Effectiveness of Three Foodservice Equipment Training Interventions for Food and Nutrition Students

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Authorization to Submit Thesis

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Abstract

Foodservice equipment training is important for dietetic students and foodservice employees; however, no validated training programs exist. This study compared changes in students' knowledge, competence, and comfort in using foodservice equipment, as well as confidence in training others after completing one of the following interventions: 1) one quantity food equipment course and one management course, and foodservice supervised practice rotations, 2) equipment introduction, and an equipment competency exam, and 3) equipment training, practice lab, and an equipment competency exam. Students ($N = 65$) completed a retrospective pre- and post-intervention survey. Actual skill was verified via instructor observation for Intervention 3. Intervention 3 should be considered for implementation because it yielded the highest post-intervention scores (≥ 3.57 out of 4) compared to Interventions 1 and 2 (≤ 3.14 and ≤ 2.79, respectively), $p < 0.05$, and because most (88%) students in Intervention 3 received 86% or better for their actual skill.

Acknowledgments

A big thank you to my major professor, Katie Brown for her time, edits, guidance, and encouragement as I worked on my thesis. Thank you for numerous Wednesday and Saturday meetings, I will miss them. I would like to thank Katie Miner, one of my committee members, for her positivity, vision, and opportunity. It is really amazing, my research all began on your FCS 384 students and now this semester as a Registered Dietitian Nutritionist (RDN) and Licensed Dietitian (LD) I am teaching your FCS 384 course as a graduate teaching assistant; my thesis has come full circle. Thank you to Robert "Bob" Haggerty, one of my committee members, for his knowledge and enjoyable conversations. Lastly, thank you to the Margaret Ritchie School of Family Consumers Sciences, College of Graduate of Studies, College of Agriculture and Life Sciences, and the University of Idaho. I am proud to have two bachelor degrees and now a master of science degree from such a remarkable University! Go Vandals!!

Dedication

This thesis is dedicated to my mom and dad,

for all their support, encouragement, confidence, and love throughout my academic career.

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Chapter One

Introduction

The Accreditation Council for Education in Nutrition and Dietetics (ACEND) establishes accreditation standards for Coordinated Dietetic Programs. Standard Five: Curriculum and Learning Activities states that entry-level dietitians should have knowledge and skills of food science, food systems, and techniques of food preparation and development ("ACEND accreditation standards for nutrition and dietetics coordinated programs," 2016). The Coordinated Program in Dietetics curriculum includes: 1) clinical nutrition, 2) management nutrition, and 3) community nutrition. Students learn about these three areas in classes and supervised practice experiences. Students are required to complete 1,200 hours of supervised practice. During the junior year dietetic students take classes in these three areas and participate in supervised practice rotations in campus dining facilities. Dietetics students in their senior year take classes in clinical nutrition and community nutrition, and have in-depth, long-term supervised practice placements in all three areas; some placements last 8 weeks. University of Idaho food and nutrition students, including dietetic students, take coursework to prepare them for a foodservice management position, including operating quantity foodservice equipment and being able to train others to use the foodservice equipment. Foodservice training and education is integrated into the Coordinated Dietetic Program at the University of Idaho, through coursework and supervised practice rotations in campus foodservice establishments. Historically, the University's foods lab was comprised of six residential kitchen stations, including an oven, stove, stand mixer (KitchenAid), and microwave. The University's foods lab was fully renovated in 2013 and now includes quantity foodservice equipment ("University of Idaho

Margaret Ritchie School of Family and Consumer Sciences: Carmelita Spencer Foods Laboratory," 2015). Quantity foodservice equipment is large scale commercial kitchen equipment that is used for preparing food for large amounts of people (Payne-Palacio & Theis, 2016). However, there were no validated equipment training programs available through the Academy of Nutrition and Dietetics or the foodservice industry to teach students to use the equipment. The most effective way to use the foods lab was to develop a training program, so students would know how to safety and correctly operate the equipment to its fullest potential use.

The National Restaurant Association emphasizes the need for employees and managers to have training on kitchen equipment to ensure they know how to correctly operate, clean, and perform preventative maintenance on all pieces of equipment ("Training staff on kitchen equipment, National Restaurant Association," n.d.). Having training and experience is key to long-term success for foodservice employees and managers (Okeiyi, Finley, & Postel, 1994). Lack of employee training can cost foodservice operations thousands of dollars if improper use of equipment shortens the equipment's service life (White, 2012). Also, if users are not properly trained they are not getting the full use of the equipment (White, 2012) and are at risk for injuring themselves or others (Sinclair et al., 2003). During training, operational safety should be emphasized; for example, do not assume that trainees know to un-plug the slicer or dice (food processor) before cleaning it (White, 2012). Training needs may vary from one piece of equipment to another to ensure employees can perform all necessary tasks (White, 2012).

Problem Statement

Equipment training is important and emphasized for foodservice operations, and is a competency for dietetic students. However, there is a lack of validated quantity foodservice equipment training programs available in the foodservice sector and in dietetics education. Therefore, additional research is needed to examine the effectiveness of quantity foodservice equipment training.

Statement of Purpose

The purpose of this study was to compare nutrition and dietetic students' knowledge, competence, and comfort in using foodservice equipment, as well as confidence in training others to use foodservice equipment before and after completing one the following interventions: 1) completion of one quantity food equipment and production course and one management course, including an equipment introduction walk through, and supervised practice rotations in campus foodservice establishments, 2) equipment introduction walk through, optional open labs times, and an equipment competency exam, and 3) extensive equipment training, optional open labs times, practice lab, and an equipment competency exam.

Research Question

Are there differences in reported knowledge, competence, and comfort in using foodservice equipment, as well as confidence in training others to use foodservice equipment before and after completing one the following interventions: 1) completion of one quantity food equipment and production course and one management course, including an equipment introduction walk through, and supervised practice rotations in campus foodservice establishments, 2) equipment introduction walk through, optional open labs

times, and an equipment competency exam, and 3) extensive equipment training, optional open labs times, practice lab, and an equipment competency exam?

It is hypothesized that students will show higher levels of knowledge, competence, and comfort in using foodservice equipment, as well as confidence in training others to use foodservice equipment following Intervention 3 due to the increased training and hands-on experience.

Significance of Study

There are few research studies on the effectiveness of training within the foodservice industry, especially for foodservice equipment training (Rodríguez & Gregory, 2005). Similarly, there are no validated resources for training dietetic students how to use foodservice equipment (Gates & Sandoval, 1998). Few studies evaluated the effect that training had on actual performance (Rodríguez & Gregory, 2005). The current study adds to the body of research because it evaluated three food service equipment training strategies aimed at increasing nutrition and dietetic students' reported knowledge, competence, comfort in using foodservice equipment, and confidence in training others to use foodservice equipment. In addition, skill levels were assessed in Intervention 3 and were compared to students' reported skill level. The findings from this study may guide the development and implementation of future quantity foodservice equipment training for food and nutrition students, including dietetic students and also for foodservice operations and employees.

Limitations

While this study provides findings regarding the effectiveness of foodservice equipment training, certain limitations exist. The low sample size of Intervention 1 presents a limitation; this may have been because dietetic students were invited by email to complete

a survey after the courses had already ended. A further limitation is that actual skills were only reported for Intervention 3; therefore, comparison between skills from intervention to intervention cannot be established. Actual skills were rated on a scale from 1-14, it would have made for an easier comparison on a Likert scale from 1-4, since the survey scale was from 1-4. Additionally, the participants in all interventions were mostly female and from one university in the Pacific Northwest. In Interventions 2 and 3 only dietetic students had completed some supervised practice rotations in campus foodservice establishments, this was not controlled for in the analysis. The investigator was the same for the all three interventions. During Intervention 1 the instructor took FCS 384 and 387, during Intervention 2 and 3 the instructor was a student in the Coordinated Program in Dietetics (CPD). Students may have treated their intervention experience and survey participation less seriously as the instructor was a classmate and not a professor.

Summary

A lack of research exists on the effectiveness of quantity foodservice equipment training. Results from this study may guide future foodservice equipment training for food and nutrition students, including dietetic students, and foodservice employees and operations. The purpose of this study was to compare levels of knowledge, competence, and comfort in using foodservice equipment, as well as confidence in training others to use foodservice equipment before and after three training interventions. The first chapter provides an introduction, problem statement, purpose statement, research question, significance of study, and limitations of the study. The second chapter reviews the available literature on training, foodservice equipment training, food safety training, and dietetics education in foodservice equipment training. The third chapter is written in journal-style

format and includes an introduction, the methodology, results, discussion, and implications from this research.

Chapter Two

Review of Literature

Training

Training is defined as "the process of learning the skills you need to do a particular job or activity" ("Training Definition in the Cambridge English Dictionary," n.d.). Training can be conducted via lectures, workshops, or on-the-job training. On-the-job training can occur during regular work duties, an experienced employee guides the trainee through the process of accomplishing a task (Rodríguez & Gregory, 2005; van Zolingen, Streumer, de Jong, & van der Klink, 2000). Training programs aim to improve trainees' knowledge, attitudes, and ability to apply what was learned during training to real life practices (Rodríguez & Gregory, 2005).

Benefits of training. Training is beneficial to the organization and to the individual employees (Tahir, Yousafzai, Jan, & Hashim, 2014). Training is found to improve job knowledge and skills, increase employee productivity, decrease employee turnover, reduce production waste, increase product quality, and improve customer service at all levels in the organization (Frantz & Hamouz, 1999; Ninemeir, 2001; Tahir et al., 2014). A study by Hackes and Hamouz (1995) looked at the effectiveness of training programs in reducing labor turnover and increasing productivity for foodservice employees working at a college or university. Of the foodservice organizations, 98% reported having some form of training, 85.6% reported having orientation, and 61% reported using the three major types of training: 1) orientation, 2) skill based, and 3) growth development (Hackes & Hamouz, 1995). Participation in training significantly increased retention, reduced labor turnover, increased promotions within in the organization, and increased work productivity and morale of

employees (Hackes & Hamouz, 1995). If users are not properly trained, they are at risk for injuring themselves or others (Sinclair et al., 2003). For these reasons organizations spend an estimated $200 billion on workforce training annually (Awoniyi, Griego, & Morgan, 2002).

Barriers to training. Training is beneficial; however, there are barriers when starting, implementing or having a training program in place. Barriers to training include: 1) the experienced employee giving the training may see it as a burden and their normal work load may cause the quality of the training to decrease, 2) the work relationship between the trainee and trainer may be effected, 3) inappropriate behaviors may be developed, 4) the environment may not be suited for training, 5) out of date training material, and 6) often background information of skills and knowledge is overlooked (Rodríguez & Gregory, 2005; van Zolingen, et al., 2000). Training materials are often developed and implemented by supervisors who are Baby Boomers or Generation Xers and may not align with Generation Y's learning style, values, and/or attitudes about the workplace (Knight, 2000; Rodríguez & Gregory, 2005). Costs may prohibit some establishments from using training programs; however, on-the-job training programs are found to be cost effective to the organization (Jehanzeb & Bashir, 2013).

Training is Key to Succeed in a Foodservice Operation

Training is an important skill within an operation and needs to be emphasized. Hospitality educators, students, and industry representatives from foodservice operations were surveyed to determine the competencies needed to succeed in food and beverage operations (Okeiyi, Finley, & Postel, 1994). The results from the three groups were varied; however, they all considered the following ten competencies important or very important:

human relations, leadership skills and supervision, oral and written communication, customer relations, professional conduct/ethics, time management, energy management, conflict management, recruitment, and training (Okeiyi, et al., 1994). It was stated that the "key to long-term success for food and beverage managers comes from a balance of education, training, and experience" (Okeiyi, et al., 1994, p. 37). Roers (1975) assessed the prevalence of foodservice equipment training, reporting that only 48% of foodservice employees had formal training. However, 78% felt that equipment training safety should be emphasized (Roers, 1975). The author indicated that instruction would prepare workers for foodservice positions (Roers, 1975).

Need for equipment training. Equipment training is an important aspect of a foodservice operation. The National Restaurant Association emphasizes the need for employees and managers to have training on kitchen equipment, so they know how to correctly operate, clean, and perform preventative maintenance on all pieces of equipment ("Training staff on kitchen equipment, National Restaurant Association," n.d.). Training needs may vary from one piece of equipment to another to ensure employees can perform all necessary tasks (White, 2012).

The importance of equipment training is often minimized; however, this factor can make or break an operation (White, 2012). According to Lisa White, the editor of Foodservice Equipment and Supplies Magazine, "the lack of an equipment training program can result in the loss of thousands of dollars by shortening a unit's service life. With improper training, the resulting safety hazards and loss of productivity can have dire consequences in the kitchen" (White, 2012, "Foodservice operators benefit," para. 2). David Maxwell, a sales representative at Thompson & Little foodservice dealers believes that if the

user is not properly trained they are not getting the full use out of the equipment (White, 2012). Maxwell gave an example of the combi oven and described that untrained employees will use only the steamer mode, not taking full advantage of the combi oven system (White, 2012).

Aspects of a Good Training Program

The quality of training can have a significant impact on employees' efficiency and work quality of life. A study with over 200 university and business employees looked at the effect of training and development, concluding that there is a direct relationship between one's positive training experiences, attitudes, and work status proficiency (Truitt, 2011). Therefore, designing a good training program is of utmost importance.

The National Restaurant Association indicates that "it is never too late to implement or improve training; a training program can save money for the operation in the long run" ("Training staff on kitchen equipment, National Restaurant Association," n.d.). The Association notes that providing kitchen staff access to equipment manuals, including information on cleaning and maintenance can be valuable ("Training staff on kitchen equipment, National Restaurant Association," n.d.); however, this should not be the only resource for employees. Lisa White described that training programs should be implemented before employees start using the equipment to prevent incorrect habits (White, 2012). During training operational safety should be discussed, including pointing out the safety features of the equipment (White, 2012). Trainers should not assume that trainees know how to complete a task, for example un-plug the slicer or dice (food processor) before cleaning it (White, 2012).

Good training programs promote a positive attitude, and provide opportunity to apply the material (Rodríguez & Gregory, 2005). Rodríguez and Gregory (2005) surveyed undergraduate front-line dinning services employee's ($N = 23$) (who are not supervisors) perceptions and attitudes toward training and the transfer of training. Those surveyed had worked for dining services for at least three months and attended a three-day long training event that took place in a structured classroom setting and included presentations (Rodríguez & Gregory, 2005). A trained facilitator led three focus groups consisting of six to ten participants (Rodríguez & Gregory, 2005). Important themes from the focus groups emerged. Employees felt that even if they had worked in foodservice before they still needed training for that facility, training brought self-efficacy to the employees, and training resulted in employees learning new skills (Rodríguez & Gregory, 2005). Participants' views on the training design were that a smaller training group would be more beneficial along with having the opportunity to follow and observe someone with more experience (Rodríguez & Gregory, 2005). Before putting their new skills to work participants would like the opportunity to practice what has been learned (Rodríguez & Gregory, 2005). Participants also felt that learning information that was transferable to their actual job was more pertinent (Rodríguez & Gregory, 2005). In addition to well-developed training program, it is beneficial to include on-the-job training, a mentor to guide them through the process, and provide social support (Rodríguez & Gregory, 2005).

