BREASTFEEDING EDUCATION IN UNIVERSITY NURSING PROGRAMS

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THESIS

Submitted as partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Nursing Science
in the Graduate College of the
University of Illinois at Chicago, 2004

Chicago, Illinois

THE UNIVERSITY OF ILLINOIS AT CHICAGO
Graduate College
CERTIFICATE OF APPROVAL

February 26, 2004

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entitled BREASTFEEDING EDUCATION IN UNIVERSITY NURSING PROGRAMS

be accepted in partial fulfillment of the requirements for the degree of
DOCTOR OF PHILOSOPHY

I concur with this recommendation

Recommendation concurred in:

Members of
Thesis or
Dissertation
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ACKNOWLEDGMENTS

I would like to recognize my committee members, Dr. Linda Cassata, Dr. Pamela Hill, Dr. Carole Kenner, Dr. Nancy Lowe, Dr. Joyce Roberts, and my advisor and chairperson, Dr. Kathleen Norr, for their individual contributions and collective support. From each of you I received words of encouragement, options for direction, and respect for my opinions and goals. I graciously thank you.

I would also like to acknowledge the National League for Nursing, Foundation for Nursing Education, which provided the Promise of Nursing Faculty Award to support my final year of education and my dissertation research.

A special thanks to Kristin Rankin at the Center for Advancement of Distance Education (CADE) in the School of Public Health at the University of Illinois at Chicago. Your attention to detail and "we can do it" attitude were greatly appreciated.

Finally, I express my gratitude to the deans, directors, and faculty of the nursing programs who participated in this study and to the individual nursing students who took time out of their busy schedules to complete my survey. Your responses are the catalyst for educational change in nursing.

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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF TABLES (continued)

TABLE PAGE

LIST OF TABLES (continued)

LIST OF FIGURES

SUMMARY

Past goals, future goals, and current statistics regarding breastfeeding rates in the United States support the need for university programs to address the topic of breastfeeding education. Currently, exclusive breastfeeding rates are 46.3% initiation and 17.2% continuation at 6 months of age, well below the goals of 75% initiation and 50% continuation. Nurses are the largest group of health care professionals, and research has shown that their care influences women's breastfeeding experience. The literature informs us that although nurses most often have positive attitudes towards breastfeeding, they lack knowledge about breastfeeding support.

The purpose of this study was to describe the current state of breastfeeding education in university nursing programs, determine the knowledge, attitudes, and self-efficacy scores of senior nursing students, and identify factors associated with higher knowledge and attitude scores. Albert Bandura's Social cognitive theory, as applied to behavioral change, provided the theoretical framework for the study.

Results from a 78-item Web-based national survey of 385 senior nursing students from 36 randomly selected U.S. baccalaureate nursing programs were analyzed. The use of traditional modalities for teaching and evaluating breastfeeding knowledge (lecture by nursing faculty, use of a textbook, written test questions) prevailed. Despite low knowledge scores and supportive attitude scores students were confident in their ability to support breastfeeding. Personal breastfeeding experience explained the greatest variance for both knowledge and attitude scores while program characteristics explained the least. Instructional characteristics associated with higher knowledge and attitude scores were

feedback to students on their breastfeeding support skills and student utilization of social supports such as LaLeche League.

Recommendations include structured feedback from faculty, such as evaluation of the nursing student's performance on a standardized breastfeeding support simulation. Also, didactic content and clinical experience should model the use of breastfeeding social supports.

I. INTRODUCTION

A. Background

Past goals, future goals, and current statistics regarding breastfeeding rates in the United States support the need for university nursing programs to address the topic of breastfeeding education. The United States Department of Health and Human Services (USDHHS, 2000) identified as one of its goals for the Healthy People 2000 objectives a 75% breastfeeding initiation rate and a 50% breastfeeding continuation rate at 6 months of age. The current Healthy People 2010 (USDHHS, 2000) goals for breastfeeding add an additional target of at least a 25% breastfeeding continuation rate at 1 year of age. The American Academy of Pediatrics (AAP, 1997) recommends breastfeeding solely for about the first 6 months, breastfeeding in combination with solid food through at least 12 months, and breastfeeding thereafter for as long as mutually desired by the mother and baby. The Association of Women's Health, Obstetric, and Neonatal Nurses (AWHONN, 1999) also supports breastfeeding as the optimal method of infant feeding.

