Incorporating Active Learning into Breastfeeding Education and Lactation Management Training of the Future Registered Dietitian Nutritionist

Madelyn Sesser

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INCORPORATING ACTIVE LEARNING INTO BREASTFEEDING EDUCATION AND LACTATION MANAGEMENT TRAINING OF THE FUTURE REGISTERED DIETITIAN NUTRITIONIST

by

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A Thesis Presented in Partial Fulfillment of the Requirements for the Degree Master of Science

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be accepted in partial fulfillment of the requirements for the degree of

**Master of Science in Nutrition & Dietetics**

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ABSTRACT

Background: Breastfeeding has been shown to have multiple benefits for mother and child, yet rates of breastfeeding continue to stay insignificant. Infant nutrition is the base of future health of an individual, yet Registered Dietitians are not provided in depth breastfeeding education during their education.

Objective: The purpose of this study is to evaluate the active learning component of breastfeeding and lactation education modules meant to increase self-efficacy and confidence in the ability to perform lactation education and to obtain feedback regarding the usefulness of the developed education modules in graduate-level dietetic interns.

Design: This study was part of a larger breastfeeding education intervention with Dietetic Interns (N=38). The research took place in classrooms and online at the University of Texas Medical Branch, Louisiana Tech University, and the University of Central Arkansas. A pre-and post-test design was used to compare changes in self-efficacy related to the ability to provide nutrition services related to lactation after completing four breastfeeding education and lactation management modules.

Results: Of the respondents (n=31) 45% scored a 4 or 5 in all categories of gains questions. The greatest gains (scores of 4 or 5) were seen for “confidence in the understanding of types of infant stool” (87%) “ability to pour and store breastmilk correctly” (77.4%), “correct positioning of the bottle when bottle feeding an infant with breastmilk” (70%), and “ability to demonstrate infant stomach size” (74.2%).
All self-efficacy items had statistically significant increases in scores when pre-intervention scores were compared to post-intervention scores. During reflections, participants verbalized positive important gains related to the active learning strategies applied in the intervention.

Conclusion: Participants felt hands-on active learning had a positive impact along with traditional lecture-style coursework. Providing future registered dietitian nutritionists with hands-on lactation education could increase their self-efficacy and confidence in the ability to provide lactation education in the future.
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DEDICATION

This thesis is dedicated to my daughter, Sawyer Aliese Sesser. She is the motivation behind all I do. She was the framework required for the establishment of my life. Through her, I discovered my love for nutrition and the reason I have met a multitude of goals. Without her, all my achievements would have never come to fruition.
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CHAPTER 1

INTRODUCTION

Background

As breastfeeding rates continue to plateau, many healthcare professionals are searching for the missing link to increasing the breastfeeding rates of the communities around them (Bozzette et al., 2012; Camel et al., 2020; Ingram et al., 2006; McFadden et al., 2006). Women encounter many healthcare professionals during their fertile years and pregnancy. Most healthcare professionals need to know more about the production and management required during lactation. Many medical professionals feel lactation education would benefit their practices (Ingram et al., 2006). Lactation Consultants are primarily healthcare professionals with in-depth knowledge of lactation management. Registered dietitians are currently required to have a limited amount of lactation education during their undergraduate degree (ACEND, 2021; Eat Right, 2022). Incorporating hands-on lactation education within dietetic internships could help utilize the span of lactation education to the public (Theurich et al., 2016). Hands-on activities have been shown to increase the critical thinking of the participants (Freeman et al., 2014; Walker, 2003). Giving students the ability to act out scenarios and have hands-on experience can increase self-efficacy and attitude when placed in a similar situation during practice (Allsop et al., 2020; Freeman et al., 2014).
Human milk is considered the gold standard of infant nutrition for the many benefits that it can provide. Breastfeeding has been shown to have a link with a decreased risk of developing obesity, high blood pressure, cardiovascular diseases, type two diabetes mellitus, and atopy (Maruszewska et al., 2021; Stevens et al., 2009; Michiels Hernandez et al., 2015). Breastfeeding rates in the United States are drastically lower than the goal rates. Nationally 25.8% of infants are exclusively breastfed for the first six months of life. The Health People 2030 goal rate of infants exclusively breastfed at six months old is 42.4% (Cdc.gov, 2021; Health.gov, 2018). Rates of breastfed infants have decreased in the past due to social stigmas of public breastfeeding and the inability of mothers to pump at work (Stevens et al., 2009; Dol.gov, 2022). Laws have been established to give mothers the security to legally breastfeed in public and pump at work (Dol.gov, 2022). Unfortunately, this has not resulted in a considerable increase in the breastfeeding rate in the country. Over the decades that breastfeeding was socially stigmatized, women have lost the knowledge of the benefits of breastfeeding or how to have a successful breastfeeding journey (Stevens et al., 2009). There are few medical professionals women come into contact with who can provide up-to-date lactation education pre-pregnancy or during pregnancy (Bozzette et al., 2012; Eatright.org, 2022; IBLCE, 2022; McFadden et al., 2006).

**Research Purpose**

The purpose of this study is to evaluate the active learning component of breastfeeding and lactation education modules meant to increase self-efficacy and confidence in the ability to perform lactation education and to obtain feedback regarding the usefulness of the developed education modules in graduate-level dietetic interns.
Justification

Consumption of human milk during infancy has been shown to decrease the risk of multiple preventable chronic illnesses. However, breastfeeding rates have continued to plateau at an undesirable rate, due to lack of support socially and medically. Health care workers are rarely educated on strategies to troubleshoot the problems breastfeeding mothers struggle with during their lactation journey. This study will evaluate the benefits of providing active learning strategies with future Registered Dietitian Nutritionists in order to support their ability to provide lactation education in future practice and have a positive impact on breastfeeding rates.
CHAPTER 2

REVIEW OF LITERATURE

Historical Perspective

While human milk has always been the gold standard source of nutrition for infants although breastfeeding is not always the chosen method of infant feeding. Over time, mothers have had to deal with lactation deficiencies, social stigmas, and misinformation related to breastfeeding. Lactation deficiency refers to the lack of sufficient breast milk production or insufficient nutrients in human milk. There is historical evidence of prescriptions for lactation deficiencies dating back to 1550 BC in Egypt, where the first medical encyclopedia was found (Stevens et al., 2009). The prescription states: “To get a supply of milk in a woman’s breast for suckling a child: Warm the bones of a swordfish in oil and rub her back with it. Or: Let the woman sit cross-legged and eat fragrant bread of soused durra while rubbing the parts with the poppy plant” (Stevens et al., 2009). While lactation deficiencies have resulted in the inability to breastfeed for some mothers, many have failed to breastfeed due to the lack of support in their community, family, or society. As early as 950 AD, upper-class Greek women would acquire a wet nurse to feed their infant instead of nursing the infants themselves. Up until the 19th century, wet nurses were commonly bought or employed. So much so that laws were developed to create regulated medical examinations and guidelines for wet nurses. For upper-class women, lactation deficiencies if present were
not problematic as they had resources to buy or hire a wet nurse. For those without resources, this was a serious problem. Lactation-deficient mothers of poor families, who were unable to afford a wet nurse, were forced to find alternative sources of nutrition for their infants (Stevens et al., 2009). Animal milk such as goat, pig, donkey, cow, and camel were often used as a replacement for human milk. When large amounts of animal milk were not available, bread soaked in animal milk or water was often used as a replacement. Many infants perished from malnutrition or soured milk due to a lack of proper storage. In 1865, the first artificial formula, consisting of cow’s milk, wheat flour, malt flour, and potassium bicarbonate, was created by Justus von Liebig. After this was created, more followed, but none provided all the needed nutrients for infants (Stevens et al., 2009). In 1980, the Food and Drug Administration (FDA) created the Infant Formula Act which mandated certain macronutrients and micronutrients in amounts recommended by the American Academy of Pediatrics (AAP) to be included in infant formulas. Until this time, infant formulas contained primarily carbohydrates and some fats. The Infant Formula Act required formulas contain the recommended dietary intake for protein, fat, vitamins A, C, D, E, and K, all B vitamins, calcium, phosphorus, magnesium, iron, zinc, manganese, copper, iodine, sodium, potassium, and chloride (Stevens et al., 2009).

Despite current guidelines and regulations of infant formulas, studies have shown discrepancies in the levels of nutrients. A study published in July 2021 looked at the nutrient levels of 18 infant formulas used in Poland. It showed discrepancies in the number of micronutrients in the product compared to what the product stated on the nutrition label (Maruszewska et al., 2021). Several micronutrients were well above the adequate recommended intake in many formulas. Phosphorus (P) was up to 15 times
higher, calcium (Ca) was 2.5 times higher, iron (Fe) was 18 times higher, and Manganese (Mn) was up to 33 times higher in some formulas. While all these nutrients are necessary for the proper development of an infant, toxicities can develop when over-consumed. Effects from overconsumption of micronutrients can vary from gastrointestinal issues and skin rashes to altered immune responses or neurobehavioral disorders. The same study also found toxic contaminants of lead (P.B.), strontium (Sr), and lithium (Li) at higher than recommended safe limits in some or all the tested formulas (Maruszewska et al., 2021). The discrepancies in the nutrient content of formula is a concerning factor when used as a main source of nutrient for infants.

**Breastfeeding Benefits**

Human milk nutrient composition varies from each woman, the nutrient composition can change based on infant age, illnesses, infant gender, and mother’s health and environment (Ballard et al., 2013). Human milk contains 87% water, 1% protein, 4% lipid, and 7% carbohydrate (Boquien et al., 2018). Human milk provides the recommended amount of all vitamins and minerals, except for vitamin D and K. Hormones, Growth factors, probiotics, and microRNAs are also provided in human milk (Kim et al., 2020).

Breastfeeding has been linked to a decreased risk of developing obesity, high blood pressure, cardiovascular diseases, type two diabetes mellitus, and atopy (Maruszewska et al., 2021; Stevens et al., 2009; Hernandez et al., 2015). Human milk properties have been shown to adjust to an infant’s gender and, over time, the nutrients needed throughout the first few years of life. Due to the changes in the properties of human milk, it is easier on the gastrointestinal system, causing a decrease in negative
issues and an increase in nutrient absorption. According to a study by Hernandez, et al. (2015), when comparing toddlers who were breastfed, mixed-fed, or formula-fed, breastfed infants statistically had lower obesity and overweight rates than mixed and formula-fed infants. According to the American Academy of Pediatrics, exclusively breastfed infants of at least four months have a 72% reduction in respiratory tract infection hospitalizations and a 74% decrease in risk of respiratory syncytial virus bronchiolitis. Infants exclusively breastfed have a 64% reduction in gastrointestinal tract infection with protection that follows for up to 2 months once breastfeeding has stopped. Breastfed infants also have a 36% reduced risk of sudden infant death syndrome (SIDS) (Eidelman et al., 2012). According to a study by DiSantis, et al. (2013) mothers who breastfed their infants for >6 months had a stronger ability to pick up on the infant’s satiety cues once complementary foods were added to the diet. The ability to know when your child is satisfied will help to lessen the child’s overconsumption from pressuring the infant to eat. Pressuring an infant to overconsume food can have a negative effect on the response they have to their satiety cues, possibly leading to excessive weight gain and compilation. The same study found that mothers who breastfed their infants for >6 months provided complimentary foods later than mothers who breastfed for <3 months or 3-6 months (DiSantis et al., 2013). The most appropriate time to begin introducing food to infants is about six months. An infant should be able to sit up without help, bring food to their mouth, have neck control, open mouth when food is offered, and have appropriate tongue control to swallow food instead of pushing it out of their mouth. Infant gastrointestinal systems are very sensitive and need to be developmentally able for nutrition other than human milk. If infants are not developmentally prepared for
complimentary foods, choking or gastrointestinal issues may follow (Centers for Disease Control, 2021). The benefits of breastfeeding are so foundational that the U.S. Surgeon General Regina Benjamin requested more support for breastfeeding mothers and that barriers should be brought down to promote breastfeeding (Louisiana Department of Health, 2022).