Hands-on training can be an effective way to reinforce practices and ensure employees are capable of completing tasks ("Restaurant Server and Employee Training Guidelines," n.d.). Hands-on training can be done four ways: 1) demonstrating, trainee observes the task being performed, taking note of the proper produce and asks questions; 2)

shadowing, trainee follows an experienced, trained member of the foodservice team and does not engage in the tasks; 3) supervised job performance, trainee completes tasks under active supervision of an experienced foodservice team member; 4) stimulated event exercise, trainee participates in “role-playing” scenarios that could take place in the foodservice operation ("Restaurant Server and Employee Training Guidelines," n.d.). The Social Cognitive Theory can be applied to the concept of training, as the trainee learns how to carry out the behavior correctly (behavioral capability), perform the behavior correctly (observational learning), and self-efficacy is increased (Bandura, 1988). Bandura’s Social Leaning Theory describes that people learn from one another through observation, imitation, and modeling (Bandura, 1971). The Social Leaning Theory can be implemented in training programs, as behavior modeling and modifications, and observations are taking place during the hands-on training (Bandura, 1971).

Good Training Programs in Practice

Both Scotland High School and the U.S. Army Quartermaster Corps and Quartermaster School in Fort Lee, Virginia have good training programs in practice and are great examples of what a good training program can look like. Steve Dibble, a culinary instructor at Scotland High School, demonstrates how equipment works, starting from how to turn units off and on, and demonstrating how to take it apart and put it back together (White, 2012). Dibble then watches the students perform these tasks until they are comfortable and perform the jobs properly (White, 2012). The more comfortable and familiar employees are with the equipment, the more likely they will use it correctly and use it to its full potential (White, 2012). Dibble, has a strong training program in place for his class; however, his training has not been evaluated or studied (White, 2012). The U.S.

Army Quartermaster Corps and Quartermaster School, Fort Lee, Virginia offers and entry-level foodservice specialist course which is taken by approximately 4,000 soldiers and marines annually ("Basic food service training division," 2013). The course provides extensive hands-on training with the foodservice equipment they will be using at their work stations ("Basic food service training division," 2013). Participants in the course take a written exam and are evaluated using the equipment ("Basic food service training division," 2013). Upon completion of the course the participants have gained experience, knowledge, and confidence in their ability to operate and perform tasks on the equipment ("Basic food service training division," 2013). However, this training course has not been evaluated or researched.

Evaluation of Training Programs

The foodservice industry has a lack of research and documented studies on the effectiveness, perceptions, attitudes towards training, and the transfer of training to the workplace (Rodríguez & Gregory, 2005); however, some studies of the effectiveness of food safety training are available. Previous research has reported improved knowledge among employees who participated in food safety training. Park, Kwak, and Chang (2010) evaluated employee knowledge and practices before and after a food safety training program. Lectures and demonstrations were provided to the intervention group (training group); the control group did not receive any training (Park, Kwak, & Chang, 2010). The results showed that the level of knowledge on food safety improved in the training group, more than the no-training group (Park, et al., 2010). The total score for knowledge in the training group increased from 49 to 66 out of 100 after training, showing a significant improvement ($p < 0.05$) (Park, et al., 2010). However, no significant changes in employee

practices or sanitation were observed (Park, et al., 2010). The authors recommended hands-on training, and noted that the frequency of food safety training should be reinforced through goal setting, and training programs should be designed at a level suitable for the employees' level of education (Park, et al., 2010).

Short hands-on training programs may affect food safety knowledge and practices. Adesokan, Akinseye, & Adesokan (2015) evaluated the association between training, training area, training duration, refresher training knowledge, and practices. Foodservice employees *(N* = 211*)* with at least two years of experience were invited to take a survey regarding their training experiences (Adesokan, Akinseye & Adesokan, 2015). An association between training and knowledge *(p* = 0.000*)* and food safety practices (*p* = 0.05) was reported (Adesokan, Akinseye & Adesokan, 2015). Relatively shorter duration training programs were related to improved performance and behavior, as longer programs resulted in a decline of knowledge and practice level (Adesokan, Akinseye & Adesokan, 2015). A systematic review determined that interactive media and hands-on activities contribute towards the enhancement of employees' skills and knowledge, and encourage changes in attitude and behaviors (Medeiros, Cavalli, Salay, & Proença, 2011).

Sinclair et al. (2003) evaluated the effectiveness of safety training, often in retail trade employers do not make the time for safety training as they do not know the effect of training. A new safety training was developed consisting of ten modules, which included reading manuals, posters, and watching videos (Sinclair et al., 2003). A consultant foodservice trainer trained managers over a two-day period, including reviewing the new training curriculum and participating in role playing exercises (Sinclair et al., 2003). Within two weeks of the training, the manager trained their current employees (Sinclair et al.,

2003). Sinclair et al. (2003) reported an increase in knowledge and reduced number of injuries after completing safety training.

A food safety and food hygiene review article determined that nine out of 46 studies found statistically significant improvements following various training interventions (Egan et al., 2006). Costello, Gaddis, Tamplin, and Morris (1997) used a comparative-experimental design, which compared two different food safety training intervention groups 1) computer interactive method, including nine narrated modules and questions and, 2) lecture, including the use of a scripted workbook for participants to follow along. Participants ($N = 43$) were employees from six different quick service restaurants chains (Costello et al., 1997). Results of pre- and post-training tests revealed significant increases in knowledge for the lecture group (29%) and the computer group (20%). While both interventions were successful, the computer interactive method was the preferred method for the trainer and employees, due its easier implementation (Costello et al., 1997). Sparkman, Briley, & Gillham (1984) used a pre-/post-intervention design to assess the effectiveness of a training manual for foodservice workers ($N = 23$). Workers reviewed the two-part, step-by-step training manual, which covered food preparation and sanitation concepts. Workers then attended a 3-hour training session, where the workers' performance was observed and recorded as they followed the training manual (Sparkman et al., 1984). Pre- and post-training knowledge tests determined that post-training knowledge was significantly higher than pre- training knowledge ($p < 0.01$) (Sparkman et al., 1984). On-the job performance evaluations were conducted four weeks after the training, as on-the job observation is the most effective method for evaluating the transfer of knowledge (Sparkman et al., 1984). The results of these evaluations indicated a significant change in work behavior, for example

using proper thawing procedures, holding temperatures, and cleaning procedures ($p < 0.001$) (Sparkman et al., 1984). It is recommended for retention of knowledge and skills gained during training that regular, short training sessions be held (Sparkman et al., 1984).

These studies provided information on the effectiveness, perceptions, attitudes towards training, and the transfer of training to the workplace. There is an association between training and knowledge (Adesokan, Akinseye & Adesokan, 2015 & Costello et al., 1997 & Egan et al., 2006 & Park, et al., 2010 & Sinclair et al., 2003 & Sparkman et al., 1984). Post-intervention assessment revealed changes in knowledge following training (Costello et al., 1997 & Egan et al., 2006 & Sparkman et al., 1984). Training resulted in significant knowledge changes (Costello et al., 1997 & Park, et al., 2010 & Sinclair et al., 2003 & Sparkman et al., 1984). After training behavior changes were observed, as seen by a reduced number of injuries on the job (Sinclair et al., 2003). On-the job performance evaluations determined that there were significant behavior changes (Sparkman et al., 1984). Park et al. (2010) noted no behavior changes in employee practice or sanitation after training. Hands-on training programs contribute towards the enhancement of employees' skills and knowledge, and encourage changes in attitude and behaviors (Medeiros, Cavalli, Salay, & Proença, 2011 & Park, et al., 2010).

Food Service Equipment Training in Dietetics Education

Coordinated Dietetic Programs follow the accreditation standards that are established by the Accreditation Council for Education in Nutrition and Dietetics (ACEND). Entry-level dietitians should have knowledge and skills of food science, food systems, and techniques of food preparation and development as stated in Standard Five: Curriculum and Learning Activities ("ACEND accreditation standards for nutrition and dietetics coordinated

programs," 2016). Entry-level dietitians should have working knowledge of facility management, including foodservice equipment selection, writing specifications for foodservice equipment, and design/re-design of work units (Institute of Medicine (U.S.), 2000).

Dietetic education provides opportunities for food and nutrition students to become cross-trained in a number of areas in the dietetics field, such as foodservice management (Gates & Sandoval, 1998). An individual who was cross-trained is able to provide more than one function to an operation (Gates & Sandoval, 1998). Gates & Sandoval (1998) surveyed dietetic program directors regarding cross-training in dietetics education programs. The cross-training areas included health education, physical assessment, enteral/parenteral nutrition, clinical management, management, and other (Gates & Sandoval, 1998). Program directors ($N = 276$) stated that it is challenging to find innovative ways to train dietetic students in all these areas, including foodservice management; cross-training usually occurs during supervised practice (Gates & Sandoval, 1998). Survey results indicated that 60.9% prepared students to work in large commercial production facilities and 61.6% prepared students to work with chefs (Gates & Sandoval, 1998). Cross-training allows students to be flexible and demonstrate skills in a number of areas within dietetics (Gates & Sandoval, 1998). However, there are no standardized equipment training programs available, there is a need for foodservice equipment training programs that are validated for the foodservice industry and food, nutrition, and dietetics education.

Summary

In the foodservice industry training is key for long-term success and is beneficial to the individual and the organization (Okeiyi, et al., 1994; Tahir, Yousafzai, Jan, & Hashim,

2014). Training is found to improve job knowledge and skills, increase employee productivity, increase retention, decrease employee turnover, reduce production waste, increase product quality, increase morale of employees, and improve customer service at all levels in the organization (Frantz & Hamouz, 1999; Hackes & Hamouz, 1995; Ninemeir, 2001; Tahir et al., 2014). The National Restaurant Association emphasizes the need for employees and managers to have training on kitchen equipment ("Training staff on kitchen equipment, National Restaurant Association," n.d.). However, the foodservice industry lacks documented research and studies on the effectiveness of training, more specifically foodservice equipment training (Rodríguez & Gregory, 2005). In addition, there is a lack of validated foodservice equipment training available for nutrition and dietetics education. The purpose of this study was to compare changes in nutrition and dietetic students' knowledge, competence, and comfort in using foodservice equipment, as well as confidence in training others to use foodservice equipment before and after they completed one of three equipment training interventions.

Chapter Three

Effectiveness of Three Foodservice Equipment Training Interventions for Food and Nutrition Students Introduction

Introduction

Training is key to a successful foodservice operation (Okeiyi, et al., 1994). Training is defined as "the process of learning the skills you need to do a particular job or activity" ("Training Definition in the Cambridge English Dictionary," n.d.). The National Restaurant Association emphasizes the need for employees and managers to have training on kitchen equipment to ensure that they know how to correctly operate, clean, and perform preventative maintenance on all pieces of equipment ("Training staff on kitchen equipment, National Restaurant Association," n.d.). Lack of employee training can cost foodservice operations thousands of dollars if improper use of equipment shortens the equipment's service life (White, 2012). If users are not properly trained, they are at risk for injuring themselves or others (Sinclair et al., 2003), and they are not getting the full use of the equipment (White, 2012). Training should be tailored to each specific piece of equipment to ensure employees can perform all necessary tasks (White, 2012).

The foodservice industry has a lack of research and documented studies on the effectiveness, perceptions, attitudes towards training, and the transfer of training to the workplace (Rodríguez & Gregory, 2005); however, some studies of the effectiveness of food safety training are available. Multiple studies reported training resulted in significant knowledge changes (Costello et al., 1997 & Park, et al., 2010 & Sinclair et al., 2003 & Sparkman et al., 1984). However, changes in behavior were less common (Sparkman et al., 1984). Park et al. (2010) noted no behavior changes in employee practice or sanitation after

training, this could be because no hands-on training was available. The Social Cognitive Theory and the Social Leaning Theory can be applied to the concept of training as self-efficacy is increased through mastery experiences, such as hands-on training (Bandura, 1988). Hands-on training programs contribute towards the enhancement of employees' skills and knowledge, and encourage changes in attitude and behaviors (Medeiros, Cavalli, Salay, & Proença, 2011 & Park, et al., 2010).

The Accreditation Council for Education in Nutrition and Dietetics (ACEND) establishes accreditation standards for Coordinated Dietetic Programs. Standard Five: Curriculum and Learning Activities states that entry-level dietitians should have knowledge and skills of food science, food systems, and techniques of food preparation and development ("ACEND accreditation standards for nutrition and dietetics coordinated programs," 2016). Equipment training is important and emphasized for foodservice operations, and is a competency for dietetic students.

Both Scotland High School and the U.S. Army Quartermaster Corps and Quartermaster School in Fort Lee, Virginia have good training programs in practice and are great examples of what a good training program can look like; however, they have not been evaluated or studied. Steve Dibble, a culinary instructor at Scotland High School, demonstrates how equipment works, starting from how to turn units off and on, and demonstrating how to take it apart and put it back together (White, 2012). Dibble then watches the students perform these tasks until they are comfortable and perform the jobs properly (White, 2012). The U.S. Army Quartermaster Corps and Quartermaster School, Fort Lee, Virginia offers and entry-level foodservice specialist course which is taken by approximately 4,000 soldiers and marines annually ("Basic food service training division,"

2013). The course provides extensive hands-on training with the foodservice equipment they will be using at their work stations (“Basic food service training division," 2013). Participants in the course take a written exam and are evaluated using the equipment (“Basic food service training division," 2013). Upon completion of the course the participants have gained experience, knowledge, and confidence in their ability to operate and perform tasks on the equipment (“Basic food service training division," 2013).

There is limited research and validated foodservice equipment training programs available in the foodservice sector and in dietetics education. In addition, few studies evaluated the effect that training had on actual performance (Rodríguez & Gregory, 2005). For these reasons further research on the effectiveness of quantity foodservice equipment training is necessary. Quantity foodservice equipment is large scale commercial kitchen equipment that is used for preparing food for large amounts of people (Payne-Palacio & Theis, 2016). This study evaluated three foodservice equipment training strategies in terms of nutrition and dietetic students’ reported knowledge, competence, comfort in using foodservice equipment, and confidence in training others to use foodservice equipment. Actual skill was assessed in Intervention 3. Therefore, the purpose of this study was to compare nutrition and dietetic students’ knowledge, competence, and comfort in using foodservice equipment, as well as confidence in training others to use foodservice equipment before and after completing one the following interventions: 1) completion of one quantity food equipment and production course and one management course, including an equipment introduction walk through, and supervised practice rotations in campus foodservice establishments, 2) equipment introduction walk through, optional open labs

times, and an equipment competency exam, and 3) extensive equipment training, optional open labs times, practice lab, and an equipment competency exam.

Methods

Three different interventions were implemented over the course of three years: 2013-2014, 2014-2015, and 2015-2016. All three interventions aimed to increase students' knowledge, competence, comfort level, and confidence in training others to use quantity foodservice equipment on all the following fourteen pieces of equipment: combination oven/steamer, cook/hold/smoke/oven, commercial microwave, convection oven, slicer, steam-jacketed kettle, tilting-braising pan, 20 and 60 quart mixers, dishwasher, combination microwave/convection oven, dice (food processor), gas range, and salamander broiler. For all interventions a retrospective survey design was used to examine students' knowledge, competence, comfort, and confidence in training others to use foodservice equipment before and after the intervention (See Appendix A). In Intervention 3, participants reported their knowledge, competence, comfort level, and confidence in training others to use food service equipment after participating in a practice lab and training, (See Appendix A) but before the equipment exam. Averages scores across all pieces of equipment were calculated for knowledge, competence, comfort, and confidence in training others to use the foodservice equipment (see Appendix A, questions 3-6). The University of Idaho Institutional Review Board (IRB) certified this project as exempt (see Appendix B).