Despite this support, the most recently available U.S. statistic for breastfeeding rates fall below past and current goals: 69.5% of mothers initiate breastfeeding, and 32.5% continue to breastfeed at 6 months (Ross Products, 2002). Breastfeeding rates at one year were not reported in Ryan, Wenjun, and Acosta's (2002) publication of Ross Laboratories' study. Ross Products, a U.S.-based formula company, gathers national breastfeeding data as part of their marketing studies. Ross bases these rates on the firm's own definition of a "breastfeeding baby" which includes any newborn who has received a "sip" or more of human milk before hospital discharge. Currently, Ross reports exclusive breastfeeding rates as 46.3% initiation and 17.2% continuation at 6 months of age.

Exclusive breastfeeding is associated with the lowest infant illness rates for diarrhea, cough or wheeze, and vomiting (Raisler, Alexander, & O'Campo, 1999).

In an effort to reach these breastfeeding rate goals, a collaborative partnership of over 35 organizations combined to form the United States Breastfeeding Committee and created a document titled "Breastfeeding in the United States: A National Agenda" (USDHHS, 2001). This document describes a strategic plan for protecting, promoting and supporting breastfeeding in the United States. Concurrently, the surgeon general released the *Health and Human Services Blueprint for Action on Breastfeeding* (USDHHS, 2000). The *Blueprint* is a comprehensive framework for increasing breastfeeding rates and promoting effective breastfeeding practices. The ideas these two government documents describe a synergistic effort for breastfeeding promotion and identify the health care professionals' basic education in breastfeeding as a key strategy for attaining these goals.

Several organizations support the inclusion of effective lactation education in nursing program curricula. In 1998, the task force at the American Association of Colleges of Nursing (AACN) compiled *The Essentials of Baccalaureate Education for Professional Nursing Practice*. This document was created to provide direction for professional nursing programs. In university nursing programs, the description of one aspect of the graduating nurse's core knowledge is that of health promotion, risk reduction, and disease prevention which supports the argument for breastfeeding education. Breastfeeding promotes maternal and child health, reduces maternal and infant risks, and contributes to the prevention of maternal and childhood disease (Lawrence, 1997). In addition to academic leadership's general support for breastfeeding

education in all university nursing program curricula, the United States government and the international community have created specific documents for this goal.

The U.S. Department of Health and Human Services *Blueprint for Action on Breastfeeding* states (USDHHS, 2000), "culturally appropriate training for breastfeeding should be integrated into the curricula of health profession schools" (p. 14). More specific expert recommendations can be found in the 1989 joint statement from the World Health Organization and United Nation's International Children's Emergency Fund (WHO/UNICEF), "Protecting, Promoting, and Supporting Breastfeeding." For the section on essential messages about breastfeeding, see Appendix A. To help achieve these goals, "The Ten Steps to Successful Breastfeeding" were developed. (See Appendix B for a copy of the "Ten Steps").

B. Statement of the Problem

Currently, fewer than half of the babies born in the United States are given the opportunity to breastfeed exclusively. Although the scientifically sound claim that breastfeeding is the optimal choice for infant feeding is prevalent, there is little support for initiating or continuing to breastfeed. This support should come from health care professionals, and nurses comprise the largest group. To date, studies show that nurses' knowledge about breastfeeding and attitudes toward breastfeeding indicate that what they know is inadequate for providing real support. Therefore, the education that professional nurses' receive about breastfeeding needs to be examined.

C. Purpose of the Study

The overall purpose of this study is to identify exemplary methods for teaching breastfeeding content. For the largest group of health care professionals to make an

impact on breastfeeding initiation and continuation rates, nursing students need to acquire accurate knowledge about breastfeeding and develop effective breastfeeding skills. As a step in achieving this goal, this study examines how breastfeeding is taught in baccalaureate nursing programs as well as the knowledge and attitudes of senior students.

A survey is used for data collection to reach a number of respondents who have had a variety of educational experiences. The focus is on the outcome of instruction rather than projected curriculum objectives. The results of the study provide a description of breastfeeding education in U.S. university nursing programs from the student's perspective.

Senior nursing students are the population of interest because they represent the culmination of basic nursing education and reflect their respective school's curricular philosophy. Practicing registered nurses and those completing a bachelor of science in nursing degrees have had other sources of breastfeeding education, such as employer-sponsored in-service programs and professional continuing education programs. Identification of an exemplary method for teaching breastfeeding content in nursing programs provides a framework for an effective educational approach to this topic.