**Breastfeeding in the United States**

According to the Centers for Disease Control (CDC), the current breastfeeding statistics are based on information from 2018 and 2019 from infants born in 2017. Nationally, about 84% of infants are ever breastfed, even if for just one feeding session. Of the 84% who are ever breastfed, 19% begin to receive formula within two days post-birth. National statistics show that only 25.6% of infants are exclusively breastfed at six months (Centers for Disease Control, 2021). Texas has an above-average breastfeeding rate of 86% of infants ever being breastfed, with 22.5% of those infants’ beginning formula within two days of birth. Louisiana’s rate of infants ever breastfed falls to a low of 66%, with 13% receiving formula within two days. According to the Louisiana Department of Health, only 36% of Black women have ever breastfed. The rate of exclusively breastfed infants at 6 months in Louisiana is only 21.8%, while 24% of infants in Texas are exclusively breastfed at 6 months of age. (Center for Disease Control, 2021; Louisiana Department of Health, 2021). According to the CDC, about 60% of mothers stop breastfeeding before they desire to stop. This occurs for many reasons, but the most common include lack of nutrition education, lack of family and social support, hospital practices, and issues with breastfeeding/expressing milk in the workplace.


Current Breastfeeding Trends and Laws

Society’s outlook on breastfeeding has varied over time. Before the introduction of formula, breastfeeding was the standard way to feed an infant, but toward the end of the 1900s, it became increasingly stigmatized as inappropriate (Stevens et al., 2009). As a result of women being humiliated for breastfeeding in public, federal laws have been enacted that now protect a mothers’ ability to breastfeed legally in public. In 2010, the Affordable Care Act amendments were created to allow breastfeeding mothers to pump while at work. Section 7 of the Fair Labor Standards Act states that any employer with over 50 employees must provide a reasonable unpaid break period in a place other than a restroom, not in the view of others, for a mother to pump for human milk for up to one year after giving birth (Department of Labor, 2022). Canada’s breastfeeding rate is significantly higher than that of the United States. Canada’s rate of ever being breastfed is at 91% based on statistics for 2015-2016 and 35% of Canadian infants were exclusively breastfed for 6 months (Government of Canada, 2022). Since 2000, women in Canada have received up to one year of paid parental leave after giving birth.

Fairbrother et al. (2009) examined the knowledge and attitude that Canadian women participating in an undergraduate program had toward breastfeeding. No specific majors were identified in the undergraduate programs. The study had 285 participants, the results showed that 83.8% of the women reported having been breastfed, and 81.7% felt that human milk was the best food for newborn infants. Breastfeeding perceptions were significantly more positive than bottle-fed perceptions (Fairbrother et al., 2010).

Camel et al. (2020) examined the attitudes and lactation knowledge college males enrolled at Sam Houston State University had towards breastfeeding. \( N = 830 \). The
results showed a significant increase in a positive attitude toward breastfeeding in men who had exposure to and knowledge of breastfeeding.

**Limited Professional Support**

Ingram et al. (2006) examined the link between the decreased length of breastfeeding in the U.K. and lactation knowledge of primary healthcare professions. The study also examined the benefits and acceptability of lactation education in several healthcare disciplines. They included six educational training sessions from June 2004 to November 2004. Participants responded to a pre- and post-training questionnaire regarding attitude, knowledge, and management tools of lactation (Ingram et al., 2006). The questions were scored on a Likert scale, with one being low and five being high. The educative intervention included four main topic areas: why and how to breastfeed, troubleshooting problems, family support, and mastitis/thrush management. The participants \((N=50)\) included eighteen health visitors, twenty-nine general practitioners, and three midwives. Following the intervention, general practitioners significantly increased their knowledge of breastfeeding from pre-training to post-training (Ingram et al., 2006). The results also indicated that healthcare professionals who had children were more likely to have a more positive attitude and increased knowledge base prior to training. Of the respondents \((n=36)\) forty-two percent reported beneficial changes in the ability to provide accurate patient care. Including 20% increase in ability to provide care involving attachment and positioning problems, mastitis, and sore nipples and 46% on troubleshooting thrush. Seventy-five percent of the respondents had a positive attitude about the training and felt it was beneficial (Ingram et al., 2006).
McFadden et al. (2006) examined the types of formal lactation education available in the U.K. for healthcare professionals. Previous research studies have shown that many healthcare professionals believe their knowledge of lactation to be much greater than it is (Freed et al., 1996; Hellings & Howe, 2000; Cantrill et al., 2003). A survey to study education programs among various healthcare provider organizations, that included the types of healthcare professionals a woman might access during lactation, investigated interventions currently available for the professionals. Responses from nineteen organizations were received which represented a 68% response rate (McFadden et al., 2006). Results showed that National Childbirth Trust and UNICEF Baby Friendly Initiative (UNICEF-UK-BFI) provided two separate lactation-related workshops for health care professionals, ten other organizations provided workshops and modules that ranged from 1 day to 12 weeks, and one university provided a 4-week master-level course for health care professionals during their senior year. Most of the courses covered lactation information related to anatomy, social stigmas, troubleshooting, and supporting breastfeeding women. Eighteen (95%) of the organizations felt that increasing the knowledge of their healthcare providers could benefit the care provided to the patients. There were varied responses on what the organizations felt would be the most practical and effective method of increasing the lactation knowledge of healthcare providers. Eleven (58%) of the organizations felt conferences should be used, while thirteen (68%) organizations chose workshops and online information. Considering the type of information to be provided during the educational course work and who should receive the information: nine (47%) of organizations felt only specialists should receive education on troubleshooting lactation issues, and fifteen (79%) felt that health outcome
information was necessary for all healthcare providers’ education. Information on diversity and social inequality was chosen as beneficial information by the three organizations that worked with lactation support most often. This study confirmed that many healthcare-related organizations believe lactation education would be beneficial and that several different types of educational programs could be utilized (Mcfadden et al., 2006).

Bozzette et al. (2012) examined the lack of breastfeeding knowledge in nursing curriculums and its detrimental effects on new parents’ lactation care. This study hypothesized that providing lactation education to the largest field in healthcare, nursing, could benefit the lactation capability rate of new mothers. Bozzette et al. (2012) acknowledged that previous research has shown that in-person education, as well as multidisciplinary teams, are the most valid way of providing lactation education. The study gathered data regarding lactation knowledge using pre and post-surveys from a previously validated survey by Marzalik et al. (2004). The questions were scored on a scale of zero to twenty. A total of 24 senior-year baccalaureate-nursing students completed all requirements of the study, including the pre-survey before attending a lecture. The lecture was one and a half hours in length and used power points, photographs, videos, and written handouts covering material on the anatomy and physiology of milk production, troubleshooting lactation problems, and multidisciplinary team benefits from which patients could benefit. The results showed a knowledge increase in most of the areas evaluated. Additionally, there was a significant increase in the section on troubleshooting common problems women encounter during lactation (Boozzette et al., 2013).
Pre-professional Nutrition and Dietetics Education

All dietetic programs leading students to attain the Registered Dietitian Nutritionist Credential (RDN) must be accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND). This council provides the required education standards an individual must meet to obtain a verification statement of knowledge and competencies in the science of nutrition and dietetics in order to progress to the 1200-hour dietetic internship (Eat Right, 2022). The current 2022 guidelines do not specify a requirement for lactation education for undergraduate or graduate programs. The guidelines only state that nutrition across an individual’s lifespan should be taught. While all nutrition throughout the lifespan is important, nutrition at the beginning of life can set you up for healthier future outcomes. Due to the indistinguishable lactation curriculum, it is unable to know the exact amount or depth of lactation education provided in each undergraduate or graduate-level program. Recognized health care professionals (dentist, dietitian, midwife, nurse, occupational therapist, pharmacist, physical therapist/physiotherapist, physician/medical doctor, and speech pathologist/therapist) are all required to take the same pathway including the same 1200-hour experience and 95 hours of education to sit for the IBCLC exam to become a International Board Certified Lactation Consultant (IBCLC, 2023).

According to the Commission on Dietetic Registration, there are over 108,000 registered dietitians in the United States (Eat Right, 2022). That is well over the 18,541 International Board-Certified Lactation Consultants that the International Board of Lactation Consultant Examiners (IBLCE) has a record of in the United States. (IBLCE, 2022). The IBLCE requires a specific number of education and experience hours, varying
depending on educational history, for an individual to sit for the IBCLE exam and become a lactation consultant. The lack of lactation consultants in an area decreases the opportunities for a mother to gain the knowledge and skills needed to have a successful initiation or continuation of breastfeeding. Far more individuals, who required breastfeeding support, could be reached with the vast number of dietitians available. Unfortunately, many RDN’s need to gain more knowledge of lactation management to adequately support mothers.

Theurich et al. (2016) discussed the underutilization of dietitians in the lactation aspect of motherhood. She stated that dietetic interns should have the opportunity to gain hands-on experience during their 1200-hour internship and that those experiences could be used towards becoming an International Board-Certified Lactation Consultant (IBCLC) (Theurich et al., 2016). Studies have shown that a lack of exposure to breastfeeding increases the negative attitudes toward breastfeeding and stigmatizes breastfeeding (Austen et al., 2016; Leslie et al., 2018; Heathman et al., 2019; Camel et al., 2020). Increasing exposure among Dietetic Interns, along with providing hands-on experience for the 1200-hour internship could increase their knowledge, attitude, and comfort level when caring for women in the breastfeeding journey.

Becker et al. (2020) examined lactation education provided to dietitians in Ireland and the effects on breastfeeding attitudes, skills, and knowledge. The results showed dietitians who had previously had breastfeeding experience had increased positive attitudes and confidence in skills. Fifty-nine percent of the participants had previous received general lactation education but lacked clinical training. Reflections expressed by
the participants when asked for barriers related to their professional ability to provide breastfeeding care were:

“I lack the skills”, “I lack the confidence”, and “I lack the knowledge to provide assistance with breastfeeding” (Becker et al., 2020).

Radcliffe et al. (2011), provided a four-year educational breastfeeding program to undergraduate nutrition and dietetic students in hopes to improve breastfeeding support, knowledge, and attitudes. Throughout the four-year undergraduate program students participate in lactation education involving nutrition over the life cycle, reproductive physiology, health behavior changes, process of nutrition education, and community and public health nutrition. Results showed a significant increase in knowledge and positive attitude towards breastfeeding, as well as participants’ interest in working in a professional environment involving breastfeeding (Radcliffe et al., 2011).

**Active Learning**

Active learning is defined as a type of teaching strategy that allows students to become involved in the learning experience (Brame, C.J., 2019; Queensu.ca, 2022). Active learning can provide students with experiences that go beyond lecture-type settings (Brame, C.J., 2019; Faust et al., 1998; Queensu.ca, 2022). Students are allowed to have instructor-guided activities that involve hands-on, case studies, classroom debates, and or role-playing (Coakley et al., 2021; Queensa.ca, 2022; Sadovnikova et al., 2020; Wood et al., 2021). Active learning is often paired with a traditional lecture-style classroom. It is used to further the understanding of the subject and increase critical thinking (Coakley et al., 2021; Walker, S. E., 2003). Active learning sessions do not have to be a specific length to gain benefits. The sessions can take place during a short
duration of a single class period or may be spaced out during an entire class session of ten
weeks (Coakley et al., 2021; Queensa.ca, 2022; Sadovnikova et al., 2020; Wood et al.,
2021). Active learning has been incorporated into several medical discipline educational
programs through internships, clinical, and in-facility student work (Coakley et al., 2021;
Sadovnikova et al., 2020; Wood et al., 2021). According to Edgar Dale’s Cone of
Experience, people remember 90% of what they do and 50% of what they see and hear.
Walker (2003) explains, “Students need to be exposed to diverse teaching methods that
promote critical thinking in order to nurture the critical thinking process.” Freeman et al.
(2014) compared traditional lectures and active learning and found that participants in
traditional lecture education were 1.5 times more likely to fail a course.

Participants involved in active learning often have an increase in self-efficacy and
desire to participate in coursework. Reflections from Nelson et al. (2014) research on
active learning show this:

“The class discussions really opened my eyes to different ways of handling tough
situations, and I realized there are many ways of addressing teaching issues.”

“I enjoyed coming to class every day, and I felt if I missed, I was going to miss
out on something important and useful.”

“Watching others handle the role-play situations was the most useful part of the
class. I remember several of us saying to ourselves, ‘Oh, I wouldn’t have ever thought to
say or handle things that way,’ or ‘that was handled well.’”

Allsop et al. (2020) examined the benefits of active learning in undergraduate
students. A total of 45 students were randomly assigned to either a traditional or an active
learning curriculum. The two groups were given the same test and assignments and had
classes at the same time of the day. The students were given pre- and post-surveys using the Active Learning Classroom Student Survey (ALCSS), with slight changes made to keep the students blinded to the groups. Students participated in the pre-survey before completing the coursework in the curriculum, and the post-survey was completed once the coursework was finished. The study’s results indicated that the active learning experimental group experienced a significant increase in participation, better communication, increased relationship connections, and satisfaction during lessons. (Allsop, J., 2020).