Participants. Participants were food and nutrition students including dietetic students enrolled in a quantity food equipment and production course at one university in the Pacific Northwest. All participants in Intervention 1 were dietetic students.

Interventions. There were three interventions aimed at increasing students' knowledge, competence, comfort level, and confidence in training others to use food service equipment. Refer to Table 1 to see the components that were in each intervention.

Table 1. Intervention methods for all Interventions.
(Shaded box indicates inclusion in interventions.)

Intervention	**1**	**2**	**3**
Dietetic students *Students in the Coordinated Program in Dietetics*			
Supervised practice in campus foodservice establishments *Dietetics students worked with chefs and kitchen staff on food preparation and cooking, using quantity foodservice equipment in campus foodservice establishments*		19/25 students completed 6-7 rotations	19/26 students completed 2-6 rotations
Food and nutrition students *Students studying food and nutrition who were not in the Coordinated Program in Dietetics*			
Currently in a quantity food equipment and production course			
Optional open labs *Specific times were scheduled for students to come to the foods lab and ask the instructor questions about the equipment, and the review equipment manuals*			
Equipment competency exam *Practical equipment exam to demonstrate competency using all the pieces of equipment*			
Extensive equipment training *A two-hour, extensive hands-on foodservice equipment training in small groups (3-4 people)*			
Practice lab *Students cooked with five pieces of equipment they felt least comfortable with after receiving the extensive equipment training*			
Foods lab equipment walk through *Instructor took students on a tour of the foods lab providing a brief introduction to the equipment, including the name and use of each piece of equipment*			
Completion of one quantity food equipment and production course and one management course			

Intervention 1. Intervention 1 included the completion of one quantity food equipment and production course: FCS 384 Quantity Food Production and Equipment, and one management course: FCS 387 Food Systems Management. FCS 384 explored food production in large volume, and selection and use of institutional quantity foodservice equipment. Students completed an equipment evaluation assignment, in which they researched two different brands of the same piece of quantity foodservice equipment. Students evaluated the equipment comparing a number of factors: cooking capacity, dimensions, material, utility and plumbing requirements, freight and delivery specifications, installation requirements, warranties, certifications, estimated life of equipment, and cost of equipment. FCS 387 examined institutional organization and management. Students were taken on an equipment introduction walk through of the foods lab by their instructor. A brief foods lab equipment walk through handout was provided, students were to initial off on each piece of equipment (See Appendix C). As part of FCS 384 and 387 students also completed a Theme Meal project in groups of three to four students. The Theme Meal project required students to develop and prepare a lunch meal to be served to approximately 25 guests; therefore, students utilized the quantity foodservice equipment in the foods lab. Equipment manuals were available to students for review in the foods lab. Participants were all in the Coordinated Program in Dietetics (CPD) and also completed supervised practice rotations in campus foodservice establishments. Students had the opportunity to work with chefs and kitchen staff on food preparation and cooking, using quantity foodservice equipment.

Intervention 2. Intervention 2 involved an equipment introduction walk through, optional open lab times, and an equipment competency exam. Intervention 2 students were

enrolled in FCS 384 Quantity Food Production and Equipment; the interventions took place in the class. In class students were taken on an equipment introduction walk through by the instructor. Students were introduced to the fourteen pieces of quantity foodservice equipment. During the open lab times, students were able to ask the instructor questions on the equipment. Open lab times were optional for students to attend, but highly encouraged to be prepared for the exam. The equipment manuals were available to students on-line and in the foods lab. To assess the validity and clarity of the exam, the equipment competency exam was pilot tested before participants in Intervention 2 took the exam. Three students not enrolled in a quantity food equipment and production course piloted the exam. Students then took the practical equipment exam to demonstrate competency using all the pieces of equipment (See Appendix D). The exam was completed independently; however, two other students were also completing their exam at the same time. Only dietetic students had completed some supervised practice rotations in campus foodservice establishments at the time of the equipment competency exam.

Intervention 3. Intervention 3 consisted of extensive equipment training, optional open lab times, a practice lab, and an equipment competency exam. Intervention 3 students were enrolled in FCS 384 Quantity Food Production and Equipment; the interventions took place in the class. Refer to Table 2 to see a timeline of when the training, practice lab, and equipment exam took place.

Table 2. Timeline of Intervention 3 strategies.
(Shaded box indicates which week the strategy took place.)

Week	1	2	3	4	5	6	7	8	9	10
Training										
Practice Lab										
Exam										

Before taking the exam students attended a two-hour, extensive foodservice equipment training in small groups (3-4 people). The instructor pilot tested the training to one nutrition professor before implementation. During the training the instructor explained and demonstrated how to turn on, operate, clean, and turn off each piece of equipment. Students then completed the same tasks. This was done for each piece of equipment. Students were given an equipment training note sheet to fill out during the training (See Appendix E). Students received hands-on experience using all the quantity equipment in the foods lab. The instructor used a note sheet while proving the training, making sure each training session covered all the same material (See Appendix F). A scribe was present at each training session to make sure that the training was consistent from session to session. Students also had the opportunity to attend open lab times, in which they could go through the steps of operating each piece of equipment. Students participated in a two-hour practice lab in the foods lab (See Appendix G). The practice lab allowed students to cook with five pieces of equipment they felt least comfortable with after receiving the training. When students finished their practice lab they were given the opportunity to review the steps of using each piece of equipment and review the manuals, before leaving they completed a self-reflection assignment. The equipment manuals were available to students on-line and in

the foods lab. The practice lab was completed independently; however, one other student was also completing their practice lab at the same time. Before Intervention 3 took the exam two nutrition professors and two students not enrolled in a quantity food equipment and production course piloted tested the exam twice. Students then took the practical equipment exam to demonstrate competency using all the pieces of equipment (See Appendix D). Working independently, two students completed their exam at the same time. During the exam the instructor assessed the students' ability to operate the equipment correctly (See Appendix H). Through observation, the instructor assessed each students' actual skill on each piece of equipment. Only dietetic students had completed some supervised practice rotations in campus foodservice establishments at the time of the equipment competency exam.

Foodservice Equipment Surveys. Retrospective pre- and post-intervention surveys collected demographic information as well as students' knowledge, competence, comfort using each piece of foodservice equipment, and confidence level in training others (See Appendix A) which was rated on a 4-point Likert Scale. The questions used over the three interventions were the same; however, some wording varied slightly depending on the intervention. For example, Intervention 1 had fewer questions, as they had already completed FCS 384 and 387. The additional survey in Intervention 3 was adapted from the retrospective survey (See Appendix A). Participants reported their knowledge, competence, comfort level, and confidence in training others to use food service equipment after participating in a practice lab and training, but before the equipment exam.

Survey Administration Procedures. All surveys were administered using Qualtrics, an online survey software (Qualtrics Research Suite (2014) [Computer software].

Provo, UT: Qualtrics, LLC.). For Intervention 1, participants received an email invitation to participate in an on-line retrospective pre- and post- intervention survey after the courses had ended. For Intervention 2 and 3, participants were invited in class to participate; they completed the retrospective pre- and post-intervention survey following completion of the equipment competency exam. Participants in Intervention 3 took an additional survey after participating in a practice lab and training, but before the equipment exam.

Data Analysis

Statistical significance was set at $p < 0.05$ for all tests. SPSS Statistics (IBM Corp. Released 2011. IBM SPSS Statistics for Windows. Version 22. Armonk, NY: IBM Corp) was used to complete the analysis.

Interventions 1, 2, and 3. Average scores across all pieces of equipment were calculated for knowledge, competence, comfort, and confidence in training others to use the foodservice equipment (see Appendix A, questions 3-6). Percent of students who had prior experience using each piece of quantity foodservice equipment was calculated. To test for normality, the Shapiro-Wilk test was conducted. This test compared the shape of the sample distribution to the shape of a normal curve. The significance value (p) was below 0.05 for pre- and post-intervention responses related to knowledge, competence, comfort level, and confidence in training others; therefore, the data significantly deviates from a normal distribution. The Levene Statistic tested the null hypothesis that the variances of pre- and post-knowledge, competence, comfort level, and confidence in training others are significantly different. The significance value (p) was greater than 0.05 for pre- and post-intervention responses related to knowledge, competence, comfort level, and confidence in training others; therefore, homogeneity of variance is assumed. Homogeneity of variance

means that the variability of pre- and post-knowledge, competence, comfort level, and confidence in training others does not change from Intervention 1, 2, and 3. Due to the non-normal distribution, a non-parametric test was selected and results were reported as medians (range). The Jonckheere-Terpsta test was used to test for a pattern to the medians of each variable (knowledge, competence, comfort level, and confidence in training others) across interventions in the following order: Intervention 1, Intervention 2, and Intervention 3. This test was conducted to evaluate trends across interventions for pre-intervention, post-intervention, and changes from pre- to post-intervention in levels of knowledge, competence, comfort level, and confidence in training others. Post hoc pairwise comparisons were conducted. It was hypothesized that there would be a positive trend for post-intervention levels, and changes from pre- to post-intervention with Intervention 1 having the lowest medians, Intervention 2 having the next highest medians, and Intervention 3 having the highest medians as evidenced by a positive Z score.

Intervention 3. The students were asked to rank each piece of equipment in order their competency from most (1) to least (14) competent. Medians were calculated to determine the pieces of equipment that students were most and least competent in using. The Friedman's test is a non-parametric test, that uses mean ranks to test for differences between groups when the dependent variable being measured is ordinal. A Friedman's test was used to determine if there were differences in overall pre-, post-training, and post-exam knowledge, competence, comfort level, and confidence in training others to use foodservice equipment. Pre-, post-training, and post-exam knowledge, competence, comfort level, and confidence in training others to use foodservice equipment was ranked for each student, meaning that the lowest score out of pre-, post-training, and post-exam was assigned a rank

of 1, then the next highest score was assigned a rank of 2, and the highest score was assigned a rank of 3. High scores were associated with higher ranks and lower scores with a lower rank. For each variable (knowledge, competence, comfort level, and confidence in training others) sum ranks were calculated for pre-, post-training, and post-exam. Mean ranks were calculated by dividing the sum rank by the total number of students. Each student's actual skill for each piece of equipment was determined by the instructor during the exam. Students were considered competent by demonstrating their ability to complete each task: turn on the equipment, cook with the equipment, clean the equipment, and turn off the equipment. Failure to complete one or more of the tasks resulted in no score for that piece of equipment. Students reported their competence (skill) for each piece of equipment on a scale of 1-4, 1 not competent, 2 somewhat competent, 3 competent, and 4 highly competent. Each student received an actual skill score: pieces of equipment they used correctly out of the total number of pieces of equipment (14). Self-reported competence (skill) score was calculated by diving their response by 4 (indicating highly competent). Spearman correlations were conducted to determine the strength and direction between the actual skill and self-reported competence (skill). A Bland-Altman Plot compared the agreement between actual skill to self-reported competence (skill).

Results

Participants in Intervention 1 (n = 14) were dietetic students, and in Intervention 2 (n = 25) and Intervention 3 (n = 26) participants were food and nutrition students, including dietetic students.

Interventions 1, 2, and 3. Percent of students who had prior experience using each piece of quantity foodservice equipment was calculated. Intervention 1 had the highest

percent of students who had prior experience using quantity foodservice equipment (average 31%) compared to Interventions 2 and 3 (average 20% and 14%, respectively). In all three interventions the highest percentage of students reported prior experience using the dishwasher. The tilting braising pan and salamander broiler had the lowest percentage of students' prior use (see Table 3).

Table 3. Prior experience using the quantity foodservice equipment.

Foodservice Equipment	**Intervention 1** (n = 14)	**Intervention 2** (n = 25)	**Intervention 3** (n = 26)
Combination Oven/Steamer	21%	8%	8%
Cook Hold Smoke Oven	21%	4%	4%
Commercial Microwave	50%	24%	19%
Convection Oven	50%	20%	8%
Slicer	36%	32%	23%
Steam Jacketed Kettle	21%	12%	4%
Tilting Braising Pan	14%	8%	4%
20 Quart Mixer	43%	28%	8%
60 Quart Mixer	21%	20%	12%
Dishwasher	64%	56%	69%
Combination Microwave/Convection Oven	14%	20%	8%
Dice (Food Processor)	14%	36%	8%
Gas Range	50%	8%	12%
Salamander Broiler	14%	8%	4%
Average	**31%**	**20%**	**14%**

To test for normality of the data the Shapiro-Wilk test was conducted. Shapiro-Wilk results indicate that pre-intervention responses were left-skewed and were therefore not normally distributed ($p \leq 0.001$). The Levene Statistic tested the null hypothesis that the variances of pre- and post-knowledge, competence, comfort level, and confidence in training others are significantly different. Results from the Levene Statistic indicate that intervention averages did not violate homogeneity of variance for knowledge, competence, comfort level, and confidence in training others prior to intervention ($p \geq 0.05$). Since the data is not a

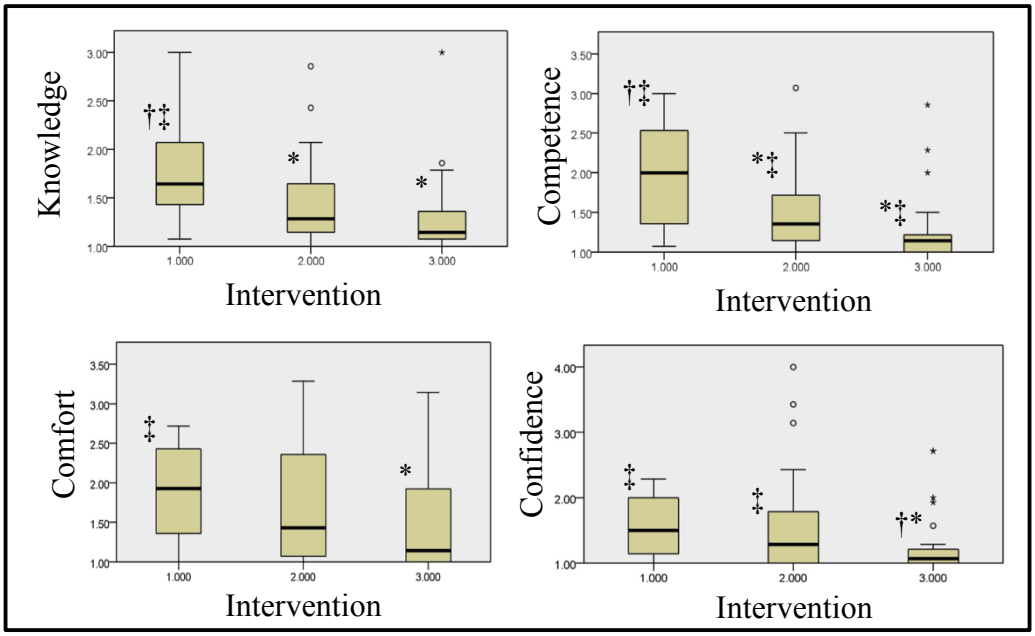
normal distribution, a non-parametric test, Jonckheere-Terpsta was selected and results were reported as medians (range).