Previous research on breastfeeding education is limited in two ways: first, there have been very few studies that include methods for teaching breastfeeding, and second, the subjects in the studies so far have had limited geographic distribution. Despite these problems, studies to date have demonstrated that breastfeeding content in nursing programs is less than adequate. This research provides a comprehensive, theory-based study of breastfeeding education using a national sample.

D. Significance of the Problem

The problem of the disparity between scientific knowledge that "breast is best" and the appropriate professional nursing support for promotion, initiation, and continuation of breastfeeding significantly compromises the optimal health and well being of infants and mothers. Although factors such as uninformed opinions from family and friends, restrictive work situations, and successful formula-marketing campaigns may negatively influence a mother's decision to breastfeed, lack of scientifically based, consistent information and support from nursing professionals should not contribute to the low rates of breastfeeding initiation and continuation in the United States.

This study will be significant for professional nursing education because it will provide a view of how nursing education may vary on one topic (breastfeeding promotion) across programs. This study will also be significant for nursing science because it will provide an indication of the degree to which breastfeeding support is considered a part of nursing practice. Most significant is that the results of this study will provide the information needed to encourage effective breastfeeding education in university nursing programs and ultimately benefit the future health of mothers, babies, and their families.

E. The Research Questions

1) What are the breastfeeding educational experiences of U.S. baccalaureate nursing students in their senior year as measured by an online survey?

2) What are the breastfeeding knowledge and attitudes of these students as measured by an online survey?

3) What factors affect senior undergraduate nursing students' breastfeeding knowledge and attitude scores?

a) What are the effects of student characteristics on knowledge and attitude scores?

b) What are the effects of instructional characteristics on knowledge and attitude scores?

c) What are the effects of program characteristics on knowledge and attitude scores?

d) What are the combined effects of these characteristics on knowledge and attitude scores?

4) Do breastfeeding knowledge and attitude scores correlate with the student's evaluation of the program with regard to breastfeeding education or the student's evaluation of their own confidence in their ability to provide breastfeeding support?

The answers to these questions will provide a description of the current status of U.S. baccalaureate education with regard to breastfeeding and the effectiveness of this education as measured by knowledge and attitude scores. A closer look at the data will provide the characteristics that can best explain the variance in scores and on further examination, significant instructional characteristics, if present, will be identified.

F. Definition of Terms

Definitions of the key terms of the study are listed below:

information – the communication or reception of knowledge

knowledge – the fact or condition of knowing something with familiarity gained through experience or association

attitude – a mental position, feeling, or emotion with regard to a fact or state

self-efficacy – an individual's perceived ability to perform a specific behavior which serves as a predictor of performance; this ability is developed through practice and feedback (Bandura, 1986)

confidence – belief that one will act in a right, proper, or effective way

practice – to do or perform often; to perform or work at repeatedly so as to become proficient

feedback – the transmission of evaluative or corrective information to the original source about an action, event, or process

personal breastfeeding intent - actual or planned involvement with breastfeeding

social skills – the ability to use one's knowledge effectively to form cooperative and interdependent relationships with others of one's kind

self-regulation skills – the ability to use one's knowledge to effectively execute an authoritative rule

modeling – to construct or fashion in imitation

social supports – like-minded individuals within groups who provide confidence and approval

identify – to establish the distinguishing characteristics of something

enlist – to secure the support and aid of

II. CONCEPTUAL FRAMEWORK AND RELATED LITERATURE

A. Conceptual Framework

Social learning theory has been widely used and shown to be effective in a variety of programs in which behavioral change is desired (Montgomery, 2002; Murray-Johnson et al., 2000-2001; Stewart, DiClemente, & Ross, 1999). Social learning theory as described by psychologist Albert Bandura was developed in the early 1960s as an outgrowth of Piaget's developmental modeling theory. "Virtually all learning phenomena resulting from direct experience occur on a vicarious basis by observing other people's behavior and its consequences for them" (Bandura, 1977, p. 12). Bandura viewed his theory as one that would be useful because of its ability to predict behavior based on the presence (or lack of) examples or models. This vicarious modeling provided faster and safer learning than having to master behavior through trial and error. With regard to breastfeeding, modeling examples were pervasive until the development and subsequent marketing of infant formula. Now many new mothers and their nurses rely on trial and error (Patton, Beaman, Csar, & Lewinski, 1996). Moreover, they lack adequate modeling that would promote vicarious learning.