Kressler and Kressler (2020) examined active learning in an ethnically diverse group of STEM students. Active learning strategies were added to the course, titled “Measurement and Evaluation in Kinesiology.” A qualitative survey was given at the end of the course to collect data on student perceptions of the coursework. Quantitative data included student grades and participation. Many students said they felt that active learning benefited their education. Participants stated, “I did feel like I applied the knowledge I acquired towards assignments” and “My higher order thinking skills improved through partner activities and engaged learning.” There were no significant differences in the results among ethnic groups (Kressler et al., 2020).

Active learning has also been utilized with dietetic students. The perceptions of active learning of dietetic students were examined by Coakley et al. (2021). A total of 97 participants enrolled in a higher education course, *Methods in Nutrition Education*, participated in a pre-survey before beginning the coursework and completed the post-survey after completing the coursework (Coakley et al., 2021). Participants were primarily female (67%) and had an average age of 22. The course survey examined their perception
of different educational activities and their ability to learn by participating in them. The course activities included in-class activities, practice-providing education, debates/group discussions, volunteering in nutrition education organizations, case studies, and other educational activities. The results showed that the students felt that work involving interviewing professionals, group projects, and case studies maximized the learning experience (Coakley et al., 2021).

Nutrition education has become a necessary component of many fields of health care. Wood et al. (2021) investigated active learning with medical students to increase nutrition knowledge in their program. The study was a voluntary pilot for first-year medical students at Wayne State University School of Medicine (Wood et al., 2021). The program lasted four weeks and included a pre, post, and 2-month post-completion survey, all of which was voluntary for the participants. The sessions were two hours long, and the lesson plans were designed to be related to the clinical nutrition lecture coursework: micronutrients, obesity, diabetes, and cardiovascular disease. The hands-on weekly themes were food safety/knife skills, sauces/broil and boil, the importance of acid, and portioning. Each session consisted of culinary theory didactic instruction, a demonstration of culinary techniques, group cooking with supervision, and interactive discussions on nutrition while enjoying the food (Wood et al., 2021). Items created were healthier versions of food that are regularly consumed in America. Ten students volunteered for the program with a 100% retention rate for the courses and a 98.8% survey completion. Surveys showed an increase in the participant’s confidence in their ability to counsel patients on nutrition involving clinical, nutritional, and culinary knowledge. Participants had an increase in preparedness in counseling clients post-
survey. The two-month post-survey also showed a significant increase in the number of meals made at home by the participants verse the baseline number of meals made at home. This study shows the benefits that hands-on, active learning courses can have for people in the medical field (Wood et al., 2021).

Sadovnikova et al. (2020) developed and evaluated a hands-on lactation bodysuit for healthcare professional education. Lactation education is rarely included in healthcare professional education, and many providers feel they need to be more comfortable and confident in providing lactation services. Realistic, high-fidelity lactation simulators are recommended over unrealistic simulators like commercial and cloth by The World Health Organization. This study hypothesized that using realistic and functioning breast models would increase practitioner confidence in examining and touching patients, decrease group training with actual patients, thus increasing patient comfort, and increase the types of maternal/lactation training healthcare workers can obtain. The Lactation Simulation Model (LSM) was developed and evaluated with a questionnaire that had open and close-ended questions. The close-ended questions were scaled on a 7-point Likert scale. The LSM was evaluated on four main items: do the conditions and tissue of the LSM look and feel realistic, are the performances for common conditions realistic, is breast pump use realistic, and are the concerning features of the breast identifiable? The LSM prototype was evaluated and improved during three rounds of testing from 2015 to 2017, first with physicians, second with first-year obstetrics, gynecology, and family medicine residents, and third with nurse-midwifery students. The LSM was created into four styles: Essential LSMs, and Advance LSMs. Each style allowed different nipple shapes, sizes, skin tones, and conditions to be realistically presented. The final evaluation was at a 2018
symposium presented by the Institute for the Advancement of Breastfeeding and Lactation Education. Six medical professionals, nine lactation medicine physicians, and a non-physician lactation consultant evaluated the LSM. The Essential LSM scored a (6.1/7) on the realistic look and feel, (5.8/7) on the simulation of pumping, (5.7/7) for realistic conditions, and (5.5/7) for realistic nipple movement during pumping. The Advanced LSM scored 70% or greater when asked to identify necrosis in the abscess, milk bleb, ectopic tissue, anchor scar, or nipple damage. Almost all the respondents (6.2/7) felt the LSM would be beneficial for educational purposes with health care students and professionals, and patients (Sadovnikova et al., 2020).

**Development of the Lesson Plans**

One method of creating a lesson plan is using the DESIGN procedure (Contento, 2016). The procedure stands for decide behavior, explore determinates of change, select theory and clarity philosophy, indicate general objectives, generate plans, and nail down evaluation plans. The procedure requires creating a lesson plan tailored to the subjects to create behavioral and knowledge change. A model that can be used for lesson plans should begin with an “excite” aspect. The purpose of the exciting part of the design is to grab the learner’s attention. An excite strategy can be questions, interactive games, a fun fact, or another strategy that pulled the participant’s attention into the curriculum (Contento, 2016). The explanation portions of a lesson plan are designed to educate the participants on the material’s importance. Explanations can be traditional-style lectures or hands-on activities that provide new information at a generic level. The expanded portion of the Design procedure is used to create skills that could influence future use. The last component of the four Es is the exit strategy. This strategy brings all the information
together for a conclusion, it can also help to establish goals and future application (Contento et al., 2016).

The DESIGN procedure is commonly used during nutrition education plans. Luesse et al. (2019) looked at the application of the Design plan in nutrition curriculum development. The study aimed to test the DESIGN procedure’s efficiency and effectiveness when developing a lesson and a previously designed educational curriculum (Luesse et al., 2019). The lesson plans developed in this study also used the four E’s (excite, explain, expand, exit). The participants used during this study were middle schoolers aged 11 to 14 in an after-school program. The nine lessons aimed to create a diet intake change from processed items to whole food products. Each lesson included videos, hands-on activities, and taste tests. After each lesson, participants filled out feedback forms that the program’s creators later used to create a post-survey. The study concluded that the Design procedure was efficient and effective when combined with a previously developed program (Luesse, H.B., 2019).

**Research Purpose**

The purpose of the research project is to evaluate the impact of the active learning components of an in-depth breastfeeding education and lactation management program designed for graduate-level dietetic interns. These learning components are meant to increase the depth of breastfeeding knowledge and improve confidence in care delivery, including education and counseling of breastfeeding women.
Hypotheses and Objective

**H1** Active learning strategies will not influence changes in self-efficacy measures related to the provision of lactation education.

**H2** Active learning strategies will not influence the professional skills related to the ability to perform lactation education in the future.

**Objective 1**: Participants will provide reflections on gains and needs related to active learning components within the intervention.
CHAPTER 3

METHODS

Design

This study was part of a larger breastfeeding education intervention. A pre-and post-test design was used to compare changes in self-efficacy related to ability to provide nutrition services related to lactation after completing four breastfeeding education and lactation management modules. Specifically, comparisons will include changes in breastfeeding knowledge, attitudes, and self-efficacy (confidence in breastfeeding knowledge, practices, and the provision of breastfeeding counseling) among graduate level dietetic interns, future registered dietitian nutritionists, after completing the breastfeeding education and lactation management modules. This thesis project focused on self-efficacy and gain in ability to perform future lactation education based on the active-learning component of the intervention.

The modules were developed using evidence-based resources (see Appendix E-H) and delivered to dietetic interns through face-to-face lectures with visual teaching tools and through electronic course delivery systems such as Moodle. The visual teaching tools included belly beads that represent the size of a newborn stomach, an anatomical breast model, and a human milk composition chart for hands-on learning. The modules and overall learning objectives are listed below:
(1) Importance of Breastfeeding - focused on the unique quality of human milk, identified benefits of breastfeeding for mother and infant, and discussed recommendations and current breastfeeding trends in the United States.

(2) Recommendations for Successful Breastfeeding - identified common barriers, the importance of breastfeeding policy, and high-risk breastfeeding behaviors.

(3) Science of Breastfeeding - focused on infant latch, number of feeds and changing composition of human milk, nutrition needs of a breastfeeding mother, and common breastfeeding positions.

(4) Assessment of Breastfeeding Progress - focused on identifying weight change using a growth chart, assessing drug and vaccine safety for breastfeeding mothers, contraindications to breastfeeding, and the need for lactation services referrals.

The active learning component of the education program was provided in two modules, each module contained two specific active learning lesson plans developed using the DESIGN model. The lesson plans model the four Es: excite, explain, expand, and exit. Each lesson began with an “excite” question that was related to the active learning topic. The purpose of the excite portion was to grab the participants’ attention. The explain portion provides the participants with a base level of knowledge on the information. The expand section, which is where the active learning fits, brought a greater understanding and depth of knowledge to the information. The exit portion concluded all the information provided and closed out any questions participants had. The influence of the active learning lessons was measured by the pre-post self-efficacy questionnaire items and the post education report by the participants of the skills gained from the active learning intervention.
The first lesson (Appendix E) included review of a three-dimensional model of a breast cross-section depicting breast tissue, glands and common pathologies. Each pathology was discussed and then the models are circulated for an up-close view by each participant. Four common breast condition models are used for developing a deeper understanding of inverted nipples, flat nipples, mastitis, and lactating breasts. Models of flat and inverted nipples were compared to the protruding nipple breast model. These breast models were used to demonstrate ways to protrude nipples for latching. The mastitis breast model was discussed and viewed for comparison to healthy breasts. All models were passed around for each participant to practice nipple protrusion.

The second lesson (Appendix F) involved human milk composition, infant stool, infant belly size, and milk storage. Glasses of human milk modeling changes in composition were observed and discussed. Participants visually saw the color change between colostrum, foremilk, and hindmilk while reviewing the information provided during the lecture. Infant belly beads and a flip chart were shown to compare infant stomach sizes at different stages post-birth. Belly beads were circulated among the participants and the flip chart was available for review during times when participants were allowed to walk around and review the models. Stool stories diapers were shown while the leader discussed what each was representing, then the diapers were circulated, giving an up-close view of normal stool changes from day one to day five of life.

The third lesson (Appendix G) focused on the infant feeding positions, latching, and bottle positioning. Positions were demonstrated for the class with a realistic infant doll. Positions for different needs a mother may have, large breasts and post-cesarean, were reviewed. Using the infant doll and breast model, proper positioning of the nipple
and infant mouth was demonstrated. Infant dolls and breasts were made available for participants to practice latching and nursing positions. Some participants chose to use a Mom breastfeeding trainer apron to practice nursing positions and acted as models for the others in the training. Bottle-feeding formula versus human milk positioning was demonstrated. Correct human milk bottle positioning of 45 degrees was shown. Bottles were circulated allowing participants to position bottles to feed infant dolls.

The fourth lesson (Appendix H) provided experience with breast pumps and nipple flanges. Flanges were shown and the importance of a proper fit was explained. Breast models were used to show the correct way to measure a nipple for flange size. A video was shown to reinforce correct sizing before each participant attempted to size a nipple for a flange. A hand pump and an electric pump were compared and shown to participants. Different parts of each pump are discussed and shown to participants. Pumps were made available so participants could feel different levels of suction.

**Pre- and Post-Questionnaires**

The pre-test (Appendix C) contained 41 items and began with a consent page, and if consent to participate is given, a link to the questionnaire was provided. A question was generated to provide a self-identification code allowing researchers to link pre-test and post-test responses and three demographic items such as age, race, and identity. The remaining 34 items included 14 items to assess breastfeeding knowledge which are based on evidence-based scientific literature, six items that measure breastfeeding exposure (ex., whether any close friends or family members have breastfed), and 12 items that assess attitudes toward breastfeeding, 10 of which were adapted from the 2007 Texas Behavioral Risk Factor Surveillance System (BRFSS) (Vaaler et al., 2011). The
remaining two questions included one open-text question that asks students for additional
comments on the topic and one question (with eight subparts) that assesses self-efficacy,
specifically, confidence in breastfeeding knowledge, practices, and the provision of
breastfeeding counseling.

The post-test (Appendix D) contained 30 items repeated from the pre-test, with
only the demographic and exposure questions being removed from the initial
questionnaire. Including the instructions, there was a question to generate a self-
identification code, 14 knowledge questions or statements, 12 attitude items, open text
question for additional comments, a self-efficacy question containing 8 subparts, a gains
question containing 11 subparts, and 5 reflection questions. Participants completed the
pre-and post-tests through a self-administered electronic survey (Qualtrics). The tests
took approximately 10-15 minutes to complete. All responses remained confidential, and
outcomes were reported in the aggregate for the group. Student names were not collected.
Instead, students answered a series of questions (ex., What are the first two letters of your
birthday month) to create a self-generated identification code. This unique code is
necessary to link pre- and post-test responses.