The Jonckheere-Terpsta test was used to test for a pattern to the medians of each variable (knowledge, competence, comfort level, and confidence in training others) across interventions in the following order: Intervention 1, Intervention 2, and Intervention 3. Intervention 1 had the highest level of all pre-intervention variables. Intervention 3 had the lowest level of all the pre-intervention variables. The trend for pre-knowledge, competence, comfort level, and confidence in training others decreased from interventions (see Table 4 and Figure 1). Intervention 3 had the highest levels of all post-intervention variables, higher than Intervention 1 and 2 (see Table 5 and Figure 2). Post-Intervention scores were not significantly different when comparing Interventions 1 and 2. Intervention 2 was higher in post- confidence in training others, while Intervention 1 was higher in post-knowledge, competence, comfort level. Intervention 3 had the greatest change from pre- to post-intervention changes across interventions (see Table 6 and Figure 3). This was expected at Intervention 3 had the lowest pre- and highest post-variables. Intervention 3 was higher than Intervention 1 and 2 across all variables.

Table 4. Trends in pre-intervention knowledge, competence, comfort level, and confidence in training others among Interventions 1, 2, and 3 (Medians and Ranges).

Intervention	1	2	3	Z	*p*
Knowledge	1.64 (1.93) *n* = 13r	1.29 (1.86) *n* = 25	1.14 (2.00) *n* = 26	-2.875	0.004 *N* = 64
Competence	2.00 (1.93) *n* = 12	1.36 (2.07) *n* = 25	1.14 (1.86) *n* = 26	-3.857	0.000 *N* = 63
Comfort Level	1.93 (1.71) *n* = 12	1.43 (2.29) *n* = 25	1.14 (2.14) *n* = 26	-2.243	0.025 *N* = 63
Confidence in training others	1.50 (1.29) *n* = 9	1.29 (3.00) *n* = 25	1.07 (1.71) *n* = 26	-2.397	0.017 *N* = 60

Figure 1. Trends in pre-intervention knowledge, competence, comfort level, and confidence in training others among Interventions 1, 2, and 3, Jonckheere-Terpsta boxplots.

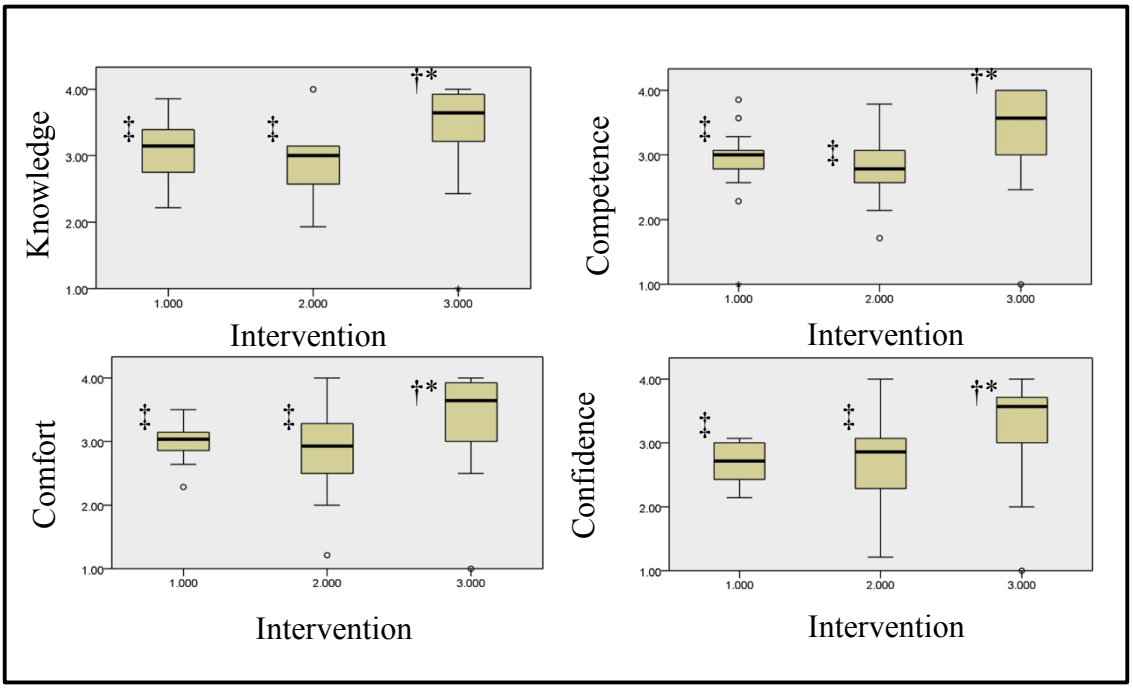


*Significantly different from 1
†Significantly different from 2
‡Significantly different from 3

Table 5. Trends in post-intervention knowledge, competence, comfort level, and confidence in training others among Interventions 1, 2, and 3 (Medians and Ranges).

Intervention	1	2	3	Z	*p*
	Post-	Post-	Post-		
Knowledge	3.14 (1.64) *n* = 12	3.00 (2.07) *n* = 25	3.64 (3.00) *n* = 25	3.074	0.002 *N* = 62
Competence	3.00 (2.86) *n* = 13	2.79 (2.07) *n* = 25	3.57 (3.00) *n* = 25	3.414	0.001 *N* = 63
Comfort Level	3.04 (1.21) *n* = 12	2.93 (2.79) *n* = 25	3.64 (3.00) *n* = 25	2.353	0.019 *N* = 62
Confidence in training others	2.71 (0.93) *n* = 9	2.86 (2.79) *n* = 25	3.57 (3.00) *n* = 25	2.928	0.003 *N* = 59

Figure 2. Trends in post-intervention knowledge, competence, comfort level, and confidence in training others among Interventions 1, 2, and 3, Jonckheere-Terpsta boxplots.

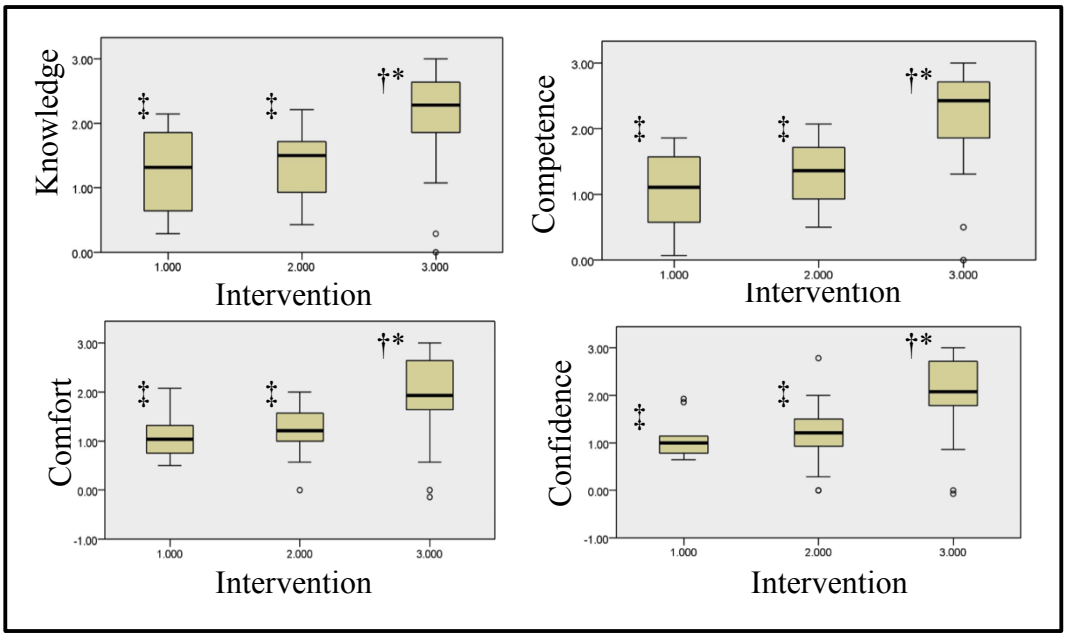


*Significantly different from 1
†Significantly different from 2
‡Significantly different from 3

Table 6. Trends in pre- to post-intervention changes among Interventions 1, 2, and 3 (Medians and Ranges).

				Z	*p*
	Intervention 1	Intervention 2	Intervention 3		
Knowledge	1.32 (1.86) *n* = 12	1.50 (1.79) *n* = 25	2.29 (3.00) *n* = 25	4.207	0.000 *N* = 62
Competence	1.11 (1.79) *n* = 12	1.36 (1.57) *n* = 25	2.43 (3.00) *n* = 25	4.943	0.000 *N* = 62
Comfort Level	1.04 (1.57) *n* = 12	1.21 (2.00) *n* = 25	1.93 (3.14) *n* = 25	4.070	0.000 *N* = 62
Confidence in training others	1.00 (1.29) *n* = 9	1.21 (2.79) *n* = 25	2.07 (3.07) *n* = 25	3.616	0.000 *N* = 59

Figure 3. Trends in pre- to post-intervention changes among all Interventions 1, 2, and 3, Jonckheere-Terpsta boxplots.



*Significantly different from 1

†Significantly different from 2

‡Significantly different from 3

Intervention 3. The students were asked to rank each piece of equipment in order their competency from most (1) to least (14) competent. Medians were calculated to determine the pieces of equipment that students were most and least competent in using. On the retrospective pre- and post-intervention survey students indicated that they were most competent using the following pieces of equipment: convection oven, dice (food processor), and dishwasher. Students reported that they were least competent in using the cook hold smoke oven, steam jacketed kettle, and gas range.

Table 7. Most and least competent pieces of equipment.

Most	**Median**		**Least**	**Median**
Convection Oven	4		Cook Hold Smoke Oven	10
Dice	4		Steam Jacketed Kettle	10
Dishwasher	4		Gas Range	10
20 qt. mixer	5		Menumaster	13

A Friedman's test was used to determine if there were differences in overall pre-, post-training, and post-exam knowledge, competence, comfort level, and confidence in training others to use foodservice equipment. Results of this test indicated that there was a significant increase in knowledge, competence, comfort level, and confidence in training others using each piece of foodservice equipment calculated from pre-intervention to, post-exam (see Table 8).

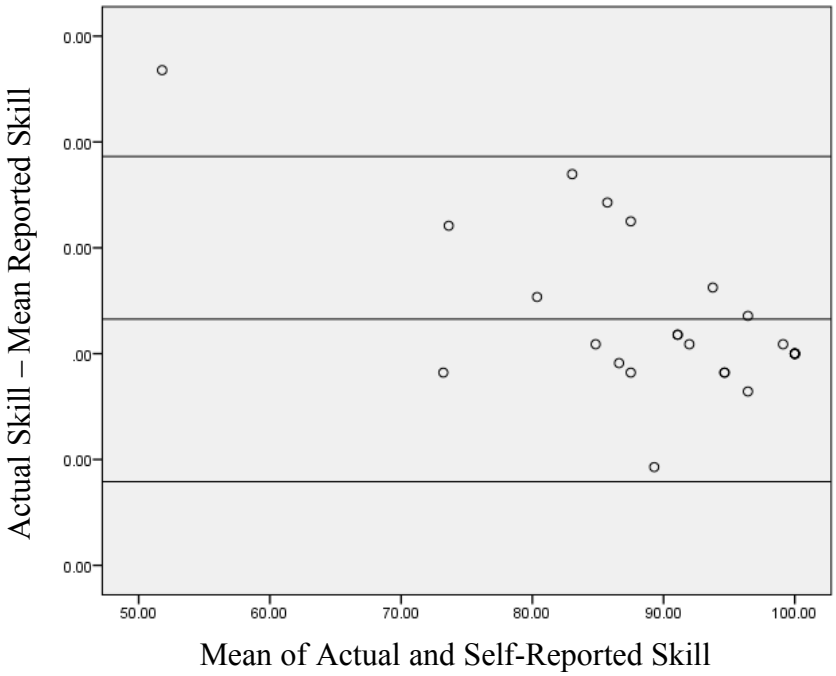
Table 8. Mean Rank of knowledge, competence, comfort level, confidence Pre-, post-training, and post- exam Friedman's Test.

Intervention 3	Mean rank			x^2	df	*p*
n = 25	Pre-	Post-training	Post-exam			
Knowledge	1.04	2.14	2.82	41.163	2	<.0001
Competence	1.08	2.04	2.88	41.814	2	<.0001
Comfort	1.10	2.12	2.78	36.182	2	<.0001
Confidence in training others	1.14	2.08	2.78	34.202	2	<.0001

Actual skill. Each student's actual skill for each piece of equipment was determined by the instructor during the exam. Each student received an actual skill score: pieces of equipment they used correctly out of the total number of pieces of equipment (14). Self-reported competence (skill) score was calculated by diving their response by 4 (indicating highly competent). Eighty-eight percent of students received an 86% or better (maximum = 100%, minimum = 71%) on their actual skill. Actual skills from the exam were compared to self-reported competence (skill), spearman correlations showed that there were no significant correlations. A Bland-Altman Plot compared the agreement between actual skill to self-reported competence (skill) (see Figure 4). The plot showed that there were points plotted on each side of the mean, with one outlier. This tests identifies possible outliers and differences between the two groups. The Y axis is the difference of the actual skill and the self-reported competence (skill) (difference = actual skill - self-reported competence [skill]). The X axis is the mean of actual skill and the self-reported competence (skill). The plot reports the upper and lower 95% confidence limits and mean difference between the two measurements (middle line). Students (*n* = 13) reported a low skill level, but their actual

skill level was higher than reported, under reporting. Students (n = 7) reported a high skill level, but their actual skill level was lower than reported, over reporting. Students (n = 5) reported a skill level and their actual skill level matched their reported.

Figure 4. Agreement between actual skill to self-reported competence (skill), Bland-Altman Plot.



Discussion

These results indicate that there were improvements in knowledge, competence, and comfort in using foodservice equipment, as well as confidence in training others following each of the interventions. Students in Intervention 3 had the highest post-intervention score, despite the fact that students in Intervention 1 had the highest pre-intervention score and highest amount of prior experience using quantity foodservice equipment. With more training and experience from Intervention 1, 2 and 3, students' levels of knowledge, competence, and comfort in using foodservice equipment, as well as confidence in training others to use foodservice equipment were higher. Fifty percent or fewer had prior

experience on most pieces of equipment. In all three interventions, the highest percentage of students had used a dishwasher prior to the intervention, while the tilting braising pan and salamander broiler had the lowest percentage of students' prior use. The tilting braising pan and salamander broiler were less common in foodservice establishments

The results of this study add to body of research as actual skill was assessed; not all training studies evaluated actual behavior. Students in Intervention 3 received an actual skill score, all students received an overall passing score. Most students received an 86% or better. Following Intervention 3 (extensive equipment training, optional open labs times, practice lab, and an equipment competency exam) students were competent operating the equipment. It was determined that most students under report on their skill level to their actual skill level. If students were not certain of their ability to perform a task, this may negatively affect their competence when operating foodservice equipment. Students were operating the equipment correctly; however, their reported comfort level was low. This was possibly due to the fact it was an exam and students are typically stressed in exams.

