDH, Eastern Washington University, online
Spring 2017	Accreditation Review of Dental Hygiene Course Syllabi Eastern Washington University Department of Dental Hygiene
October 2016	*The Importance of Instrument Sharpening* Lecture BSDH, Eastern Washington University – Senior students
August 2015- June 2016	Graduate Assistant "Dental Hygiene Capstone" BSDH, Eastern Washington University, online
January 2015- Present	Clinical Instructor Eastern Washington University Department of Dental Hygiene Spokane, WA
September 2009- June 2010	Teaching Assistant for Local Anesthesia Lab and Clinic Eastern Washington University Department of Dental Hygiene Spokane, WA

Professional Experience

March 2015- Present	Clinical Dental Hygienist Full-time for Dr. Kurt Peterson Spokane, WA
December 2014- August 2015	Clinical Dental Hygienist Temporary/Substitute Spokane, WA
August 2011- October 2014	Clinical Dental Hygienist and Surgical Assistant Full-time for Drs. Fred and Thomas Mueller Periodontics Corvallis, OR
January 2011- June 2011	Clinical Dental Assistant Part-time for Dr. Richard Shannon and Dr. David Yang Flagstaff, AZ

Licensure

2014 - Present	Washington Dental Hygiene Washington State Department of Health
2011 - Present	Oregon Dental Hygiene Oregon Board of Dentistry

Certifications

2014 - Present	Washington Registered Dental Hygienist Expanded functions including local anesthesia, nitrous oxide/oxygen sedation, pit and fissure sealants, and restorative functions
2011 - Present	Oregon Registered Dental Hygienist Expanded functions including local anesthesia, nitrous oxide/oxygen sedation, pit and fissure sealants, and restorative functions
2007 - Present	Healthcare Provider Certification in Basic Life Support/CPR/First Aid Spokane, WA

Professional Memberships

September 2007 - Present	American Dental Education Association
August 2011 - Present	American Dental Hygienists' Association
September 2007- December 2010	Student American Dental Hygienists' Association

Service to Profession

October 2012 - October 2014	President and Co-Founder of Mueller Implants and Periodontics Hygiene Study Club Corvallis, OR

Community Involvement

2015-2018	Dental Hygiene Applicant Interviews, Eastern Washington University Applicant Interviewer Spokane, WA
2016 - 2017	Special Populations Workshop, Eastern Washington University Volunteer Workshop Facilitator Spokane, WA
February 2016	Veteran's Day Event, Eastern Washington University Volunteer Clinical Instructor Spokane, WA
September 2015	Spokane River Clean-Up Volunteer Spokane, WA
March 2014	"Smiles for Veterans," Eastern Washington University Volunteer Clinical Instructor Spokane, WA
October 2014 - Present	Volunteer at Meadow Ridge Elementary Spokane, WA
2012 - 2013	Choir Member for Christmas Concerts Retirement Communities in Corvallis, OR

February 2010	Sacred Heart Medical Center Pediatric Oncology Community Project Spokane, WA
June 2009	Volunteer at Spokane Paralympics Spokane, WA
2000 - 2010	Volunteer at Fisher's Landing Elementary Vancouver, WA