**Setting**

The research will take place in classrooms and online at the University of Texas
Medical Branch, Louisiana Tech University, and the University of Central Arkansas.
Sample

The subject population will include all dietetic internship students enrolled in program courses as part of their training to become registered and licensed dietitians. All participants will be 18 years of age or older.

All students were English-speaking. The research component of the educational modules was described verbally to the students and was provided in writing as part of the consent, which was at the start of the online pre-survey. Students were only directed to the questionnaire/survey once they have consented. No data collection occurred prior to approval by the institutional review board.

Data Collection

Confidentiality was maintained and a unique code (ex., the color of their first car) was used to link pre-test and post-test responses. The data for this proposed thesis project was collected as part of a data set that includes measures of breastfeeding knowledge, attitude toward breastfeeding, intentions to breastfeed, and self-efficacy. This proposal focused on the active learning educational component delivered to dietetic interns, where the self-reported gains achieved by the active learning component were measured. This portion of the research project also gather qualitative data to evaluate the educational program.

Data Analysis

Participant characteristics and gains attained by participation in the program were analyzed with frequencies and other measures of central tendency, including means and medians. Associations with demographic variables were explored with correlations.
Comparisons between pre and post-test self-efficacy responses were analyzed utilizing paired samples t-tests. Narrative responses were assessed for themes and suggestions for program improvement.
CHAPTER 4

RESULTS

Demographics

A total of 38 dietetic interns participated in the education intervention. They were primarily female (94.7%) and white (57.9%). The mean age was 25.5 ($SD = 5.61$), with 71.1% being aged 18-24 years. Participant characteristics are exhibited in Table 1.

Table 1

*Characteristics of Participants (N=38)*

<table>
<thead>
<tr>
<th>Baseline Characteristics</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>2</td>
<td>5.3</td>
</tr>
<tr>
<td>Females</td>
<td>36</td>
<td>94.7</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>22</td>
<td>57.9</td>
</tr>
<tr>
<td>White, Hispanic</td>
<td>6</td>
<td>15.8</td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
<td>3</td>
<td>7.9</td>
</tr>
<tr>
<td>Blank, Hispanic</td>
<td>1</td>
<td>2.6</td>
</tr>
<tr>
<td>Asian, Pacific Islander</td>
<td>3</td>
<td>7.9</td>
</tr>
<tr>
<td>Biracial</td>
<td>1</td>
<td>2.6</td>
</tr>
<tr>
<td>Multiracial</td>
<td>1</td>
<td>2.6</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24</td>
<td>27</td>
<td>71.1</td>
</tr>
<tr>
<td>25-29</td>
<td>9</td>
<td>23.7</td>
</tr>
<tr>
<td>30-35</td>
<td>1</td>
<td>2.6</td>
</tr>
<tr>
<td>36+</td>
<td>1</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Note: One participant did not report race/ethnicity. Mean age=25.5($SD=5.612$)
Gains Associated with the Active Learning Component of the Intervention

Participants were asked to score the influence of the hands-on strategies on their gain in confidence in their ability to perform future lactation education. The gain scores are presented in Table 2. Of those who responded (n=31), \( \geq 45 \% \) reported they experienced a “good” gain (4 on a scale of 1-5) or a “great” gain (5 on a scale of 1-5) in all categories. All items but the “ability to size proper nipple shield size for nipple sizes” and the “ability to acknowledge a good latch verse a bad latch” identified good to great gains by more than 50% of respondents; these two items were identified as resulting in good to great gain by more than 45% of the participants. The greatest gains (scores of 4 or 5) were seen for “confidence in the understanding of types of infant stool” (87\%) “ability to pour and store breastmilk correctly” (77.4\%), “correct positioning of the bottle when bottle feeding an infant with breastmilk” (70\%), and “ability to demonstrate infant stomach size” (74.2\%).

Self-efficacy Associated with the Active Learning Component of the Intervention

All self-efficacy items had statistically significant increases in scores when pre-intervention scores were compared to post-intervention scores. Cohen’s d revealed a large effect on self-efficacy for six items. One item “benefits of breastfeeding for infant” had a medium effect, and “discussing recommendations for breastfeeding” had a small effect. This is exhibited in Table 3.
Table 2

Gains in Knowledge, Confidence, or Comfort from Active Learning (n=31)

<table>
<thead>
<tr>
<th>Confidence/ability items</th>
<th>Total responses</th>
<th>Median</th>
<th>No gain</th>
<th>A little gain</th>
<th>Moderate gain</th>
<th>Good gain</th>
<th>Great gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remaining professional when seeing an individual’s breast</td>
<td>3.61(1.334)</td>
<td>4.00</td>
<td>2(6.5)</td>
<td>6(19.4)</td>
<td>5(16.1)</td>
<td>7(22.6)</td>
<td>11(35.5)</td>
</tr>
<tr>
<td>Ability to hold an infant</td>
<td>3.55(1.261)</td>
<td>4.00</td>
<td>3(9.7)</td>
<td>3(9.7)</td>
<td>7(22.6)</td>
<td>10(32.3)</td>
<td>8(25.8)</td>
</tr>
<tr>
<td>Ability to size proper nipple shield size for nipple sizes</td>
<td>3.32(1.400)</td>
<td>3.00</td>
<td>4(12.9)</td>
<td>5(16.1)</td>
<td>8(25.8)</td>
<td>5(16.1)</td>
<td>9(29.0)</td>
</tr>
<tr>
<td>Ability to work an electric pump</td>
<td>3.39(1.358)</td>
<td>4.00</td>
<td>4(12.9)</td>
<td>5(16.1)</td>
<td>4(12.9)</td>
<td>11(35.5)</td>
<td>7(22.6)</td>
</tr>
<tr>
<td>Ability to work a breast pump a</td>
<td>3.43(1.406)</td>
<td>4.00</td>
<td>3(10.0)</td>
<td>7(23.3)</td>
<td>3(10.0)</td>
<td>8(26.7)</td>
<td>9(30.0)</td>
</tr>
<tr>
<td>Ability to hold or show an infant in different nursing positions a</td>
<td>3.90(0.995)</td>
<td>4.00</td>
<td>0(0.0)</td>
<td>3(10.0)</td>
<td>7(23.3)</td>
<td>10(33.3)</td>
<td>10(33.3)</td>
</tr>
<tr>
<td>Ability to acknowledge a good latch versus bad latch</td>
<td>3.32(4.13)</td>
<td>3.00</td>
<td>2(6.5)</td>
<td>6(19.4)</td>
<td>8(25.8)</td>
<td>10(32.3)</td>
<td>5(16.1)</td>
</tr>
<tr>
<td>Understanding of types of infant stool</td>
<td>4.13(0.991)</td>
<td>4.00</td>
<td>1(3.2)</td>
<td>2(6.5)</td>
<td>1(3.2)</td>
<td>15(48.4)</td>
<td>12(38.7)</td>
</tr>
<tr>
<td>Ability to pour and store breastmilk correctly</td>
<td>4.00(1.125)</td>
<td>4.00</td>
<td>2(6.5)</td>
<td>1(3.2)</td>
<td>4(12.9)</td>
<td>12(38.7)</td>
<td>12(38.7)</td>
</tr>
<tr>
<td>Correct positioning of the bottle when bottle feeding an infant with breastmilk a</td>
<td>3.87(1.137)</td>
<td>4.00</td>
<td>2(6.7)</td>
<td>1(3.3)</td>
<td>6(20.0)</td>
<td>11(36.7)</td>
<td>10(33.3)</td>
</tr>
<tr>
<td>Ability to demonstrate infant stomach size</td>
<td>4.03(0.948)</td>
<td>4.00</td>
<td>1(3.2)</td>
<td>0(0.0)</td>
<td>7(22.6)</td>
<td>12(38.7)</td>
<td>11(35.5)</td>
</tr>
</tbody>
</table>

α: Three items had only 30 respondents:
Table 3

Comparison of Pre-Post Matched Pairs for Self-Efficacy (n=27)

<table>
<thead>
<tr>
<th></th>
<th>Pre-Intervention</th>
<th></th>
<th>Post-Intervention</th>
<th></th>
<th>t</th>
<th>df</th>
<th>p</th>
<th>Cohen d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits of breastfeeding for Mother</td>
<td>n=28</td>
<td>M (SD)</td>
<td>n=28</td>
<td>M (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benefits of breastfeeding for infant</td>
<td>28</td>
<td>1.82 (0.548)</td>
<td>28</td>
<td>1.43 (0.573)</td>
<td>3.034 **</td>
<td>27</td>
<td>&lt;0.005</td>
<td>0.695634</td>
</tr>
<tr>
<td>Knowledge of Contradictions for breastfeeding</td>
<td>28</td>
<td>2.36 (0.731)</td>
<td>28</td>
<td>1.68 (0.612)</td>
<td>4.385 **</td>
<td>27</td>
<td>&lt;0.001</td>
<td>1.008706</td>
</tr>
<tr>
<td>Nutritional composition of breastfeeding</td>
<td>28</td>
<td>2.11 (0.497)</td>
<td>28</td>
<td>1.57 (0.573)</td>
<td>4.091 **</td>
<td>27</td>
<td>&lt;0.001</td>
<td>1.006809</td>
</tr>
<tr>
<td>Discussing recommendations for breastfeeding</td>
<td>28</td>
<td>2.50 (1.171)</td>
<td>28</td>
<td>2.00 (0.903)</td>
<td>2.393 *</td>
<td>27</td>
<td>0.024</td>
<td>0.478184</td>
</tr>
<tr>
<td>Breastfeeding techniques</td>
<td>28</td>
<td>3.39 (1.286)</td>
<td>28</td>
<td>2.04 (0.838)</td>
<td>6.019 **</td>
<td>27</td>
<td>&lt;0.001</td>
<td>1.24382</td>
</tr>
<tr>
<td>Providing breastfeeding counseling</td>
<td>28</td>
<td>3.50 (1.072)</td>
<td>28</td>
<td>2.46 (1.170)</td>
<td>4.562 **</td>
<td>27</td>
<td>&lt;0.001</td>
<td>0.926858</td>
</tr>
<tr>
<td>Referring to IBCLC</td>
<td>27</td>
<td>2.81 (1.241)</td>
<td>27</td>
<td>1.78 (0.974)</td>
<td>4.293 **</td>
<td>26</td>
<td>&lt;0.001</td>
<td>0.923339</td>
</tr>
</tbody>
</table>

Note: * p <0.05, ** p <0.01, not all 38 participants were matched pairs.
Correlations

There was no correlation between age and change in self-efficacy (2-tailed 0.524) or total gain score (2-tailed 0.684). There was a significant negative correlation between Q 33 (see Appendix C) “It is important to educate students enrolled in nutrition and dietetics programs about breastfeeding” and change in self-efficacy. Those that agreed with the need for additional breastfeeding education had a higher change in self-efficacy scores.

Reflections Associated with the Active Learning Components of the Intervention

Participants were asked to reflect on their experiences with the hands-on strategies of the breastfeeding program (See Appendix L). Several expressed that the hands-on portion was beneficial (three responses). Examples of the reflections include:

“I liked this part a lot as it was hands-on and allowed us to see different models, and practice our skills. It was fun to apply the knowledge in real-time and modeling what proper latching should look like.”

“I liked the variety of materials used for the hands-on experiences. The visual and kinesthetic elements made this material more memorable and allowed for practice in life-like settings.”

“I liked that I was able to see all the necessary things involved in breastfeeding because I am a visual learner. I have seen breast pumps before; however, I have never learned how to use them until now. I also liked having the infant-size dolls to practice the positioning techniques because it is much different watching someone do it versus doing it myself.”
Participants also voiced that the hands-on strategies provided exposure to breastfeeding that they had previously not experienced (2 responses):

“Seeing that materials that are actually used, having a doll as an example, etc. made the whole process feel more tangible since I haven’t experienced with friends or family. I like that I know what goes into latching, feeding, pumping, etc. now.”

“As I visual learner, I loved the hands-on portion I especially liked the egg portion (baby’s stomach), how to use the pump machine, and the diapers. I was never exposed to these so it’s nice to know what to expect from the babies!”

Participants provided insights gained from the hands-on portion (See Appendix G). Multiple insights involved an understanding of electric and manual pumps, flange sizes, and infant stool (five responses). Gaining empathy for the struggles a mother can go through during breastfeeding was described by two respondents.