The equipment training in this study is standardized and may be a more effective way to train students rather than supervised practice in campus foodservice establishments. Supervised practice rotations may differ from one dietetic student to the next at the exact same rotation, due to the daily variation in production tasks and kitchen staff. Also, supervised practice experience may differ from one university to another depending on what is available at the campus foodservice establishment(s).

Interventions 2 and 3 in this study followed good hand-on training practices, such as having the instructor demonstrating how to turn on and off, operate, and clean each piece of equipment then having each student repeat the same tasks for each piece of equipment

(“Basic food service training division," 2013 & White, 2012). In the current study for Interventions 2 and 3, students had hands-on experience as they took a practical exam on the equipment (“Basic food service training division," 2013). Intervention 3 allowed for mastery experiences during the practice lab and extensive equipment training. The findings from this study aligned with The Social Learning Theory and Social Cognitive Theory, as self-efficacy was increased and desired behaviors were achieved.

While this study provides findings regarding the effectiveness of foodservice equipment training, certain limitations exist. The low sample size of Intervention 1 presents a limitation; this may have been because dietetic students were invited by email to complete a survey after the courses had already ended. A further limitation was that actual skills were only reported for Intervention 3; therefore, comparison between skills from intervention to intervention cannot be established. Actual skills were rated on a scale from 1-14, it would have made for an easier comparison on a Likert scale from 1-4, since the survey scale was from 1-4. Additionally, the participants in all interventions were mostly female and from one university in the Pacific Northwest. In Interventions 2 and 3 only a few of the dietetic students completed supervised practice rotations in campus foodservice establishments, this was not controlled for in the analysis. The instructor was the same for the all three interventions. During Intervention 1 the instructor took FCS 384 and 387, during Intervention 2 and 3 the instructor was a student in the Coordinated Program in Dietetics (CPD). Students may have treated their intervention experience and survey participation less seriously as the instructor was a classmate and not professor.

Implications for Future Studies

This study compared nutrition and dietetic students' knowledge, competence, and comfort in using foodservice equipment, as well as confidence in training others to use foodservice equipment after completing one the following interventions. These findings will allow for further research on this topic, for one example monitoring the actual skill from after the time of the equipment exam. Future research for dietetic students could evaluate the effectiveness of supervised practice for training students on foodservice equipment among different universities. This same study could also be carried out at another university or a foodservice operation that has a quantity foodservice equipment. This research highlights the importance of foodservice equipment training for food and nutrition students, including dietetic students and also for foodservice operations and employees. Though further research should be done, this study gives good examples of a number of training options as knowledge, competence, and comfort in using foodservice equipment, as well as confidence in training others to use foodservice equipment increased after all interventions. Foodservice operations and dietetic programs should consider implementing Intervention 3 because it resulted in the greatest amount of change due to the extensive equipment training, and was verified with actual skill.

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Appendix A: Survey Tools
Intervention 1 – Retrospective Pre- and Post-Intervention Survey

Default Question Block

Please reflect on your knowledge, competence, and comfort level related to working with foodse prior to beginning FCS 384/387, after completing FCS 384/387, and after completing the Coordina (CPD).

In FCS 384/387 you completed the following: equipment investigation project, etiquette dinner, N theme meal, and campus dining rotations.

This project has been certified as exempt by the University of Idaho Institutional Review Board. anonymous. Completion of the survey implies consent to participate and certifies you are at leas

Following completion, you will be redirected to a second survey. You will be asked to enter your receive a $5.00 Starbucks gift card for participation in this survey.

Please indicate the pieces of equipment you had experience using prior to beginning FCS 384/387. If you used the type of equipment before t brand), you can still check the box.

- ☐ Alto-Sham Combination Oven/Steamer
- ☐ Alto-Sham Cook Hold Smoke Oven
- ☐ Amana Microwave
- ☐ Blodgett Convection Oven ZephaireE
- ☐ Globe Slicer
- ☐ Groen Steam Jacketed Kettle
- ☐ Groen Tilting Braising Pan
- ☐ Hobart 20 Quart Mixer
- ☐ Hobart 60 Quart Mixer
- ☐ Hobart Dishwasher AM15
- ☐ Menumaster High
- ☐ Robot Coupe Dice
- ☐ Vulcan Endurance
- ☐ Vulcan Salamande

Please assess knowledge prior to FCS 384/387, after FCS 384/387, and after completing the Coordinated Pro consider the type of equipment and not the specific brand.

	Please asses knowledge prior to beginning the FCS 384/387 course.				Please assess knowledge after completing the FCS384/387 course.				Please a
	Not knowledgeable	Somewhat knowledgeable	Knowledgeable	Highly knowledgeable	Not knowledgeable	Somewhat knowledgeable	Knowledgeable	Highly knowledgeable	Not knowledgeabl
Alto-Sham Combination Oven/Steamer	○	○	○	○	○	○	○	○	○
Alto-Sham Cook Hold Smoke Oven	○	○	○	○	○	○	○	○	○
Amana Microwave	○	○	○	○	○	○	○	○	○
Blodgett Convection Oven ZephaireE	○	○	○	○	○	○	○	○	○
Globe Slicer	○	○	○	○	○	○	○	○	○
Groen Steam Jacketed Kettle	○	○	○	○	○	○	○	○	○
Groen Tilting Braising Pan	○	○	○	○	○	○	○	○	○
Hobart 20 Quart Mixer	○	○	○	○	○	○	○	○	○
Hobart 60 Quart Mixer	○	○	○	○	○	○	○	○	○
Hobart Dishwasher AM15	○	○	○	○	○	○	○	○	○
Menumaster High Speed Combi Oven	○	○	○	○	○	○	○	○	○

	Please asses knowledge prior to beginning the FCS 384/387 course.				Please assess knowledge after completing the FCS384/387 course.				Please a
	Not knowledgeable	Somewhat knowledgeable	Knowledgeable	Highly knowledgeable	Not knowledgeable	Somewhat knowledgeable	Knowledgeable	Highly knowledgeable	Not knowledgeabl
Robot Coupe Dice	O	O	O	O	O	O	O	O	O
Vulcan Endurance / Wolf Challenger Range	O	O	O	O	O	O	O	O	O
Vulcan Salamander	O	O	O	O	O	O	O	O	O

Please assess competence (skill level) prior to FCS 384/387, after FCS 384/387, and after completing the C (CPD). Please consider the type of equipment and not the specific brand.

	Please asses competence prior to beginning the FCS 384/387 course.				Please assess competence after completing the FCS 384/387 course.				Please assess competence after completing the CPD.			
	Not Competent	Somewhat Competent	Competent	Highly Competent	Not Competent	Somewhat Competent	Competent	Highly Competent	Not Competent	Somewhat Competent	Competent	Highly Competer
Alto-Sham Combination Oven/Steamer	O	O	O	O	O	O	O	O	O	O	O	O
Alto-Sham Cook Hold Smoke Oven	O	O	O	O	O	O	O	O	O	O	O	O
Amana Microwave	O	O	O	O	O	O	O	O	O	O	O	O
Blodgett Convection Oven ZephaireE	O	O	O	O	O	O	O	O	O	O	O	O
Globe Slicer	O	O	O	O	O	O	O	O	O	O	O	O
Groen Steam Jacketed Kettle	O	O	O	O	O	O	O	O	O	O	O	O
Groen Tilting Braising Pan	O	O	O	O	O	O	O	O	O	O	O	O
Hobart 20 Quart Mixer	O	O	O	O	O	O	O	O	O	O	O	O
Hobart 60 Quart Mixer	O	O	O	O	O	O	O	O	O	O	O	O
Hobart Dishwasher AM15	O	O	O	O	O	O	O	O	O	O	O	O
Menumaster High Speed Combi Oven	O	O	O	O	O	O	O	O	O	O	O	O
Robot Coupe Dice	O	O	O	O	O	O	O	O	O	O	O	O
Vulcan Endurance / Wolf Challenger Range	O	O	O	O	O	O	O	O	O	O	O	O
Vulcan Salamander	O	O	O	O	O	O	O	O	O	O	O	O

Please assess comfort level in using the equipment prior to FCS 384/387, after FCS 384/387, and after comp in Dietetics (CPD). Please consider the type of equipment and not the specific brand.

	Please asses comfort level prior to beginning the FCS 384/387 course.				Please assess comfort level after completing the FCS 384/387 course.				Please assess comfort level after c CPD.		
	Not Comfortable	Somewhat Comfortable	Comfortable	Highly Comfortable	Not Comfortable	Somewhat Comfortable	Comfortable	Highly Comfortable	Not Comfortable	Somewhat Comfortable	Comfortal
Alto-Sham Combination Oven/Steamer	O	O	O	O	O	O	O	O	O	O	O
	O	O	O	O	O	O	O	O	O	O	O

	Please asses comfort level prior to beginning the FCS 384/387 course.				Please assess comfort level after completing the FCS 384/387 course.				Please assess comfort level after c CPD.		
	Not Comfortable	Somewhat Comfortable	Comfortable	Highly Comfortable	Not Comfortable	Somewhat Comfortable	Comfortable	Highly Comfortable	Not Comfortable	Somewhat Comfortable	Comfortal
Alto-Sham Cook Hold Smoke Oven											
Amana Microwave	O	O	O	O	O	O	O	O	O	O	O
Blodgett Convection Oven ZephaireE	O	O	O	O	O	O	O	O	O	O	O
Globe Slicer	O	O	O	O	O	O	O	O	O	O	O
Groen Steam Jacketed Kettle	O	O	O	O	O	O	O	O	O	O	O
Groen Tilting Braising Pan	O	O	O	O	O	O	O	O	O	O	O
Hobart 20 Quart Mixer	O	O	O	O	O	O	O	O	O	O	O
Hobart 60 Quart Mixer	O	O	O	O	O	O	O	O	O	O	O
Hobart Dishwasher AM15	O	O	O	O	O	O	O	O	O	O	O
Menumaster High Speed Combi Oven	O	O	O	O	O	O	O	O	O	O	O
Robot Coupe Dice	O	O	O	O	O	O	O	O	O	O	O
Vulcan Endurance / Wolf Challenger Range	O	O	O	O	O	O	O	O	O	O	O
Vulcan Salamander	O	O	O	O	O	O	O	O	O	O	O

Please assess <u>confidence level</u> in being able to train someone on the equipment prior to FCS 384/387, after completing the Coordinated Program in Dietetics (CPD). Please consider the type of equipment and not the s

	Please asses confident level prior to beginning the FCS 384/387 course.				Please assess confident level after completing the FCS 384/387 course.				Please assess confident level after completing the CPD.			
	Not Confident	Somewhat Confident	Confident	Highly Confident	Not Confident	Somewhat Confident	Confident	Highly Confident	Not Confident	Somewhat Confident	Confident	Highly Confident
Alto-Sham Combination Oven/Steamer	O	O	O	O	O	O	O	O	O	O	O	O
Alto-Sham Cook Hold Smoke Oven	O	O	O	O	O	O	O	O	O	O	O	O
Amana Microwave	O	O	O	O	O	O	O	O	O	O	O	O
Blodgett Convection Oven ZephaireE	O	O	O	O	O	O	O	O	O	O	O	O
Globe Slicer	O	O	O	O	O	O	O	O	O	O	O	O
Groen Steam Jacketed Kettle	O	O	O	O	O	O	O	O	O	O	O	O
Groen Tilting Braising Pan	O	O	O	O	O	O	O	O	O	O	O	O
Hobart 20 Quart Mixer	O	O	O	O	O	O	O	O	O	O	O	O
Hobart 60 Quart Mixer	O	O	O	O	O	O	O	O	O	O	O	O
Hobart Dishwasher AM15	O	O	O	O	O	O	O	O	O	O	O	O
	O	O	O	O	O	O	O	O	O	O	O	O

	Please asses confident level prior to beginning the FCS 384/387 course.				Please assess confident level after completing the FCS 384/387 course.				Please assess confident level after completing the CPD.			
	Not Confident	Somewhat Confident	Confident	Highly Confident	Not Confident	Somewhat Confident	Confident	Highly Confident	Not Confident	Somewhat Confident	Confident	Highly Confident
Menumaster High Speed Combi Oven												
Robot Coupe Dice	○	○	○	○	○	○	○	○	○	○	○	○
Vulcan Endurance / Wolf Challenger Range	○	○	○	○	○	○	○	○	○	○	○	○
Vulcan Salamander	○	○	○	○	○	○	○	○	○	○	○	○

Please rank in order of your competency, by dragging the number to the equipment name. Number 1 would be most competent using and number 14 the equipment you feel the least competent using. Please consider the specific brand.

- Alto-Sham Combination Oven/Steamer
- Alto-Sham Cook Hold Smoke Oven
- Amana Microwave
- Blodgett Convection Oven ZephaireE
- Globe Slicer
- Groen Steam Jacketed Kettle
- Groen Tilting Braising Pan
- Hobart 20 Quart Mixer
- Hobart 60 Quart Mixer
- Hobart Dishwasher AM15
- Menumaster High Speed Combi Oven
- Robot Coupe Dice
- Vulcan Endurance / Wolf Challenger Range
- Vulcan Salamander

Please describe areas of foodservice equipment use in which you do not feel knowledgeable, confident, or c

Please describe foodservice experiences and resources prior to the FCS 384/387 course that contributed to and comfort level using foodservice equipment.

Please describe foodservice experiences and resources **during** your CPD senior year that contributed to you comfort level using foodservice equipment.

Please describe recommendations for equipment training for FCS 384/387 students.

Thank you for participating in this project.
Following completion, you will be redirected to a second survey. You will be asked to enter your receive a $5.00 Starbucks gift card for participation in this survey.
All survey responses are anonymous. Your name will not be linked to the previous responses.

Intervention 2 – Retrospective Pre- and Post-Intervention Survey

Default Question Block

Please reflect on your knowledge, competence, and comfort level related to working with foodservice equipment both currently and prior to beginning FCS 384.

This project has been certified as exempt by the University of Idaho Institutional Review Board. All responses are anonymous. Completion of the survey implies consent to participate and certifies you are at least 18 years of age.

Following the survey, you will be redirected to a second survey to enter your name and receive class credit for completing the activity.

Prior to FCS 384 please check all the equipment that you have used before. If you have used the type of equipment before but from a different company (different brand), you can still check the box.

- ☐ Alto-Sham Combination Oven/Steamer
- ☐ Alto-Sham Cook Hold Smoke Oven
- ☐ Amana Microwave
- ☐ Blodgett Convection Oven ZephaireE
- ☐ Globe Slicer
- ☐ Groen Steam Jacketed Kettle
- ☐ Groen Tilting Braising Pan
- ☐ Hobart 20 Quart Mixer
- ☐ Hobart 60 Quart Mixer
- ☐ Hobart Dishwasher AM15
- ☐ Menumaster High Speed Combi Oven
- ☐ Robot Coupe Dice
- ☐ Vulcan Endurance / Wolf Challenger Range
- ☐ Vulcan Salamander

Please assess knowledge prior to FCS 384 and after the competency exam. Please consider the type of equipment and not the specific brand.