“I gained a better understanding of how to utilize the breast pump both manually and electronically. I also learned how to pick the correct size for the breast pump/nipple thing and how to help mothers measure what is best for them.”

“Insights I have gained from the hands-on portion of the breastfeeding education program are the different positioning techniques of the infant during breastfeeding and how to measure the breast to determine the flange size needed. Those are two things I learned that I previously did not know about. I have always used the same positioning when I feed babies not realizing there were other techniques taught to mothers for better comfort. I also thought that mothers used the same size flange to a breast pump, however after learning how to measure for a mother’s breast it makes sense how necessary that would be.”
“I learned how breast pumps work and how much time/energy it might take; I learned way more about infant handling than I knew in the past, I learned how different feeding positions might be better for women with different types of bodies.”

“What baby’s poop will look like and not be alarmed and how the pump works.”

“What baby’s poop will look like and not be alarmed and how the pump works.”

1. How to work a breast pump and see how it mimick the sucking of the child. 2. How uncomfortable and challenging it can be for mothers to position a baby and breastfeed.”

When asked what could be improved in the program for future use, many participants felt that increased time with the hands-on activities and incorporating real stories or visuals could be beneficial (three responses) (Appendix M).

“I would have liked to hear personal stories about people’s breastfeeding journey as there are a lot of confounding factors that can help and hinder a mother during this time. I also think I would have like getting a bit more time to work with the hands on things like having specific activities or something that went with it rather than it being just supplemental to the lecture.”

“I wish I could see the process with an actual mother and baby besides a doll.” “I think it would be interesting to see an animated or real demonstration video of breastfeeding from start to finish. Providing the pretend doll and pretend breast were helpful, but in real life we will need to have seen what it should look like to be helpful practitioners.”
CHAPTER 5

DISCUSSION

This study examined the benefits of hands-on active learning incorporated with a traditional lecture-style breastfeeding education program for dietetic interns. The program used pre- and post-questionnaires to examine self-efficacy and confidence in the ability to perform lactation education in the future. The overall learning goal of the active learning modules was to increase self-efficacy and professional skills when provided care. The active learning components are meant to improve confidence in patient care including education and counseling of breastfeeding women. The active learning modules were designed using the DESIGN procedure and the four E’s: excite, explain, expand, excite.

Previous studies have shown the importance of breastfeeding exposure and knowledge of breastfeeding to the attitude someone has toward breastfeeding women (Camel et al., 2020). Lack of nutrition education, family and social support, hospital practices that are not breastfeeding-positive, and work-related lactation issues are the top reasons why 60% of mothers cease breastfeeding before they meet their goal (Center for Disease Control, 2021). Amendments to the Affordable Care Act, Section 7 of the Fair Labor Standards Act, have been created to provide reasonable unpaid breaks for mothers who are pumping, yet rates have not significantly increased (Department of Labor, 2022; Center for Disease Control, 2021).
As breastfeeding rates decrease the need for supportive and knowledgeable medical workers becomes an important aspect of a lactating mother’s support system. Most healthcare workers have little to no lactation education in their curriculums (Freed et al. 1996; Hellings & Howe 2000; Cantrill et al. 2003). A study involving primary care physicians in the UK showed a positive attitude and gain of knowledge for lactation education within health care (McFadden et al., 2006). A study examining the benefits of breastfeeding education with undergraduate nutrition and dietetics students resulted in increased knowledge and attitude towards breastfeeding, as well as participants’ interest in working in a professional environment involving breastfeeding (Radcliffe et al., 2011). There is little research examining the benefits of breastfeeding education within future registered dietitian nutritionists. Theurich et al. (2016) discusses the underutilization of registered dietitians for increasing medical care for lactating mothers. Recognized health care professionals (dentist, dietitians, midwife, nurse, occupational therapist, pharmacist, physical therapist/physiotherapist, physician/medical doctor, and speech pathologist/therapist) are all required to take the same pathway including the same 1200-hour experience and 95 hours of education to sit for the IBCLC exam to become an International Board Certified Lactation Consultant.

Active learning has been shown to have many benefits in previous studies. Active learning can increase confidence in patient counseling and increase a participant’s understanding of the coursework. Many participants in past studies found greater satisfaction and communication throughout the curriculum (Allsop et al., 2020; Kressler et al., 2020; Walker et al., 2003; Wood et al., 2021).
This study had two hypotheses and one main objective. The first hypothesis postulated that active learning strategies would not influence changes in self-efficacy measures related to the provision of lactation education. There were significant increases in self-efficacy of the participants through the active learning strategies in this educational intervention. Therefore, this hypothesis was rejected. This is consistent with other studies that demonstrated increases in self-efficacy when providing breastfeeding counseling, increased self-efficacy when providing patient counseling has been shown in other active learning studies (Nelson et al., 2014; Wood et al., 2021). The lowest score for improvement of self-efficacy was the item “discussing recommendations for breastfeeding”. This could be due to the base level of knowledge provided during courses taken during undergraduate education. The second hypothesis postulated that active learning strategies would not influence the professional skills related to the ability to perform lactation education in the future. This study resulted in significant gains related to breastfeeding techniques and problem solving for providing lactation education. Therefore, this second hypothesis was rejected. This study sought to obtain participant reflections on the intervention and its components. Participants were asked to provide reflections on gains related to the active learning provided. The reflections of the participants described multiple, positive important gains related to the active learning strategies applied in the intervention.

Limiting factors of the study included a small pool of participants, which was limited further through decreased responses on the post-questionnaire. The majority of the participants were female, this limited the male perspective. Some hands-on equipment
was not returned for the final breastfeeding education program intervention, which could have had a negative impact on the education of the participants.

Current undergraduate nutrition and dietetic education provides foundational knowledge for entry-level, basic lactation education. Providing advanced course work focused on the provision of lactation education and management could increase the proficiency of a greater number of RDN’s in the future, enhancing the realm of influence in this area of practice. RDNs are uniquely qualified in the areas of maternal and infant nutrition within the profession’s scope of practice, therefore improving expertise in the management of lactation is warranted as part of preparation for counseling. The incorporation of specific lactation education requirements into the ACEND competencies could increase the exposure to this content earlier in RDN careers, assisting with the development of skills for providing lactation education and counseling to lactating mothers.
CHAPTER 6

CONCLUSIONS AND FUTURE RESEARCH

Conclusions

In conclusion, participants felt hands-on active learning had a positive impact along with traditional lecture-style coursework. Providing future registered dietitian nutritionists with hands-on lactation education could increase their self-efficacy and confidence in the ability to provide lactation education in the future. While a short educational intervention such as this one may not provide all the professional skills needed to assist a lactating mother reach her goals throughout the entire lactation period, it could provide future registered dietitian nutritionists enough skills to help troubleshoot chronic breastfeeding problems until the mother is able to connect with a specialized breastfeeding consultant. As breastfeeding rates continue to be less than desirable and remain inconsistent with the recommendations of healthcare professionals, finding educational strategies that are efficient and effective for a group of future nutritional professionals who have influence on feeding behaviors is a priority. Future studies continuing to examine the advantages of active learning as part of education larger pools of dietetic interns and those with more diversity, specifically with larger numbers of males could improve future education interventions. Evaluating the male perspective could yield results that were not available during this study. Increased time with the active learning equipment could increase the benefits gained by the participants.
Providing adequate time with the program in the most realistic and beneficial manner, would be around an hour and half per intervention. Providing free time after class for the participants to engage with the hands-on materials could increase gains in skills and self-efficacy. Empathy for lactating mothers was expressed during the sessions, however, was not measured in this study specifically. Future efforts should consider comparing empathy for lactating mothers. Multiple participants expressed a desire for videos of real mothers breastfeeding to provide a more realistic experience, this addition could be beneficial. Because a class of Dietetic Interns includes students from different undergraduate programs, it is important to approach educational efforts as both reviewing concepts that they may have been exposed to previously as well as bringing the entire group to a greater understanding of lactation and to develop skills needed in future practice as Registered Dietitian Nutritionists.
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Evaluation tools: Undergraduate research student self-assessment (URSSA).


Fibroadenomas are common, benign (non-cancerous) breast conditions. A woman goes through menopause.


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APPENDIX A

OPERATIONAL DEFINITIONS
**Human milk**: Milk produced in the mammary gland located in the breast of a human female. Human milk is the primary source of nutrients for infants, containing all the necessary carbohydrates, protein, fats, minerals, and vitamins.

**Lactation**: The secretion of milk via the mammary ducts and out the nipple, triggered by the combination of prolactin and oxytocin. Prolactin stimulates milk production, and oxytocin creates contractions in the alveoli of the mammary glands to push milk from the ducts leading to the nipple.

**Active learning**: Learning that requires people to be involved and engaged in the learning process. Examples are hands-on, investigation, decision-making, and problem-solving.

**Knowledge, confidence, and comfort of lactation**: will be measured using a survey based on the Undergraduate Research Student Self-Assessment (URSSA) instrument created by the Student Assessment of their Learning Gains (SALG).
APPENDIX B

RESEARCH MATRIX
### Purpose Statement
The research aims to evaluate active learning modules meant to increase the depth of knowledge, attitudes, and confidence in application in future practice. There will be no association between hands-on learning and knowledge, attitude, or confidence.

### Hypotheses
- **H1** Active learning strategies will not influence changes in self-efficacy measures related to the provision of lactation education.
- **H2** Active learning strategies will not influence confidence in the ability to perform lactation education in the future.

### Study Design
**Objective 1:** Participants will provide reflections on gains and needs related to active learning components within the intervention.

**Testing sample:**
- Louisiana Tech University dietetic interns
- University of Texas Medical Branch dietetic interns
- The University of Arkansas dietetic interns

### Variables (+ Measurement Tool)
- **Demographics**
- **Self-Efficacy**
  - URSSA
- **Gains**
  - SALG
- **Reflections**

### Type of Data
- Descriptive
- Continuous
- Quantitative
- Qualitative

### Statistical Test(s)
- Central Tendency measures
- Pre-Post T-test
- Descriptive central tendency
- Common Themes
APPENDIX C

BREASTFEEDING PRE-SURVEY
Breastfeeding Pre-Survey

Start of Block: Assessment Summary

Q1 We are interested in learning about your current breastfeeding knowledge and attitudes. This questionnaire asks about breastfeeding knowledge, exposure, attitude, and self-efficacy in teaching about breastfeeding. Please answer all questions. It will take you about 10-15 minutes to complete. Your responses will remain confidential and will be published only in summary, statistical form. By responding to the questionnaire, you are agreeing to participate in this educational project. Thank you for your time.

End of Block: Assessment Summary

Start of Block: Code

Q2 We will be linking your pre-survey and post-survey responses. Please include the following unique code created by the following:

1. First letter of your middle name (if none, just use the letter X)
2. The zip code of the city where you grew up.
3. The Color of your first car (Full Word)
   (EX: A70363red)

End of Block: Code

Start of Block: Knowledge

Q3 Which of the following are recognized breastfeeding benefits for baby?

- Reduced risk for sudden infant death syndrome (SIDS) (1)
- Reduced risk for types 1 and 2 diabetes (2)
- Reduced risk for gastrointestinal infections (3)
- All of the above (4)
Q4 All of the following are recognized benefits of breastfeeding for the mother EXCEPT?

- Optimal postpartum weight loss (1)
- Increased rate of postpartum depression (2)
- Protection from diabetes (3)
- Natural child spacing due to reduced fertility (4)

Q5 The transfer of which substance from mother to infant through breastfeeding supports immune health?

- Allergies (1)
- Antibodies (2)
- Genetic data (3)
- Resistance to medications (4)

Q6 A breastfeeding mother asks you about introducing a pacifier to her infant daughter. How can use of a pacifier influence breastfeeding success?

- No harm can result from the introduction of a pacifier early after birth (1)
- Limit the use of the pacifier to when the mother experiences discomfort, such as with a plugged milk duct or mastitis (2)
- Use of a pacifier before breastfeeding is established can interfere with sucking (3)
- Use of the pacifier can be used to teach the infant how to latch (4)
Q7 In accordance with the federal Affordable Care Act, what must employers provide for nursing mothers?
- A hospital-grade breast pump (1)
- On-site child care so they can nurse their babies (2)
- Employee paid leave to pump each work day (3)
- Reasonable break time and a private space (not a bathroom) to pump or express breast milk (4)

Q8 In addition to vitamin K, exclusively breastfed infants should receive a supplement for_____.
- vitamin D only (1)
- iron only (2)
- fluoride and vitamin D (3)
- vitamin D and calcium (4)

Q9 The mother should hear_____sounds when the infant is breastfeeding and in the proper position.
- swallowing (1)
- coughing (2)
- smacking (3)
- clicking (4)
Q10 Latching on refers to the___________.
- infant grasping the mother’s breast with her hand before beginning to suckle (1)
- the infant smacking and slurping when attached to the nipple (2)
- minerals in human milk attaching to proteins, increasing their availability to the infant (3)
- mother centering the nipple in her infant’s mouth (4)

Q11 Which statement correctly describes milk production?
- The amount of milk produced is the same regardless of the number of infants being nursed. (1)
- Women with smaller breasts have a reduced capacity for milk production. (2)
- Milk production is highest in the days following birth and decreases thereafter. (3)
- Milk production is triggered by the removal of milk from the breast (4)

Q12 The American Academy of Pediatrics classifies _____as a substance that is contraindicated during lactation.
- alcohol (1)
- caffeine (2)
- THC (3)
- nicotine (4)
- sugar (5)
Q13 breastfeeding is unadvisable if the mother _____.

- smokes cigarettes (1)
- drinks alcohol (2)
- drinks coffee (3)
- has HIV (4)
- is overweight (5)

Q14 Freshly expressed breastmilk left at room temperature can be considered safe for a baby for up to _____.

- 1-3 (1)
- 2-4 (2)
- 3-5 (3)
- 4-6 (4)
- 6-8 (5)

Q15 The nutritional content of breast milk ________.

- changes throughout a feed (1)
- only requires supplementation with formula after 4 weeks (2)
- is reflective of the father’s diet (3)
- is not appropriate for premature infants (4)
Q16 A woman with mastitis should ______
- continue to breastfeed (1)
- stop nursing completely until she is able to see a health care provider (2)
- drink a glass of warm milk (3)
- take extra calcium supplements (4)

End of Block: Knowledge

Start of Block: Exposure

Q17 Were you breastfed as an infant?
- Yes (1)
- No (2)
- I Don’t Know (3)

Q18 Have you ever seen anyone breastfeed in person?
- Yes (1)
- No (2)

Q19 Have any of your close friends or family breastfed?
- Yes (1)
- No (2)
Q20 Have you ever discussed the topic of breastfeeding with anyone?
○ Yes (1)
○ No (2)

Q21 Within your nutrition-related undergraduate program, were you exposed to any of the following breastfeeding education modalities? Please check all that apply.

☐ Lecture (1)
☐ Case-study(ies) (2)
☐ Experiential learning (lab experiences/hands-on experiences) (3)
☐ Required Readings (Textbook or Supplemental) (4)
☐ No exposure occurred in my undergraduate program (5)
☐ Write in (6) ____________________________________________
Q22 During your nutrition-related **graduate program**, were you exposed to any of the following breastfeeding education modalities? Please check all that apply.

- Lecture (1)
- Case-study (ies) (2)
- Experiential learning (lab experiences/hands-on experiences) (3)
- Supervised practice rotation (4)
- Required Readings (Textbook or Supplemental) (5)
- No exposure occurred in my graduate program (6)
- Write in (7) __________________________________________
- Does not apply (8)

End of Block: Exposure

Start of Block: Attitude

Q23 breastfeeding makes a woman’s breasts look unattractive later in life.

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)
Q24 A mother cannot breastfeed her baby and work outside the home.
   - Strongly agree (1)
   - Somewhat agree (2)
   - Neither agree nor disagree (3)
   - Somewhat disagree (4)
   - Strongly disagree (5)

Q25 Breastfeeding will tie a mother down and interfere too much with her social life.
   - Strongly agree (1)
   - Somewhat agree (2)
   - Neither agree nor disagree (3)
   - Somewhat disagree (4)
   - Strongly disagree (5)

Q26 I am embarrassed when a woman who I do not know breastfeeds in front of me.
   - Strongly agree (1)
   - Somewhat agree (2)
   - Neither agree nor disagree (3)
   - Somewhat disagree (4)
   - Strongly disagree (5)

Q27 Mothers should only breastfeed in their own homes.
   - Strongly agree (1)
   - Somewhat agree (2)
   - Neither agree nor disagree (3)
   - Somewhat disagree (4)
   - Strongly disagree (5)
Q28 It is appropriate to show a woman breastfeeding her baby on a magazine cover.

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q29 It is appropriate to show a woman breastfeeding her baby on a billboard or poster.

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q30 It is appropriate to show a woman breastfeeding her baby on a television show that you would watch with your children or grandchildren.

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)
Q31 Employers should provide flexible work schedules, such as additional break times, for breastfeeding mothers to feed their babies or pump breast milk.

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q32 Employers should provide a private room (other than a bathroom), such as a lounge or break room, for breastfeeding mothers to feed their babies or pump breast milk.

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q33 It is important to educate students enrolled in nutrition and dietetics programs about breastfeeding.

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q34 Should you have children in the future, do you intend to breastfeed or provide breast milk?

- Yes (1)
- No (2)
- Not Sure (3)

End of Block: Attitude
### Q35 Self-Efficacy

<table>
<thead>
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<th>I am knowledgeable of the benefits of breastfeeding for the mother. (1)</th>
<th>Strongly Agree (1)</th>
<th>Agree (2)</th>
<th>Neither agree nor disagree (3)</th>
<th>Disagree (4)</th>
<th>Strongly disagree (5)</th>
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<th>I am knowledgeable of the benefits of breastfeeding for the infant. (2)</th>
<th>Strongly Agree (1)</th>
<th>Agree (2)</th>
<th>Neither agree nor disagree (3)</th>
<th>Disagree (4)</th>
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<tr>
<th>I am knowledgeable of the contraindications for breastfeeding. (3)</th>
<th>Strongly Agree (1)</th>
<th>Agree (2)</th>
<th>Neither agree nor disagree (3)</th>
<th>Disagree (4)</th>
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<tr>
<th>I am knowledgeable of the nutritional composition of breastmilk. (4)</th>
<th>Strongly Agree (1)</th>
<th>Agree (2)</th>
<th>Neither agree nor disagree (3)</th>
<th>Disagree (4)</th>
<th>Strongly disagree (5)</th>
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<tr>
<th>I am comfortable discussing the recommendations for breast feeding. (5)</th>
<th>Strongly Agree (1)</th>
<th>Agree (2)</th>
<th>Neither agree nor disagree (3)</th>
<th>Disagree (4)</th>
<th>Strongly disagree (5)</th>
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<tr>
<th>I am comfortable discussing breastfeeding techniques, including positioning, with women. (6)</th>
<th>Strongly Agree (1)</th>
<th>Agree (2)</th>
<th>Neither agree nor disagree (3)</th>
<th>Disagree (4)</th>
<th>Strongly disagree (5)</th>
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I am comfortable in my ability to provide breastfeeding counseling to a woman. (7)

I am confident that I know when to refer a breastfeeding mother to an IBCLC for advanced services. (8)

End of Block: Self-Efficacy

Start of Block: Comments

Q36 Please write any additional comments about this topic or survey here.

________________________________________________

End of Block: Comments

Start of Block: Demographics

Q37 How do you describe yourself?

- Male (1)
- Female (2)
- Non-binary / third gender (3)
- Prefer to self-describe (4)___________________________________________
- Prefer not to say (5)_________________________________________
Q38 What is your race/ethnicity?
- White, non-Hispanic (1)
- White, Hispanic origin (2)
- African American or Black (3)
- Black, Hispanic origin (4)
- Native American or Alaskan Native (5)
- Asian, Pacific Islander (6)
- Indian (Southeast or Subcontinental) (7)
- Middle Eastern (8)
- Biracial (9)
- Multiracial (10)

Q39 What is your age?

____________________________________________________________

Q40 What is your student classification?
- Freshman (1)
- Sophomore (2)
- Junior (3)
- Senior (4)
- First Year Graduate Student (1st 12 months) (5)
- Second Year Graduate Student (2nd 12 months) (6)
- Graduate (Doctoral) (7)
Q41 What is your primary area of study?

- Food, Nutrition, Dietetics (1)
- Fashion Merchandise (2)
- Family & Child Studies (3)
- Pharmacy (4)
- Nursing (5)
- Social Work (6)
- Health Information System (7)
- Biology or Chemistry (8)
- Engineering, Math, & Computer Science (9)
- Business (10)
- Education (11)
- Psychology or Sociology (12)
- Liberal Arts (Literature, Language, History, Art, Architecture) (13)
- Speech Pathology (14)
- Other (15) ________________________________________________
APPENDIX D

BREASTFEEDING POST-SURVEY
Start of Block: Assessment Summary

Q1 We are interested in your thoughts following the breastfeeding education modules. This questionnaire asks about breastfeeding knowledge, exposure, attitude, and self-efficacy in teaching about breastfeeding.

Please answer all questions. It will take about 10-15 minutes to complete. Your responses will remain confidential and will be published only in summary, statistical form. By responding to this questionnaire, you are agreeing to participate in this study. Thank you for your time.

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- is not appropriate for premature infants (4)

Q16 A woman with mastitis should ______

- continue to breastfeed (1)
- stop nursing completely until she is able to see a health care provider (2)
- drink a glass of warm milk (3)
- take extra calcium supplements (4)

End of Block: Knowledge

Start of Block: Attitude

Q17 breastfeeding makes a woman’s breasts look unattractive later in life.

- Strongly agree (1)
- Somewhat agree (2)
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- Somewhat disagree (4)
- Strongly disagree (5)
Q18 A mother cannot breastfeed her baby and work outside the home.
   - Strongly agree (1)
   - Somewhat agree (2)
   - Neither agree nor disagree (3)
   - Somewhat disagree (4)
   - Strongly disagree (5)

Q19 Breastfeeding will tie a mother down and interfere too much with her social life.
   - Strongly agree (1)
   - Somewhat agree (2)
   - Neither agree nor disagree (3)
   - Somewhat disagree (4)
   - Strongly disagree (5)

Q20 I am embarrassed when a woman who I do not know breastfeeds in front of me.
   - Strongly agree (1)
   - Somewhat agree (2)
   - Neither agree nor disagree (3)
   - Somewhat disagree (4)
   - Strongly disagree (5)

Q21 Mothers should only breastfeed in their own homes.
   - Strongly agree (1)
   - Somewhat agree (2)
   - Neither agree nor disagree (3)
   - Somewhat disagree (4)
   - Strongly disagree (5)
Q22 It is appropriate to show a woman breastfeeding her baby on a magazine cover.
- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q23 It is appropriate to show a woman breastfeeding her baby on a billboard or poster.
- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q24 It is appropriate to show a woman breastfeeding her baby on a television show that you would watch with your children or grandchildren.
- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)
Q25 Employers should provide flexible work schedules, such as additional break times, for breastfeeding mothers to feed their babies or pump breast milk.

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q26 Employers should provide a private room (other than a bathroom), such as a lounge or break room, for breastfeeding mothers to feed their babies or pump breast milk.

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q27 It is important to educate students enrolled in nutrition and dietetics programs about breastfeeding.

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)
Q28 Should you have children in the future, do you intend to breastfeed or provide breast milk?

- Yes (1)
- No (2)
- Not Sure (3)

End of Block: Attitude

Start of Block: Self-Efficacy

<table>
<thead>
<tr>
<th>Q29 Self-Efficacy</th>
<th>Strongly Agree (1)</th>
<th>Agree (2)</th>
<th>Neither agree nor disagree (3)</th>
<th>Disagree (4)</th>
<th>Strongly disagree (5)</th>
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</thead>
<tbody>
<tr>
<td>I am knowledgeable of the benefits of breastfeeding for the mother. (1)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>I am knowledgeable of the benefits of breastfeeding for the infant. (2)</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>I am knowledgeable of the contraindications for breastfeeding. (3)</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<td>○</td>
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<tr>
<td>I am knowledgeable of the nutritional composition of breastmilk. (4)</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>I am comfortable discussing the recommendations for breast feeding. (5)</td>
<td>○</td>
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<tr>
<td>I am comfortable discussing breastfeeding techniques, including</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
positioning, with women. (6)

I am comfortable in my ability to provide breastfeeding counseling to a woman. (7)

I am confident that I know when to refer a breastfeeding mother to an IBCLC for advanced services. (8)

---

End of Block: Self-Efficacy

Start of Block: Gains

Q30 We are interested in your thoughts about the value of the hands-on learning experiences.

What gains in knowledge, confidence, or comfort did you experience by having the “hands-on” learning component of the breastfeeding education?