	Please asses knowledge prior to beginning the FCS 384 course.				Please assess knowledge after completing the equipment competency exam.			
	Not knowledgeable	Somewhat knowledgeable	Knowledgeable	Highly knowledgeable	Not knowledgeable	Somewhat knowledgeable	Knowledgeable	Highly knowledgeable
Alto-Sham Combination Oven/Steamer	○	○	○	○	○	○	○	○
Alto-Sham Cook Hold Smoke Oven	○	○	○	○	○	○	○	○
Amana Microwave	○	○	○	○	○	○	○	○
Blodgett Convection Oven ZephaireE	○	○	○	○	○	○	○	○
Globe Slicer	○	○	○	○	○	○	○	○
Groen Steam Jacketed Kettle	○	○	○	○	○	○	○	○
Groen Tilting Braising Pan	○	○	○	○	○	○	○	○
Hobart 20 Quart Mixer	○	○	○	○	○	○	○	○
Hobart 60 Quart Mixer	○	○	○	○	○	○	○	○
Hobart Dishwasher AM15	○	○	○	○	○	○	○	○
Menumaster High Speed Combi Oven	○	○	○	○	○	○	○	○
	○	○	○	○	○	○	○	○

	Please asses knowledge prior to beginning the FCS 384 course.				Please assess knowledge after completing the equipment competency exam.			
	Not knowledgeable	Somewhat knowledgeable	Knowledgeable	Highly knowledgeable	Not knowledgeable	Somewhat knowledgeable	Knowledgeable	Highly knowledgeable
Robot Coupe Dice								
Vulcan Endurance / Wolf Challenger Range	O	O	O	O	O	O	O	O
Vulcan Salamander	O	O	O	O	O	O	O	O

Please assess competence (skill level) prior to FCS 384 and after the competency exam. Please consider the type of equipment and not the specific brand.

	Please asses competence prior to beginning the FCS 384 course.				Please assess competence after completing the equipment competency exam.			
	Not Competent	Somewhat Competent	Competent	Highly Competent	Not Competent	Somewhat Competent	Competent	Highly Competent
Alto-Sham Combination Oven/Steamer	O	O	O	O	O	O	O	O
Alto-Sham Cook Hold Smoke Oven	O	O	O	O	O	O	O	O
Amana Microwave	O	O	O	O	O	O	O	O
Blodgett Convection Oven ZephaireE	O	O	O	O	O	O	O	O
Globe Slicer	O	O	O	O	O	O	O	O
Groen Steam Jacketed Kettle	O	O	O	O	O	O	O	O
Groen Tilting Braising Pan	O	O	O	O	O	O	O	O
Hobart 20 Quart Mixer	O	O	O	O	O	O	O	O
Hobart 60 Quart Mixer	O	O	O	O	O	O	O	O
Hobart Dishwasher AM15	O	O	O	O	O	O	O	O
Menumaster High Speed Combi Oven	O	O	O	O	O	O	O	O
Robot Coupe Dice	O	O	O	O	O	O	O	O
Vulcan Endurance / Wolf Challenger Range	O	O	O	O	O	O	O	O
Vulcan Salamander	O	O	O	O	O	O	O	O

Please assess comfort level in using the equipment prior to FCS 384 and after the competency exam. Please consider the type of equipment and not the specific brand.

	Please asses comfort level prior to beginning the FCS 384 course.				Please assess comfort level after completing the equipment competency exam.			
	Not Comfortable	Somewhat Comfortable	Comfortable	Highly Comfortable	Not Comfortable	Somewhat Comfortable	Comfortable	Highly Comfortable

	Please asses comfort level prior to beginning the FCS 384 course.				Please assess comfort level after completing the equipment competency exam.			
	Not Comfortable	Somewhat Comfortable	Comfortable	Highly Comfortable	Not Comfortable	Somewhat Comfortable	Comfortable	Highly Comfortable
Alto-Sham Combination Oven/Steamer	○	○	○	○	○	○	○	○
Alto-Sham Cook Hold Smoke Oven	○	○	○	○	○	○	○	○
Amana Microwave	○	○	○	○	○	○	○	○
Blodgett Convection Oven ZephaireE	○	○	○	○	○	○	○	○
Globe Slicer	○	○	○	○	○	○	○	○
Groen Steam Jacketed Kettle	○	○	○	○	○	○	○	○
Groen Tilting Braising Pan	○	○	○	○	○	○	○	○
Hobart 20 Quart Mixer	○	○	○	○	○	○	○	○
Hobart 60 Quart Mixer	○	○	○	○	○	○	○	○
Hobart Dishwasher AM15	○	○	○	○	○	○	○	○
Menumaster High Speed Combi Oven	○	○	○	○	○	○	○	○
Robot Coupe Dice	○	○	○	○	○	○	○	○
Vulcan Endurance / Wolf Challenger Range	○	○	○	○	○	○	○	○
Vulcan Salamander	○	○	○	○	○	○	○	○

Please assess confidence level in being able to train someone on the equipment prior to FCS 384 and after the competency exam. Please consider the type of equipment and not the specific brand.

	Please asses confident level prior to beginning the FCS 384 course.				Please assess confident level after completing the equipment competency exam.			
	Not Confident	Somewhat Confident	Confident	Highly Confident	Not Confident	Somewhat Confident	Confident	Highly Confident
Alto-Sham Combination Oven/Steamer	○	○	○	○	○	○	○	○
Alto-Sham Cook Hold Smoke Oven	○	○	○	○	○	○	○	○
Amana Microwave	○	○	○	○	○	○	○	○
Blodgett Convection Oven ZephaireE	○	○	○	○	○	○	○	○
Globe Slicer	○	○	○	○	○	○	○	○
Groen Steam Jacketed Kettle	○	○	○	○	○	○	○	○
Groen Tilting Braising Pan	○	○	○	○	○	○	○	○

	Please asses confident level prior to beginning the FCS 384 course.				Please assess confident level after completing the equipment competency exam.			
	Not Confident	Somewhat Confident	Confident	Highly Confident	Not Confident	Somewhat Confident	Confident	Highly Confident
Hobart 20 Quart Mixer	○	○	○	○	○	○	○	○
Hobart 60 Quart Mixer	○	○	○	○	○	○	○	○
Hobart Dishwasher AM15	○	○	○	○	○	○	○	○
Menumaster High Speed Combi Oven	○	○	○	○	○	○	○	○
Robot Coupe Dice	○	○	○	○	○	○	○	○
Vulcan Endurance / Wolf Challenger Range	○	○	○	○	○	○	○	○
Vulcan Salamander	○	○	○	○	○	○	○	○

Please rank in order of your competency, by dragging the number to the equipment name. Number 1 would be the equipment you feel the most competent using and number 14 the equipment you feel the least competent using. Please consider the type of equipment and not the specific brand.

- Alto-Sham Combination Oven/Steamer
- Alto-Sham Cook Hold Smoke Oven
- Amana Microwave
- Blodgett Convection Oven ZephaireE
- Globe Slicer
- Groen Steam Jacketed Kettle
- Groen Tilting Braising Pan
- Hobart 20 Quart Mixer
- Hobart 60 Quart Mixer
- Hobart Dishwasher AM15
- Menumaster High Speed Combi Oven
- Robot Coupe Dice
- Vulcan Endurance / Wolf Challenger Range
- Vulcan Salamander

Please describe areas of foodservice equipment use in which you do not feel knowledgeable, confident, or comfortable.

Please describe food service experiences and resources prior to the FCS 384 course that contributed to your knowledge, competence and comfort level using foodservice equipment.

Please describe aspects within the equipment competency exam that you found helpful.

After completing the equipment competency exam please answer the following.

	Please assess the following on the exam.			
	Highly Disagree	Disagree	Agree	Highly Agree
The entire exam process was clear.	○	○	○	○
Exam explanation document was clear in the instructions, and understandable.	○	○	○	○
Exam written component document was clear, and understandable.	○	○	○	○
Exam checklist was a good indicator of completing and using each piece of equipment.	○	○	○	○
The time allotted for the exam was appropriate.	○	○	○	○

Please comment on your experience of taking the equipment competency exam.

Please describe recommendations for equipment training for future FCS 384 students.

Please comment on recommendations and changes for future equipment competency exam testing.

Thank you for participating in this project. Following completion, **you will be redirected to a second survey. You will be asked to enter your name and e-mail address to receive FCS 384 class credit for participation in this activity.** All survey responses are anonymous. Your name will not be linked to the previous responses.

Intervention 3 – Post-Practice Lab and Training Survey

Default Question Block

Please reflect on your current knowledge, competence, and comfort level related to working with foodservice equipment.

This project has been certified as exempt by the University of Idaho Institutional Review Board. All responses are anonymous. Completion of the survey implies consent to participate and certifies you are at least 18 years of age.

Following the survey, you will be redirected to a second survey to enter your name and receive class credit for completing the activity.

Please assess knowledge after completing the equipment training and practice lab. Please consider the type of equipment and not the specific brand.

	Please asses knowledge after completing the equipment training and practice lab.			
	Not knowledgeable	Somewhat knowledgeable	Knowledgeable	Highly knowledgeable
Alto-Sham Combination Oven/Steamer				
Alto-Sham Cook Hold Smoke Oven				
Amana Microwave				
Blodgett Convection Oven ZephaireE				
Globe Slicer				
Groen Steam Jacketed Kettle				
Groen Tilting Braising Pan				
Hobart 20 Quart Mixer				
Hobart 60 Quart Mixer				
Hobart Dishwasher AM15				
Menumaster High Speed Combi Oven				
Robot Coupe Dice				
Vulcan Endurance / Wolf Challenger Range				
Vulcan Salamander				

Please assess competence (skill level) after completing the equipment training and practice lab.. Please consider the type of equipment and not the specific brand.

	Please asses competence after completing the equipment training and practice lab.			
	Not Competent	Somewhat Competent	Competent	Highly Competent
Alto-Sham Combination Oven/Steamer				
Alto-Sham Cook Hold Smoke Oven				
Amana Microwave				
Blodgett Convection Oven ZephaireE				
Globe Slicer				
Groen Steam Jacketed Kettle				
Groen Tilting Braising Pan				
Hobart 20 Quart Mixer				
Hobart 60 Quart Mixer				
Hobart Dishwasher AM15				
Menumaster High Speed Combi Oven				
Robot Coupe Dice				
Vulcan Endurance / Wolf Challenger Range				
Vulcan Salamander				

Please assess comfort level in using the equipment after completing the equipment training and practice lab. Please consider the type of equipment and not the specific brand.

	Please asses comfort level after completing the equipment training and practice lab.			
	Not Comfortable	Somewhat Comfortable	Comfortable	Highly Comfortable
Alto-Sham Combination Oven/Steamer				
Alto-Sham Cook Hold Smoke Oven				
Amana Microwave				
Blodgett Convection Oven ZephaireE				
Globe Slicer				
Groen Steam Jacketed Kettle				
Groen Tilting Braising Pan				
Hobart 20 Quart Mixer				
Hobart 60 Quart Mixer				
Hobart Dishwasher AM15				
Menumaster High Speed Combi Oven				
Robot Coupe Dice				
Vulcan Endurance / Wolf Challenger Range				
Vulcan Salamander				

Please assess confidence level in being able to train someone on the equipment after completing the equipment training and practice lab. Please consider the type of equipment and not the specific brand.

	Please asses confident level after completing the equipment training and practice lab.			
	Not Confident	Somewhat Confident	Confident	Highly Confident
Alto-Sham Combination Oven/Steamer				
Alto-Sham Cook Hold Smoke Oven				
Amana Microwave				
Blodgett Convection Oven ZephaireE				
Globe Slicer				
Groen Steam Jacketed Kettle				
Groen Tilting Braising Pan				
Hobart 20 Quart Mixer				
Hobart 60 Quart Mixer				
Hobart Dishwasher AM15				
Menumaster High Speed Combi Oven				
Robot Coupe Dice				
Vulcan Endurance / Wolf Challenger Range				
Vulcan Salamander				

Please rank in order of your competency, by dragging the number to the equipment name. Number 1 would be the equipment you feel the most competent using and number 14 the equipment you feel the least competent using. Please consider the type of equipment and

not the specific brand.

- Alto-Sham Combination Oven/Steamer
- Alto-Sham Cook Hold Smoke Oven
- Amana Microwave
- Blodgett Convection Oven ZephaireE
- Globe Slicer
- Groen Steam Jacketed Kettle
- Groen Tilting Braising Pan
- Hobart 20 Quart Mixer
- Hobart 60 Quart Mixer
- Hobart Dishwasher AM15
- Menumaster High Speed Combi Oven
- Robot Coupe Dice
- Vulcan Endurance / Wolf Challenger Range
- Vulcan Salamander

Please describe areas of foodservice equipment use in which you do not feel knowledgeable, confident, or comfortable.

Please describe aspects within the equipment training that you found helpful.

After completing the equipment training and practice lab please answer the following.

	Please assess the following.			
	Highly Disagree	Disagree	Agree	Highly Agree
The training was detailed and clear.				
Small size training groups benefited my learning of the equipment.				
The training note sheet was helpful during the training and practice lab.				
The time allotted for the training was appropriate.				
The time allotted for the practice lab was appropriate.				

Please comment on your equipment training experience.

Please describe recommendations and changes for the equipment training for future FCS 384 students.

Please describe aspects within the equipment practice lab that you found helpful.

Please describe recommendations and changes for the equipment practice labs for future FCS 384 students.

Thank you for participating in this project. Following completion, you will be redirected to a second survey. You will be asked to enter your name and e-mail address to receive FCS 384 class credit for participation in this activity. All survey responses are anonymous. Your name will not be linked to the previous responses.

Intervention 3 – Retrospective Pre- and Post-Intervention Survey

Default Question Block

Please reflect on your knowledge, competence, and comfort level related to working with foodservice equipment both currently and prior to beginning FCS 384.

This project has been certified as exempt by the University of Idaho Institutional Review Board. All responses are anonymous. Completion of the survey implies consent to participate and certifies you are at least 18 years of age.

Following the survey, you will be redirected to a second survey to enter your name and receive class credit for completing the activity.

Prior to FCS 384 please check all the equipment that you have used before. If you have used the type of equipment before but from a different company (different brand), you can still check the box.

- Alto-Sham Combination Oven/Steamer
- Alto-Sham Cook Hold Smoke Oven
- Amana Microwave
- Blodgett Convection Oven ZephaireE
- Globe Slicer
- Groen Steam Jacketed Kettle
- Groen Tilting Braising Pan
- Hobart 20 Quart Mixer
- Hobart 60 Quart Mixer
- Hobart Dishwasher AM15
- Menumaster High Speed Combi Oven
- Robot Coupe Dice
- Vulcan Endurance / Wolf Challenger Range
- Vulcan Salamander

Please assess knowledge prior to FCS 384 and after the competency exam. Please consider the type of equipment and not the specific brand.