<table>
<thead>
<tr>
<th>No gain (1)</th>
<th>A little gain (2)</th>
<th>Moderate gain (3)</th>
<th>Good gain (4)</th>
<th>Great gain (5)</th>
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<tbody>
<tr>
<td>Comfort level of remaining professional when seeing an individual’s breast (1)</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
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<tr>
<td>Confidence in my ability to hold an infant (just in general comfort around an infant) (2)</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
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<tr>
<td>Confidence in ability to size proper nipple shield size for nipple sizes (3)</td>
<td>〇</td>
<td>〇</td>
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</tr>
<tr>
<td>Confidence in ability to work an electric pump (4)</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Ability to work a breast pump (5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to hold or show an infant in different nursing positions (6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confidence in ability to acknowledge a good latch versus bad latch (7)</td>
<td></td>
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<td></td>
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<tr>
<td>Confidence in understanding of types of infant stool (14)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Ability to pour and store breastmilk correctly (15)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Confidence incorrect positioning of bottle when bottle feeding an infant with breastmilk (10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to demonstrate infant stomach size (17)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

End of Block: Gains
Start of Block: Reflections

Q31 List 2 - 3 insights that you have gained from the hands-on portion of the breastfeeding education program.

________________________________________________________________

Q32 What have you experienced during the hands-on learning modules that you feel still needs more attention or follow-up practice?

________________________________________________________________

Q33 How comfortable are you taking what you learned during the hands-on modules to outside of the classroom? Why or why not?

________________________________________________________________

Q34 Please reflect on your experience with the hands-on portion of this breastfeeding education program. What did you like about the experience?

________________________________________________________________

Q35 What could be done differently or improved in the future?

________________________________________________________________

End of Block: Reflections
APPENDIX E

LESSON PLAN 1
I. Goals
i. The participants will have an increase in positive attitude and understanding of breastfeeding.

II. Objectives
i. Participants can identify hunger cues of infants.
ii. Participants can describe and present different feeding positions for breastfed infants.
iii. Participants can present proper bottle positioning when bottle feeding human milk.

III. Materials
i. MOM breast feeding trainer
ii. Breastfeeding positions handout
iii. Breastfeeding dolls
iv. Bottle
v. water

IV. Teaching procedures
Excite: PowerPoint questions
Question: How long after an infant is born should you initiate first latch
Answer: Immediately?
  i. Discuss nursing potions
    a. Pass out nursing positions hand out and go over different positions
  ii. Discuss latching
    a. L- lips flanged out (wide, gaping mouth to accommodate areola and nipple)
    b. A- asymmetric latch (more areola visible above the baby’s top lip)
    c. T- Tummy-to-Mommy (baby’s ear, shoulder, and hips in alignment)
    d. C- Chin touching breast nose free in the sniffing position
    e. H- Have a listen and watch (active suckling and swallowing indicating milk transfer)
  iii. Demonstrate the MOM breastfeeding trainer with breastfeeding dolls
    a. position trainer on body and demonstrate nursing positions with dolls
  iv. Allow participants to practice different nursing positions with the MOM breastfeeding trainer and breastfeeding dolls
  v. Demonstrate the appropriate method of bottle-feeding breast milk
    a. Tilt water-filled bottle upside down and show the heavy stream
    b. Tilt water-filled bottle at an angle of about 45 degrees and show the slow drip/no drip
    c. Explain repercussions that come with easy feeds of an overly tilted bottle
      i. Breast milk is thinner than formula
      ii. An overly tilted bottle requires less work from the infant and can decrease an infant’s desire to nurse do to an increased suckling need
  vi. Pass around the bottle and allow participants to tilt the bottle at angles and examine the flow speed
APPENDIX F

ACTIVE LEARNING LESSON PLAN 2
V. Goals
i. The participants will have an increase in positive attitude and understanding of breastfeeding.

VI. Objectives
i. Participants will have the ability to develop strategies to trouble shoot conditions that could decrease length of breastfeeding.

VII. Materials
i. Breast cross-sectional model
ii. Common breast conditions models
iii. Water for filling common breast conditions lactating model

VIII. Teaching procedures
Excite:

Question: Guess the percent decrease of breast conditions in women who breastfeed?

Answer: 4.3% for every 12 months.

Breast-cross sectional model
i. Discuss the common pathologies in breast
   a. Adenocarcinoma –
      i. Bulging
      ii. 90% of breast cancers, but there are around 30 subtypes of adenocarcinoma (a)
      iii. BRCA1 and BRCA2 are the genes that indicate an increased risk of development of breast cancer (a)
      iv. Decreasing the risk: regular physical activity, balanced diet for maintaining healthy weight, regular checkups (a)
      v. Research shows every 12 months a woman breastfeeds there is a 4.3% decreased risk of development of breast cancer (b)
   b. Fibroadenoma
      i. Benign tumors in both the glandular and stromal tissues of the breast (d)
      ii. They do not increase risk of breast cancer and normally do not require removal. (d)
   c. Cysts
      i. Normally not cancerous (e)
      ii. Fluid filled sacs (e)
      iii. Can cause pain as it grows (e)
      iv. Treatment for painful cysts is draining of fluid (e)
   d. Ampulla or lactiferous sinus -
      i. Connects the milk duct to the nipple ©
   e. Ligaments of cooper
i. Provide support
ii. Extend from the skin of the breast to the pectoralis major muscle

ii. Hands on
   i. Participants will pass breast cross sectional model around and feel/see different pathologies

Common Breast Conditions Model
   i. Discuss the four types of models provided
      a. Inverted nipple (f)
         i. Nipple dip into the breast
         ii. Many mothers with inverted nipples use nipple shields
         iii. Demonstrate the correct way of protruding an inverted nipple for latching
               1. Pull back on breast tissue and put pressure around the base of the nipple on the areola to allow for a proper latch
         iv. Pass model around and allow participants to try and protrude the inverted nipple
      b. Flat nipple (f)
         i. Nipple is smooth against breast tissue
         ii. Many mothers with flat nipples use a nipple shield
         iii. Demonstrate the same procedure as the inverted nipple
               1. Pull back on breast tissue and put pressure around the base of the nipple on the areola to allow for a proper latch
         iv. Pass model around and allow participants to try and protrude the flat nipple
      c. Mastitis
         i. Review mastitis via lecture material
         ii. Pass around model of breast with mastitis and allow participants to feel the infected breast
      d. Lactating breast
         i. Demonstrate the lactating breast by pushing fluid through the syringe
         ii. Allow participants to push fluid through breast and see the breast lactate

IX. Assessment
   i. Assessment of attitude gained during hands on will be evaluated during post survey
APPENDIX G

ACTIVE LEARNING LESSON PLAN 3
X. **Goals**  
i. The participants will have an increase in positive attitude and understanding of breastfeeding.

XI. **Objectives**  
i. Participants can identify hunger cues of infants.  
ii. Participants can describe and present different feeding positions for breastfed infants.  
iii. Participants can present proper bottle positioning when bottle feeding human milk.

XII. **Materials**  
i. MOM breast feeding trainer  
ii. Breastfeeding positions handout  
iii. Breastfeeding dolls  
iv. Bottle  
v. Water

XIII. **Teaching procedures**  
**Excite:** PowerPoint questions  

Question: How long after an infant is born should you initiate first latch  

Answer: Immediately?

vii. Discuss nursing potions  
   a. Pass out nursing positions hand out and go over different positions

viii. Discuss latching  
   a. L- lips flanged out (wide, gaping mouth to accommodate areola and nipple)  
   b. A- asymmetric latch (more areola visible above the baby’s top lip)  
   c. T- Tummy-to-Mommy (baby’s ear, shoulder, and hips in alignment)  
   d. C- Chin touching breast nose free in the sniffing position  
   e. H- Have a listen and watch (active suckling and swallowing indicating milk transfer)

ix. Demonstrate the MOM breastfeeding trainer with breastfeeding dolls  
   a. Position trainer on body and demonstrate nursing positions with dolls

x. Allow participants to practice different nursing positions with the MOM breastfeeding trainer and breastfeeding dolls

xi. Demonstrate the appropriate method of bottle-feeding breast milk  
   a. Tilt water-filled bottle upside down and show the heavy stream  
   b. Tilt water-filled bottle at an angle of about 45 degrees and show the slow drip/no drip  
   c. Explain repercussions that come with easy feeds of an overly tilted bottle  
      i. Breast milk is thinner than formula
ii. An overly tilted bottle requires less work from the infant and can decrease an infant’s desire to nurse due to an increased suckling need.

i. Pass around the bottle and allow participants to tilt the bottle at angles and examine the flow speed.
Pumping and Flanges

XIV. Goals
   i. The participants will have an increase in positive attitude and understanding of breastfeeding.

XV. Objectives
   i. Participants can identify a good nipple and flange fit.
   ii. Participants can trouble shoot strategies for moms struggling to pump.

XVI. Materials
   i. Flanges
   ii. Breast model dark
   iii. Breast model Caucasian
   iv. Handheld pump
   v. Electric pump

XVII. Teaching procedures
   Excite: PowerPoint questions

   Question: What is the average number of calories burned per day in a mother who is exclusively breastfeeding?

   Answer: around 500 calories

   Question: Do hormones change in breastmilk throughout the day?

   Answer: yes! Melatonin increases in breastmilk toward the evening

   xii. Discuss the purpose of the flange
       a. Flanges are required to form the suction around the nipple for milk extraction

   xiii. Discuss the need for correct flange fitting
       a. Each nipple could need a different size flange
       b. Adequate suction
       c. Pain, bruising, and cracking can be caused by an incorrect fitting flange

   xiv. Discuss the COMFY test from aero flow (a)
       a. C- center of nipple moves freely
b. O- only a little areola tissue in tunnel
c. M- motion of breast is gentle and rhythmic
d. F- feels comfortable
e. Y- yields a well-drained breast

xv. Show video from even flo for proper flange sizing
https://youtu.be/WV4iCsb9mYs
a. Measure in mm the base of the diameter of each nipple
b. Once measurements are taken add 4 mm
c. Chose the flange size that best fits

xvi. Pass around breast and rulers and allow participants to measure the flange sizes needed. Discuss what answers participants calculated and corrections if needed.

Pumps

i. Discuss and demonstrate the different pumps
a. Hand pumps are user driven on speed and suction
b. Electric pumps are machine driven with the user adjusting switches to control speed and suction.
   i. Electric pumps often have electric cord or battery options
ii. Pass around and allow participants to test pumps on hands to feel the suction
APPENDIX I

REFLECTIONS ITEM 31
Reflections responses questionnaire item 31

List 2 - 3 insights that you have gained from the hands-on portion of the breastfeeding education program.

Responses:

- Proper positioning, nutritional components of milk, benefits of BF for mother
- I gained a better understanding of how to utilize the breast pump both manually and electronically. I also learned how to pick the correct size for the breast pump/nipple thing and how to help mothers measure what is best for them.
- I liked getting to see the breast pumps working on the fake breasts and it gave me insight into what the proper motion to look for are. I liked seeing the different sizes on the infants stomach and now have a better visual idea of their size.
- I felt like it was helpful to see the correct sizing of the infants stomach, mothers breasts/nipples, etc.
- What a mechanical pump looks like; what a flange is
- 1. How to work a breast pump and see how it mick the sucking of the child. 2. how uncomfortable and challenging it can be for mothers to position a baby and breastfeed
- it wasn’t hands on, I am a student learning from home
- Infant stools, breastfeeding position, breast milk storage
- Our professor provided us with a model and I was able to see fake equivalents to infant’s poop at different stages. We also had sample electric pumps to try to use.
- I learned how breast pumps work and how much time/energy it might take; I learned way more about infant handling than I knew in the past, I learned how different feeding positions might be better for women with different types of bodies
- what baby’s poop will look like and not be alarmed & how the pump works
- 1. I had no idea about how to position a baby for breastfeeding but I feel much more confident about it. 2. I now understand the signs of proper latching, hunger cues, etc. 3. I feel much more knowledgeable of the benefits and contraindications.
- Colostrum vs foremilk vs hindmilk appear differently in color and opacity. A breast can be cupped via a U or a C shape to protrude the nipple when putting the breast in baby’s mouth. There are several different positions that a baby can be held in during breastfeeding depending on mom and baby. For moms who have a C section or have twins, they may prefer to hold the baby/babies in the football hold.
- Visual, real life, tangible representation of these components was helpful
- Understanding more of the benefits of breastfeeding. Learning about barriers/contraindications to breastfeeding. Using an electric pump was neat but we handed it around the class without a proper demonstration on how to start it.
- how to position baby for different feeding positions, how infant stool changes in first week of life, how to work breast pump
- I learned more breastfeeding positions and how to hold the breast to get the baby to latch
• Insights I have gained from the hands-on portion of the breastfeeding education program are the different positioning techniques of the infant during breastfeeding and how to measure the breast to determine the flange size needed. Those are two things I learned that I previously did not know about. I have always used the same positioning when I feed babies not realizing there were other techniques taught to mothers for better comfort. I also thought that mothers used the same size flange to breast pump, however after learning how to measure for a mother’s breast it makes sense how necessary that would be.
• I gained experience demonstrating the different breastfeeding positions and working a breast pump.
• Child positioning, different breast types
• How to determine flange size and what the different poops look like based on milk
• I learned how to hold the bottle because human milk is thinner than formula. I also learned the different positioning techniques.
• I learned how to measure a nipple, what mastitis looks like, and correct positioning of baby feeding
• Positions & feeding angles
• Appropriate milk volume, infant stomach size, different nipple appearance
• Infant stomach size
• Positions, how long you should do it
• Know correct breast shield size, infant stomach size.
• I feel more comfortable with positioning the infant for breastfeeding. I feel more comfortable with positioning the infant for breastfeeding.
APPENDIX J

REFLECTIONS ITEM 32
Reflections responses questionnaire item 32

What have you experienced during the hands-on learning modules that you feel still needs more attention or follow-up practice?

Responses:
- interventions for complications or infections that can happen with BF
- I think I need to practice more with latching with a baby and the different hold positions.
- Being able to actually help to latch a child is not something that I would be able to do. I would need a lot more practice in actually seeing it be done on multiple different breast sizes and shapes and different infants.
- I feel like I would need more experience talking through problems with moms.
- I feel like I would need more experience talking through problems with moms.
- Barriers to breastfeeding that come with personal choices from the mother; paternal impact on breastfeeding rates and diet
- More of the individual care for mothers (flat nipples, child issues with latching, etc.)
- actual hands on experience
- what latching looks like
- I’d like to learn more about baby handling as I don’t have much experience/confidence in it
- how to hold the baby correctly, positioning of bottle, how to know if the baby is able to get all the milk produced and when to slow them down
- Proper nipple shield sizing
- I think that one of the important experiences was how to hold the baby. Having more practice with this will be crucial if latching strategies are to be successful. If the baby is not held correctly or comfortably, it will be challenging to engage the baby in successful breastfeeding. I also would like a follow-up on how pacifiers and bottle feeding play into the ability to breastfeed successfully.
- probably proper latching
- More details on proper latching, more images or videos of breastfeeding techniques. Common problems/concerns addressed by IBCLC.
- determining appropriate size for nipple shield
- I would need more experience with latching
- I feel I need more follow up practice on helping the mother with latching. It seems like a process that would take practice for some people and I would want to be more confident on that topic.
- I think the experience was heavily focused on breastfeeding and there should have been information on bottle feeding and formula content for mother who cannot breastfeed and do not have the option for donor milk.
- Correct positioning
- Being completely comfortable with showing a mother the use of the breast pump
- I think I need more practice with how to work the pumps and how to find the right pump size.
- No
- I need more follow-up on how to put together and maneuver a breast pump
- Pumping possibly
- Maybe how to work a breast pump.
- Educating new mothers
- Positions
- I’m a pro
- I need more help with learning how to use the breast pump.
APPENDIX K

REFLECTIONS ITEM 33
Reflections responses questionnaire item 33

How comfortable are you taking what you learned during the hands-on modules to outside of the classroom? Why or why not?

Responses:

- Not very comfortable, a professional would be best at it
- I am comfortable to talk to my close peers, family and friends about this. Once I have more knowledge and experience, I can then use it on patients.
- While I now know more information on breastfeeding I don’t think that I would specifically be comfortable at this time fully teaching someone about breastfeeding. While I can give them a good surface level education being able to answer specific questions is something I would not be able to do as some of the questions we asked in class went unanswered.
- I am not comfortable because I would like to have more problem solving experience beforehand. I think I need multiple exposures to material and content before I feel confident to share with others.
- Not very - the questions being asked during class were not addressed completely and were frequently met with “I dont know” which makes me feel unprepared to discuss real life situations with patients outside of the classroom
- I am comfortable educating mothers the basics of breastfeeding and why it is important. I am not comfortable teaching mothers specific because they need more specialized care that I cannot provide, nor have the knowledge.
- fairly comfortable as I have a lot of solid information to share
- I am somewhat comfortable. I know there is a lot more I should learn first.
- Relatively comfortable, but I would say that I’m still not an expert at breastfeeding. I would still have to review the material before teaching it to others.
- Moderately comfortable. I still want more practice, but I would be much more willing to try that now
- Not comfortable with how to hold the baby and position the bottle because what if the baby moves? what if I was holding the baby wrong? Needs more guidance on if my poster is correct
- Much more confident, but not confident enough to talk with someone about it unless I had supervision for the first few times so those interactions served more as hands-on practice
- I am relatively comfortable. I am very happy to have the knowledge, however I don’t think it would sufficient enough nor within the dietitian’s scope to implement some of this on moms without more extensive training. I would love to take a course or obtain a certification so that I could perform more of the hand’s on stuff during my clinical practice.
- I think I just need practice in an outpatient setting discussing these topics.
- Very comfortable.
• I feel very comfortable applying this content outside of the classroom. The hands-on experiences helped me feel confident in my knowledge of breastfeeding positions and breast pumping.
• I feel moderately comfortable
• I would only be somewhat comfortable taking what I’ve learned during the hands-on modules outside of the classroom because I feel some of the techniques were easier than others.
• I am very comfortable. If I had to demonstrate a class I think it would be successful. What I learned is fruitful information I can provide to friend, family, and future clients/patients.
• Not 100% confident. Need more practice
• Very comfortable. I think it was very informative and I felt very comfortable asking any questions to get better insight
• I learned a lot from this education but don’t feel ready to educate someone. I think I definitely know the basics.
• I’m comfortable taking the modules outside the classroom, due to the reintroduction to breastfeeding from personal experience
• I am pretty comfortable with most parts of the presentation except on how to work the breast pump
• Very comfortable, it was very informative
• I am pretty confident in everything except using a breast pump.
• Very comfortable
• Comfortable
• I’m very comfortable.
• Not very comfortable because I need more practice.
APPENDIX L

REFLECTIONS ITEM 34
Reflections responses questionnaire item 34

Please reflect on your experience with the hands-on portion of this breastfeeding education program. What did you like about the experience?

Responses:

- I liked getting hands on experience and being able to visually see and understand techniques, pumps, milks, and positions.
- I liked this part a lot as it was hands-on and allowed us to see different models, and practice our skills. It was fun to apply the knowledge in real-time and modeling what proper latching should look like.
- I think it was neat to have visuals. I like the hand on stuff and getting to see things and move things around lets you engrain things into your head much better than just when being lectured.
- I liked having props, I felt like it made me feel more comfortable with the content. I think getting to hold the items allowed me to have a more comfortable perception of breastfeeding.
- The hands-on experience was fairly interactive and interesting to see the equipment required to breastfeed successfully.
- It humbled me. I can begin to understand the difficulties mothers face when breastfeeding. Also, I can see why mothers would be discouraged and tired.
- I liked the experience being hands on.
- I liked the demonstrations with the physical objects (such as a fake baby, breast pump, dirty underwear, etc.) Our professor showed us how to properly handle a baby, and that was very helpful.
- Seeing that materials that are actually used, having a doll as an example, etc. made the whole process feel more tangible since I haven’t experienced with friends or family. I like that I know what goes into latching, feeding, pumping, etc. now.
- as I visual learner, I loved the hands-on portion I especially liked the egg portion (baby’s stomach), how to use the pump machine, and the diapers. I was never exposed to these so it’s nice to know what to expect from the babies!
- It was really helpful! I’m a visual learner, so that was a great add that helped me to understand things better.
- I really like that we had realistic props to look at. The stool in the diapers was particularly helpful because I had not seen this prior.
- I like the life-size, real representations of these aspects, rather than just looking at them on a powerpoint slide. It helps me to feel much more competent in talking about it.
- Holding the “babies” and working with the different positions gave us an understanding of what the positions feel like.
- I liked the variety of materials used for the hands-on experiences. The visual and kinesthetic elements made this material more memorable and allowed for practice in life-like settings.
- I liked the hands on experience, but I got more experience by babysitting infants out side of this
• I liked that I was able to see all the necessary things involved in breastfeeding because I am a visual learner. I have seen breast pumps before, however I have never learned how to use them until now. I also liked having the infant size dolls to practice the positioning techniques because it is much different watching someone do it verses doing it myself.
• I enjoyed the props with educational content cards.
• Holding the baby was great practice and makes it feel more “real”
• I liked having tangible visuals and being able to be corrected if I was doing something wrong like the positioning of the baby or bottle
• I liked this because I am a hands-on learner. I want to be able to take the things I learned and use them in my practice and future personal life. I never got to do anything like this in my undergrad program.
• The hands on, the models of breast and the nipples, and flange size
• I really enjoyed all hands-on portions of the program, as it really brought everything I learned in the PowerPoint to a full circle. It helped me realize the many problems that breastfeeding women can go through such as mastitis.
• It being hands on in general. It is much easier to learn when you are able to hold something and perform tasks
• I think it was helpful to see the products and models. It helps connect the information we learn.
• Very informative
• Awesome experience
• The expose and importance of breastfeeding education
• I liked seeing a visual presentation of everything.
APPENDIX M

REFLECTIONS ITEM 35
Questionnaire item 35

What could be done differently or improved in the future?

Responses

- Nothing, I felt it was very informal
- I think breaking up into groups and practicing on each other, counseling one another could help
- I would have liked to hear personal stories about people’s breastfeeding journey as there are a lot of confounding factors that can help and hinder a mother during this time. I also think I would have like getting a bit more time to work with the hands on things like having specific activities or something that went with it rather than it being just supplemental to the lecture.
- I think adding more case study questions could benefit students to help us think more critically through problems mothers may encounter. I think this would help us put our knowledge into practice and gain more confidence with the material.
- It would behoove the teacher to be more knowledgeable about real-life complications/questions clients/patients will ask
- Have a lactation consultant come and teach us more in-depth about lactation. Policies to encourage lactation and how to implement them in a system.
- I wish I could see the process with an actual mother and baby besides a doll
- I liked the program, I don’t think I would change it.
- I thought the modules were great.
- I think it would be interesting to see an animated or real demonstration video of breastfeeding from start to finish. Providing the pretend doll and pretend breast were helpful, but in real life we will need to have seen what it should look like to be helpful practitioners.
- Practice consult sessions - one person pretends they are the dietitian, the other pretends they are the breastfeeding mother, to help with practicing communicating the information and with visual representation.
- I think elaborating on the common issues faced by women trying to breastfeed. Example, we learned women with a flatter nipple have issues and may need to use a shield. We weren’t shown what the shield looks like.
- Maybe watched a video of a nutrition professional counseling a breastfeeding women to see the direct application
- I can’t think of anything that could be done differently because I felt the modules were very informative and the hands-on experience was useful to my knowledge.
- More info on the pumps
- I think everything went very well. In the future maybe having handouts that could be beneficial to providers and patients to really show the bullet points
- Nothing
- I would have liked to receive the handouts in color. The pages were not very clear in black and white.
- More varied hands on activities, more in depth on pumping
- I think maybe talking/lectureing while looking at the models made it hard to focus on one or the other.
- ?
- More hands on positioning
- It’s perfect
- I think I just need more practice
APPENDIX N

HUMAN USE APPROVAL LETTER
MEMORANDUM

TO: Dr. Simone Camel & Madelyn Sesser (Student Researcher)

FROM: Dr. Walter Rubitz, Professor/Elva L. Smith Endowed Professor rubitz@latech.edu

SUBJECT: Human Use Committee - Review DECISION

DATE: August 26, 2022

In order to facilitate your project, an EXPEDITED REVIEW has been completed for your proposed study:

HUC No.: 22-111

TITLE: A New Education Strategy for Building Future Breastfeeding Educators

HUC DECISION: EXEMPT FROM FULL REVIEW

According to the Code of Federal Regulations Title 45 Part 46, your research protocol is determined to be exempt from full review under the following exemption category(s):

It has been determined that your study meets the requirements for exemption 45 CFR §46.104(d) (2) (i):

(2) Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:

(i) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects;

Additional Comments from HUC IRB Reviewer: The study design involves pre- and post-interview questionnaires with instruction provided between the questionnaires. It does not involve any care procedures resulting in physical contact or intervention. Educational modules are delivered through a learning management system consisting of standardized national and state resources. Responses are confidential and reported only in the aggregate. Participants are anonymized through a self-generated identification code that is used only to link the pre- and post-test responses.

Thank you for submitting your Human Use Proposal to Louisiana Tech's Institutional Review Board.