	Please asses knowledge prior to beginning the FCS 384 course.				Please assess knowledge after completing the equipment competency exam.			
	Not knowledgeable	Somewhat knowledgeable	Knowledgeable	Highly knowledgeable	Not knowledgeable	Somewhat knowledgeable	Knowledgeable	Highly knowledgeable
Alto-Sham Combination Oven/Steamer								
Alto-Sham Cook Hold Smoke Oven								
Amana Microwave								
Blodgett Convection Oven ZephaireE								
Globe Slicer								
Groen Steam Jacketed Kettle								
Groen Tilting Braising Pan								
Hobart 20 Quart Mixer								
Hobart 60 Quart Mixer								
Hobart Dishwasher AM15								
Menumaster High Speed Combi Oven								
Robot Coupe Dice								
Vulcan Endurance / Wolf Challenger Range								
Vulcan Salamander								

Please assess competence (skill level) prior to FCS 384 and after the competency exam. Please consider the type of equipment and not the specific brand.

	Please asses competence prior to beginning the FCS 384 course.				Please assess competence after completing the equipment competency exam.			
	Not Competent	Somewhat Competent	Competent	Highly Competent	Not Competent	Somewhat Competent	Competent	Highly Competent
Alto-Sham Combination Oven/Steamer								
Alto-Sham Cook Hold Smoke Oven								
Amana Microwave								
Blodgett Convection Oven ZephaireE								
Globe Slicer								
Groen Steam Jacketed Kettle								
Groen Tilting Braising Pan								
Hobart 20 Quart Mixer								
Hobart 60 Quart Mixer								
Hobart Dishwasher AM15								
Menumaster High Speed Combi Oven								
Robot Coupe Dice								
Vulcan Endurance / Wolf Challenger Range								
Vulcan Salamander								

Please assess comfort level in using the equipment prior to FCS 384 and after the competency exam. Please consider the type of equipment and not the specific brand.

	Please asses comfort level prior to beginning the FCS 384 course.				Please assess comfort level after completing the equipment competency exam.			
	Not Comfortable	Somewhat Comfortable	Comfortable	Highly Comfortable	Not Comfortable	Somewhat Comfortable	Comfortable	Highly Comfortable
Alto-Sham Combination Oven/Steamer	○	○	○	○	○	○	○	○
Alto-Sham Cook Hold Smoke Oven	○	○	○	○	○	○	○	○
Amana Microwave	○	○	○	○	○	○	○	○
Blodgett Convection Oven ZephaireE	○	○	○	○	○	○	○	○
Globe Slicer	○	○	○	○	○	○	○	○
Groen Steam Jacketed Kettle	○	○	○	○	○	○	○	○
Groen Tilting Braising Pan	○	○	○	○	○	○	○	○
Hobart 20 Quart Mixer	○	○	○	○	○	○	○	○
Hobart 60 Quart Mixer	○	○	○	○	○	○	○	○
Hobart Dishwasher AM15	○	○	○	○	○	○	○	○
Menumaster High Speed Combi Oven	○	○	○	○	○	○	○	○
Robot Coupe Dice	○	○	○	○	○	○	○	○
Vulcan Endurance / Wolf Challenger Range	○	○	○	○	○	○	○	○
Vulcan Salamander	○	○	○	○	○	○	○	○

Please assess confidence level in being able to train someone on the equipment prior to FCS 384 and after the competency exam. Please consider the type of equipment and not the specific brand.

	Please asses confident level prior to beginning the FCS 384 course.				Please assess confident level after completing the equipment competency exam.			
	Not Confident	Somewhat Confident	Confident	Highly Confident	Not Confident	Somewhat Confident	Confident	Highly Confident
Alto-Sham Combination Oven/Steamer								
Alto-Sham Cook Hold Smoke Oven								
Amana Microwave								
Blodgett Convection Oven ZephaireE								
Globe Slicer								
Groen Steam Jacketed Kettle								
Groen Tilting Braising Pan								
Hobart 20 Quart Mixer								
Hobart 60 Quart Mixer								
Hobart Dishwasher AM15								
Menumaster High Speed Combi Oven								
Robot Coupe Dice								
Vulcan Endurance / Wolf Challenger Range								
Vulcan Salamander								

Please rank in order of your competency, by dragging the number to the equipment name. Number 1 would be the equipment you feel the most competent using and number 14 the equipment you feel the least competent using. Please consider the type of equipment and not the specific brand.

- Alto-Sham Combination Oven/Steamer
- Alto-Sham Cook Hold Smoke Oven
- Amana Microwave
- Blodgett Convection Oven ZephaireE
- Globe Slicer
- Groen Steam Jacketed Kettle
- Groen Tilting Braising Pan
- Hobart 20 Quart Mixer
- Hobart 60 Quart Mixer

- Hobart Dishwasher AM15
- Menumaster High Speed Combi Oven
- Robot Coupe Dice
- Vulcan Endurance / Wolf Challenger Range
- Vulcan Salamander

Please describe areas of foodservice equipment use in which you do not feel knowledgeable, confident, or comfortable.

Please describe food service experiences and resources prior to the FCS 384 course that contributed to your knowledge, competence and comfort level using foodservice equipment.

Please describe aspects within the equipment competency exam that you found helpful.

After completing the equipment competency exam please answer the following.

	Please assess the following on the exam.			
	Highly Disagree	Disagree	Agree	Highly Agree
The entire exam process was clear.				
Exam explanation document was clear in the instructions, and understandable.				
Exam written component document was clear, and understandable.				
The time allotted for the exam was appropriate.				

Please comment on your experience of taking the equipment competency exam.

Please describe recommendations for equipment training for future FCS 384 students.

Please comment on recommendations and changes for future equipment competency exam testing.

Thank you for participating in this project. Following completion, you will be redirected to a second survey. You will be asked to enter your name and e-mail address to receive FCS 384 class credit for participation in this activity. All survey responses are anonymous. Your name will not be linked to the previous responses.

Appendix B: Institutional Review Board (IRB) Approval Letter

University *of* Idaho
Office of Research Assurances
Institutional Review Board
875 Perimeter Drive, MS 3010
Moscow ID 83844-3010
Phone: 208-885-6162
Fax: 208-885-5752
irb@uidaho.edu

To: Katie Miner

From: Leontina M. Hormel, Ph.D.
Chair, University of Idaho Institutional Review Board
University Research Office
Moscow, ID 83844-3010

Date: 10/15/2014 11:15:40 AM

Title: Evaluation of Equipment Training Competency Exam for Food and Nutrition Students

Project: 14-447
Certified: Certified as exempt under category 1,2 at 45 CFR 46.101(b)(1,2).

On behalf of the Institutional Review Board at the University of Idaho, I am pleased to inform you that the protocol for the above-named research project has been certified as exempt under category 1,2 at 45 CFR 46.101(b) (1,2).

This study may be conducted according to the protocol described in the Application without further review by the IRB. As specific instruments are developed, modify the protocol and upload the instruments in the portal. Every effort should be made to ensure that the project is conducted in a manner consistent with the three fundamental principles identified in the Belmont Report: respect for persons; beneficence; and justice.

It is important to note that certification of exemption is NOT approval by the IRB. Do not include the statement that the UI IRB has reviewed and approved the study for human subject participation. Remove all statements of IRB Approval and IRB contact information from study materials that will be disseminated to participants. Instead please indicate, 'The

University of Idaho Institutional Review Board has Certified this project as Exempt.'

Certification of exemption is not to be construed as authorization to recruit participants or conduct research in schools or other institutions, including on Native Reserved lands or within Native Institutions, which have their own policies that require approvals before Human Subjects Research Projects can begin. This authorization must be obtained from the appropriate Tribal Government (or equivalent) and/or Institutional Administration. This may include independent review by a tribal or institutional IRB or equivalent. It is the investigator's responsibility to obtain all such necessary approvals and provide copies of these approvals to ORA, in order to allow the IRB to maintain current records.

As Principal Investigator, you are responsible for ensuring compliance with all applicable FERPA regulations, University of Idaho policies, state and federal regulations.

This certification is valid only for the study protocol as it was submitted to the ORA. Studies certified as Exempt are not subject to continuing review (this Certification does not expire). If any changes are made to the study protocol, you must submit the changes to the ORA for determination that the study remains Exempt before implementing the changes. Should there be significant changes in the protocol for this project, it will be necessary for you to submit an amendment to this protocol for review by the Committee using the Portal. If you have any additional questions about this process, please contact me through the portal's messaging system by clicking the ‘Reply’ button at either the top or bottom of this message.

Leontina M. Hormel, Ph.D.

Appendix C: Intervention 1 Foods Lab Equipment Walk Through Handout

Lab Stations:

- Dishwashers (Hobart)
- Ovens
- Microwaves
- Down Draft
- Gas Cooktop
- Induction Cooktop
- Stainless Steel Counter Tops
- Sinks
- Undercounter Refrigerators
- Handwash Sink / Eye Rinse
- Lab Coats / Storage Area

Demonstration Area:

- Grill
- Hood
- Convection / Microwave Combi-Oven
- Commercial Microwave

Dining Room:

- Tables / Chairs
- Observation Room
- Use of Computer Equipment
- Service Equipment
- China and Tableware

Quantity Food Equipment:

- Work Tables
- Food Prep Sink
- Slicer
- Food Processor
- Titling Fry Pan
- Steam Jacketed Kettle
- Mixer
- Mixer
- Wolf Range /Oven
- Salamander Broiler
- Combi Oven Hot Holding Oven / Smoker
- Convection Oven
- Dishwasher
- 3 – Compartment Sink
- Rinse / Spray
- Garbage Disposal
- Freezer
- Refrigerators
- Ice Machine
- Storage Spaces

Appendix D: Equipment Competency Exam Explanation
Intervention 2

Equipment Competency Exam Explanation Name: _____
FCS 384, Fall 2014

Students will complete the equipment competency exam, which will test their foodservice equipment skills. The exam will consist of three stations, each stations will take one hour to complete. Students will complete the stations all at once, in a three-hour time period. Students will sign up for a date / three-hour time increment. Upon completion of the exam students will be confident operating all of the equipment in the Carmelita Spencer Foods Laboratory. This will prepare students for foodservice management operations.

The three stations will involve students making a number of items, allowing them to use all the foodservice equipment. After the students prepare all the food items they will evaluate and compare the items cooked, this will allow for data collection.

Description of three stations:

1. Station one: Students will make cupcakes and icing. Making of the cupcakes will include use of the following equipment: Blodgett Convection Oven ZephaireE, Alto-Sham Combination Oven, Hobart 20 Quart Mixer, Hobart 60 Quart Mixer, and Hobart Dishwasher AM15.
2. Station two: Students will make stir-fry with rice. Making of the stir-fry with rice will include use of the following equipment: Alto-Sham Steamer, Groen Steam Jacketed Kettle, Robot Coupe Dice, Groen Tilting Braising Pan, and Hobart Dishwasher AM15.
3. Station three: Students will make garlic bread, scrambled eggs, and potato chips. Making of the garlic bread, scrambled eggs, potato chips will include use of the following equipment: Vulcan Salamander, Vulcan Endurance / Wolf Challenger Range (using the gas cook top and the griddle), Alto-Sham Cook Hold Smoke Oven, Globe Slicer, Menumaster High Speed Combi Oven, Amana Microwave, and Hobart Dishwasher AM15.

The following foods and equipment students will be comparing:

- Station 1:
    - Food: Cupcakes
    - Equipment: Blodgett Convection Oven ZephaireE, Alto-Sham Combination Oven
- Station 2:
    - Food: White Rice
    - Equipment: Alto-Sham Steamer and Groen Steam Jacketed Kettle
- Station 3:
    - Food: Scrambled eggs
    - Equipment: Vulcan Endurance / Wolf Challenger Range - using the gas cook

top and the griddle, Alto-Sham Cook Hold Smoke Oven

- Station 3:
    - Food: Potato chips
    - Equipment: Menumaster High Speed Combi Oven and Amana Microwave

Directions for each station:

1. **Station one:**

Preheat ovens (read below for temperatures).
Students competency will be evaluated by being able to turn on and off the equipment, prepare a product in the equipment, and clean the equipment after use. Be sure to follow food safety! At station one, students will prepare cupcakes and icing.
To prepare the cupcakes students will be using two boxes of yellow cake mix, and adding the remaining ingredients. They will prepare the batter in the Hobart 60 Quart Mixer. They will bake the cupcakes in both the Blodgett Convection Oven ZephaireE on 300° F for 9 – 11 minutes, preheat the oven at 350° F then lower to baking temperature, and Alto-Sham Combination Oven on 315° F for 9 – 11 minutes. Portion using 1/4 cup of cupcake batter. Once baked, let the cupcakes cool. Before the cupcakes are iced, students will record the results of the cupcakes on the Equipment Competency Exam Written Component sheet.
To prepare the icing students will be following the recipe below. They will prepare the icing in the Hobart 20 Quart Mixer. Once the cupcakes are cooled and results are recorded, they can frost the cupcakes.
Students will clean up the equipment and use the Hobart Dishwasher AM15

Recipe for icing:

Ingredients:
4 cups confectioners' sugar
1/2 cup (1/2 stick) butter, softened
1/4 cup milk
1 teaspoon vanilla extract

Directions:
In the 20 quart mixer, combine the sugar, butter, milk, and vanilla. Beat on medium speed until smooth and fluffy. Frost cupcakes. Yield: 2 cup

Source: http://www.tasteofhome.com/recipes/vanilla-frosting

2. **Station two:**

Students competency will be evaluated by being able to turn on and off the equipment, prepare a product in the equipment, and clean the equipment after use. Be sure to follow food safety! At station two, students will prepare stir-fry with rice.
To prepare the rice students will be using white rice. They will prepare the rice using both the Alto-Sham Steamer and Groen Steam Jacketed Kettle. For cooking, use 2 cups of dry rice for each piece of equipment. Students will record results of rice Equipment Competency Exam Written Component sheet.
To prepare the stir-fry vegetables students will be using a frozen vegetable mix and a fresh onion. They will use the Robot Coupe Dice to pulse / chop the onion. They will prepare the frozen vegetables and onion in the Groen Tilting Braising Pan. In the Groen Tilting Braising Pan use vegetable oil when cooking.
Keep the rice and vegetables separate when cooking.

Once both items are prepared and results have been recorded, the student can combine the vegetables and the rice.
Students will clean up equipment and use the Hobart Dishwasher AM15.

3. **Station three:**

Preheat the griddle (see below).
Students competency will be evaluated by being able to turn on and off the equipment, prepare a product in the equipment, and clean the equipment after use. Be sure to follow food safety!
At station three students will prepare garlic bread, scrambled eggs, and potato chips.
To prepare the garlic bread students will be using fresh French bread and topping it with garlic butter. They will prepare the garlic bread in the Vulcan Salamander.
To prepare the scrabbled eggs students will be using liquid eggs. They will prepare the eggs using the gas cook top and the griddle on the Vulcan Endurance / Wolf Challenger Range. Use 1/2 of the liquid egg carton for the griddle and 1/2 for the cook top. Once eggs are done, record results on the Equipment Competency Exam Written Component sheet. Set aside half the eggs made and place them in a small pan. Place the small pan in the Alto-Sham Cook Hold Smoke Oven for 30 minutes. After 30 minutes, record results on the Equipment Competency Exam Written Component sheet.
To prepare the potato chips students will be using 2 potatoes. They will slice the potato into thin long slices using the Globe Slicer. Then the students will cook half the potato slices in the Menumaster High Speed Combi Oven for 6 – 8 minutes, and the other half in the Amana Microwave for 2 – 4 minutes. Students will record results of the potato slices on the Equipment Competency Exam Written Component sheet.
Students will clean up equipment and use the Hobart Dishwasher AM15.

Intervention 3

Equipment Competency Exam Explanation Name: _____
FCS 384, Fall 2015

Students will complete the equipment competency exam, which will test their foodservice equipment skills. The exam will consist of three stations, at each station 40 minutes is allotted. The three stations will involve students making a number of items, allowing them to use all the foodservice equipment. While the students prepare the food items they will evaluate and compare the items cooked, this will allow for data collection. Students competency will be evaluated by being able to turn on and off the equipment, prepare a product in the equipment, and clean the equipment after use. Be sure to follow food safety! At the beginning and end of the exam students will have time to read and finishing writing responses. Upon completion of the exam students will be confident operating all of the equipment in the Carmelita Spencer Foods Laboratory. This will prepare students for real world foodservice operations.

STATION DESCRIPTIONS AND INSTRUCTIONS

1. STATION ONE

Students will make cupcakes and icing. The following equipment will be used: Blodgett Convection Oven ZephaireE, Alto-Sham Combination Oven, Hobart 20 Quart Mixer, Hobart 60 Quart Mixer, and Hobart Dishwasher AM15.

Directions

1. Turn on and preheat the preheat the Blodgett Convection Oven ZephaireE at 350° F. (Tip: It takes forever to preheat don't forget!)
2. Using the Hobart 60 Quart Mixer put two boxes of cake mix in the mixer.
3. Add the remaining ingredients listed on the 2 boxes.
4. Turn on the mixer to desired speed and mix until smooth.
5. Using cupcake liners, line 2-12 count cupcake pans.
6. Divide the batter between the 2 pans using a 1/4-cup.
7. Turn down the Blodgett Convection Oven ZephaireE oven to 300° F.
8. Turn on the Alto-Sham Combination Oven, select combi mode (steam and heat).
9. Place one cupcake pan in the Blodgett Convection Oven ZephaireE for 9 – 11 minutes, watch during baking.
10. Place the other cupcake pan in the Alto-Sham Combination Oven for 9 – 11 minutes at 315° F, watch during baking.
11. Clean up the Hobart 60 Quart Mixer while cupcakes are baking.
12. Once baked, let the cupcakes cool.
13. Record some results of the *un-iced* cupcakes on the Equipment Competency Exam Written Component. You will have time at the end to finish.
14. Follow the recipe below to make the icing.
15. Using the Hobart 20 Quart Mixer place all the icing ingredients into the mixer.
16. Turn on the mixer to medium speed and mix until smooth.
17. If you choose you can ice your cupcakes, but you don't have to.
18. Clean up all equipment used (Allow about 10 minutes). Use the Hobart Dishwasher

AM15 and three-compartment sink.
19. Check in with the exam proctor.

Recipe for Icing:

Ingredients:
4 cups confectioners' sugar
1/2 cup butter, softened
1/4 cup milk
1 teaspoon vanilla extract

Directions:
In the 20-quart mixer, combine the sugar, butter, milk, and vanilla. Beat on medium speed until smooth and fluffy. Frost cupcakes. Yield: 2 cup

Source: http://www.tasteofhome.com/recipes/vanilla-frosting

2. STATION TWO

Students will make vegetable stir-fry with rice. The following equipment will be used: Groen Steam Jacketed Kettle, Robot Coupe Dice, Groen Tilting Braising Pan, and Hobart Dishwasher AM15.

Directions

1. Turn on the Groen Steam Jacketed Kettle. (Tip: Don't forget something you learned here!)
2. Place 2 cups of dry rice into the kettle. Add water to the kettle, have the water be about 1 inch above the rice.
3. Cover and cook for about 15-20 minutes. Check when cooking.
4. Using the Robot Coupe Dice place a peeled onion cut into halves. Turn on and chop/pulse.
5. Using the Groen Tilting Braising Pan empty one bag of frozen vegetables, the chopped onion, and 1/4-cup vegetable oil.
6. Turn on and frequently stir the mixture as it cooks fast. (Tip: Low heat, or else it will burn!)
7. Once the rice, vegetable, and onion are cooked, combine making a stir-fry! You don't have to combine if you don't want to.
8. Clean up all equipment used (Allow 10 minutes). Use the Hobart Dishwasher AM15 and three-compartment sink.
9. Check in with the exam proctor.

3. STATION THREE:

Students will make a grilled cheese with veggies, scrambled eggs, and pizza rolls. The following equipment will be used: Vulcan Salamander, Vulcan Endurance / Wolf Challenger Range (using the gas cook top and the griddle), Alto-Sham Cook Hold Smoke Oven, Globe Slicer, Menumaster High Speed Combi Oven, Amana Microwave, and Hobart Dishwasher AM15.

Directions

1. Preheat the griddle on the Vulcan Endurance / Wolf Challenger Range. (Tip: It takes forever to preheat don't forget!)
2. Turn on the Alto-Sham Cook Hold Smoke Oven. (Tip: You can ask for help on this one, since it was broken during training.)
3. Check to make sure the Menumaster High Speed Combi Oven is on.

4. Using the Globe Slicer, slice 3 pieces of the onion and tomato.
5. Place two cheese pre-cut slices onto two pieces of bread. Add the onion, tomato, and spinach (if you choose to). Making a sandwich. (Tip: There is no right or wrong, just make a sandwich!)
6. Turn on the Vulcan Salamander to a low-medium temperature. Place the sandwich on the cooking rack. (Tip: Watch that the heat source is not to close to the bread.)
7. Using the Vulcan Endurance / Wolf Challenger Range cook scrabbled eggs using liquid eggs. Using vegetable oil, oil the griddle and pan. Use 1/2 of the liquid egg carton for the griddle and 1/2 for the cook top.
8. Place the cooked eggs into a small hotel pan. Place the pan in the Alto-Sham Cook Hold Smoke Oven for 5 minutes.
9. Using the Menumaster High Speed Combi Oven and Amana Microwave cook 8 pizza rolls in each
10. For the Menumaster High Speed Combi Oven place the rolls on the appropriate pan, and use the pre-set pizza roll setting.
11. For the Amana Microwave, place the rolls on a microwave safe plate and enter in the appropriate time.
12. Clean up all equipment used (Allow 10 minutes). Use the Hobart Dishwasher AM15 and three-compartment sink.
13. Check in with the exam proctor.

Appendix E: Intervention 3 Equipment Training Note Sheet

Equipment Training **Name: _____**

Storage Area -fire extinguisher	
Handwash Sink / Eye Rinse	
Demonstration Area: -grill -hood	
Lab Stations: -dishwashers -ovens -microwaves -down draft -gas cooktop -induction cooktop -sinks -undercounter refrigerators	
Dining Room	

QUANTITY FOOD EQUIPMENT:

Garbage Disposal	
Dishwasher	
3-Compartment Sink	
Ice Machine	
Freezer	

Refrigerator	
Storage -Blender	
Hood Fans and Lights	
Convection Oven	
Cook Hold Smoke Oven	
Combination Oven/Steamer	
Range	
Salamander	
20 quart Mixer	
60 quart Mixer	
Food Prep Sink	

Work Tables	
Slicer	
Dice	
Tilting Braising Pan	
Steam Jacketed Kettle	
Microwave	
Combi-Oven/Convection Oven/Microwave	

Appendix F: Intervention 3 Equipment Training Instructor Talking Points

Equipment Training – Instructor Talking Points

- Fill out handout for your notes, it is your equipment study sheet
- Importance about training
- Why we train
- At the end show me handout to receive points for today

Lab Attire	• Long pants • Hair back with hairnet • Lab coat • Non-slip closed toe shoes
Storage Area -fire extinguisher	• Backpacks and coats • Hairnets
Handwash Sink / Eye Rinse	• Wash hands
Demonstration Area: -grill -hood	• Projects • Classes
Lab Stations: -dishwashers -ovens -microwaves -down draft -gas cooktop -induction cooktop -sinks -undercounter refrigerators	• Introductory classes use • Don't set items on cooktops!
Dining Room	• Room #110 • Theme meals

QUANTITY FOOD EQUIPMENT:

Garbage Disposal	• Scrape food off in trash can first • Water will run 40-50 seconds after you turn off • Don't keep hitting stop (red) button, will make it worse
Dishwasher	• Fan on • Use cookie sheet tray for cookie pans • Silverware twice thru • Drain slowly • Clean basket

3-Compartment Sink	• Dirty to clean in the middle • Our sink order from left to right: sanitize, rinse, wash • Drain slowly and drain one sink at a time
Ice Machine	• Use scoop • Clean hands or clean gloves
Freezer	• Label food • Be at 0 degrees F
Refrigerator	• Label food • Be at or below 40 degrees F
Storage -Blender	• Blender on counter • Spices • Cooking supplies back here • Lab manager desk
Hood Fans and Lights	• Under fan, fan needs to be on • Can have lights on without fan
Convection Oven	• Fan/blower on first • Pot holder on work tables • Can move take racks out • Wipe clean, will be hot
Cook Hold Smoke Oven	• On/off switch on back • Probe feature • Holder
Combination Oven/Steamer	• I – on • O – off • Press to get on/off • Computer screen can be tricky • Probe feature • Leave door cracked when not in use • Clean: no soap, use hose, water, rag
Range	• Oil on burners and flat top for maintenance • Flat top- takes a long time to heat up, clean: water and brick • Crumb pans
Salamander	• Pilot light must be on • Crumb pan • Handle tends to go right up, be careful
20 quart Mixer	• Attachments • Safety cage • Clean: sink, and wipe stand
60 quart Mixer	• Attachments • Safety cage • To get bowl on/off work from one side to the

	other • Bowl cart • Clean: roll cart with bowl over to sink and wipe stand
Food Prep Sink	• Drain slowly • Sanitize and polish • Wipe sinks out
Work Tables	• Don't sit on • Locked • Be careful of crumbs to fall in between tables, can cover up • Clean under tables
Slicer	• Cut glove • Leave in safety position • Take sharpener off (black box) to get to blade and blade cover • Clean: sink and wipe blade with rag
Dice	• Food processor • Safety cover on • Blade goes down all the way • Clean: sink, don't leave blade in sink for safety
Tilting Braising Pan	• Use low heat first, don't want to burn on food • On for tilt • Tilt to clean • Use hose and clean with water • Don't use abrasive cleaners
Steam Jacketed Kettle	• Minimum water level when cooking • Don't mess with pressure gauge • Pressure at 20-30 • Lid on when cooking • Tilt to clean • Use hose and clean with water • Don't use abrasive cleaners
Microwave	• Use clock button to enter in time • Clean with dish soap and water
Combi-Oven/Convection Oven/Microwave	• Menumaster • Don't hit buttons you are not sure of, can lock and mess up • Can cook at different strengths and times of Combi-Oven/Convection Oven/Microwave

- Questions?
- Additional time go over equipment on own

Appendix G: Intervention 3 Foodservice Equipment Practice Lab

Foodservice Equipment Practice Lab

Students will complete one foodservice equipment practice lab after completion of the equipment training. The student will determine 5 pieces of equipment they feel the least comfortable with. During the lab time the student will cook with the 5 pieces of equipment they feel least comfortable with. They will have the opportunity to choose what food they need for their lab. Also, practice with each piece of equipment, go though the steps on how to turn it on, operate it, power it off, and cleaning process.

The practice lab will help prepare students for the equipment competency exam, though reviewing equipment manuals and spending time using all the equipment.

The lab is worth 4 hours of supervised practice, which includes planning and a reflection. Expect to spend at least 2 hours in the facility using the equipment, it is encouraged you spend all 4 hours in the lab.
This lab activity is part of your grade for the equipment training activities.

Identify 5 pieces of equipment that you feel the least comfortable with.

1.	2.	3.	4.	5.

Write goals for your practice lab.

What do you want to do during your lab time?

Describe your leaning outcomes.

Develop a menu to prepare using the equipment you identified above. You have a budget of $20.

Develop a shopping list for the lab manager, with detailed food specifications.

Foodservice Equipment Practice Lab Evaluation

Name of Equipment	Notes
Alto-Sham Combination Oven/Steamer	
Powering on	
Cooking process	
Powering off	
Clean up	
Alto-Sham Cook Hold Smoke Oven	
Powering on	
Cooking process	
Powering off	
Clean up	
Amana Microwave	
Powering on	
Cooking process	
Powering off	
Clean up	
Blodgett Convection Oven ZephaireE	
Powering on	
Cooking process	
Powering off	
Clean up	
Globe Slicer	

Powering on	
Cooking process	
Powering off	
Clean up	
Groen Steam Jacketed Kettle	
Powering on	
Cooking process	
Powering off	
Clean up	
Groen Tilting Braising Pan	
Powering on	
Cooking process	
Powering off	
Clean up	
Hobart 20 Quart Mixer	
Powering on	
Cooking process	
Powering off	
Clean up	
Hobart 60 Quart Mixer	
Powering on	
Cooking process	
Powering off	
Clean up	
Hobart Dishwasher AM15	
Powering on	
Cleaning Process	
Powering off	
Clean up	
Menumaster High Speed Combi Oven	
Powering on	
Cooking process	
Powering off	
Clean up	
Robot Coupe Dice	
Powering on	
Cooking process	
Powering off	
Clean up	
Vulcan Endurance / Wolf Challenger Range	

Powering on	
Cooking process	
Powering off	
Clean up	
Vulcan Salamander	
Powering on	
Cooking process	
Powering off	
Clean up	

1. Reflections on equipment competency after lab completion.

2. If you need additional time working with the equipment, please arrange a time with the lab manager.

3. Please rate overall competency, for all pieces of quantity equipment after lab completion. Please circle your competency.

Not competent	Somewhat competent	Competent	Highly competent

Appendix H: Equipment Competency Exam Checklist

Equipment Competency Exam Checklist

Name of Equipment	Notes
Alto-Sham Combination Oven/Steamer	
Powering on	
Cooking process	
Powering off	
Clean up	
Alto-Sham Cook Hold Smoke Oven	
Powering on	
Cooking process	
Powering off	
Clean up	
Amana Microwave	
Powering on	
Cooking process	
Powering off	
Clean up	
Blodgett Convection Oven ZephaireE	
Powering on	
Cooking process	
Powering off	
Clean up	
Globe Slicer	
Powering on	
Cooking process	
Powering off	
Clean up	
Groen Steam Jacketed Kettle	
Powering on	
Cooking process	
Powering off	
Clean up	
Groen Tilting Braising Pan	
Powering on	
Cooking process	
Powering off	
Clean up	
Hobart 20 Quart Mixer	

Powering on	
Cooking process	
Powering off	
Clean up	
Hobart 60 Quart Mixer	
Powering on	
Cooking process	
Powering off	
Clean up	
Hobart Dishwasher AM15	
Powering on	
Cleaning Process	
Powering off	
Clean up	
Menumaster High Speed Combi Oven	
Powering on	
Cooking process	
Powering off	
Clean up	
Robot Coupe Dice	
Powering on	
Cooking process	
Powering off	
Clean up	
Vulcan Endurance / Wolf Challenger Range	
Powering on	
Cooking process	
Powering off	
Clean up	
Vulcan Salamander	
Powering on	
Cooking process	
Powering off	
Clean up	