In addition to observing the modeling of breastfeeding, parents also need to know the consequences of their actions if they choose not to breastfeed. "Whether or not people choose to perform what they have learned observationally is strongly influenced by the consequences of such actions" (Bandura, 1977, p.38). Parents observe infants' formula feedings and see desirable consequences for these actions with the babies' growth and development. Parents observe their health care providers talk about the benefits of breastfeeding, such as the breastfed baby having fewer colds and ear infections. Health

care providers do not inform parents that formula feeding will increase the risk that their babies will have more colds and ear infections. Instead, formula feeding outcomes (more colds/more ear infections) are described conversely as the benefits of breastfeeding (fewer colds/fewer ear infections). In this context, parents who choose formula are choosing standard infant nutrition for their baby instead of premium breast milk. With breastfeeding as the norm, parents who choose formula for their infant would be choosing substandard infant nutrition that actually has associated health risks. Philipp, Merewood, and O'Brien (2001) commented on the physicians role in the promotion of breastfeeding: "we all worry that breastfeeding advocacy may make new parents feel guilty at a particularly vulnerable and sensitive time. Meanwhile, mothers and fathers look to the health care community for our wisdom and advice" (p. 586). The health care community is sending a mixed message that may be a result of their balancing economic business concerns (keeping the customer happy) with evidence-based practice and as a result parents are unable to recognize the consequences of not breastfeeding.

Low U.S. breastfeeding initiation and continuation rates may be due to this lack of modeling and unclear behavioral consequences. For professionals, there are few, if any, obvious consequences for those who do not overtly promote breastfeeding. With no tangible consequences, how is breastfeeding education promoted?

Bandura (1986) did not neglect the impact of cognition on behavior. As his work evolved, he renamed his theory *social cognitive theory* and, he posits, cognition mediates behavior. Behavior is the outcome of the interaction between cognition, modeling, practice and feedback which develops self-efficacy, and the ability to identify and enlist social supports in the environment. Health care professionals can be given the cognitive

rationale for the promotion of breastfeeding as a worthwhile endeavor and this may support their behavior to promote breastfeeding despite the lack of consequences for their behavior. By instilling in professionals the belief that they can influence others to breastfeed and instructing them in how to assist mothers in breastfeeding skills and how to provide support to mothers to persevere through any setbacks, success can be achieved.

Along with cognitive information, modeling is an excellent method to develop the social and self-regulative skills that are needed to translate information into action (Bandura, 1994). Nursing students who observe their instructors and other health care professionals practice evidence-based breastfeeding support will have this experience to reflect upon when individually challenged by a less informed colleague or when faced with a breastfeeding situation that tests their creativity and skill. As Bandura (1977) states, "After the capacity for observational learning has fully developed, one cannot keep people from learning what they have seen" (p.38). By immersing students in an environment where breastfeeding is the norm and demonstrating how to promote and teach the skill of breastfeeding to mothers, knowledge will be more easily transformed into behavior.

A third component for an effective behavioral program (Bandura, 1994) is skill enhancement to develop resilient self-efficacy, which is the perceived ability to perform a specific behavior (Bandura, 1986). Providing opportunities for guided practice and consistent corrective feedback will help to initiate the development of self-efficacy. Nursing faculty need to plan clinical time for student practice and return demonstration with feedback. Breastfeeding is a learned skill for the mother, baby, and professional.

The fourth and final component is that of identifying and enlisting social supports for the desired change. These activities provide the social sanctions and self-sanctions that will give the individual the requisite consequences for maintaining their behavior. Support organizations, such as La Leche League, International Lactation Consultants Association (ILCA), and the World Health Organization (WHO) may provide the authoritative influence, or sanctions, needed to maintain the behavior of effective breastfeeding support.

This program for behavioral change, which includes providing information, modeling experiences, ensuring practice opportunities with feedback, and identifying access to social supports to effect behavioral change (Bandura, 1994), can be better understood by examining Bandura's basic theory of human behavior (1986). Bandura describes this phenomenon as the simultaneous interaction between three characteristics: the person, the environment, and the behavior itself as shown schematically in Figure 1. The logic of this explanation is clear and simple in diagram but complex in contextual meaning because each concept is in an interactive relationship. Advantages to using this approach include a comprehensive theory with concepts suited to the nursing profession (person, environment, and behavior) and a framework that will guide the study of complex human events.

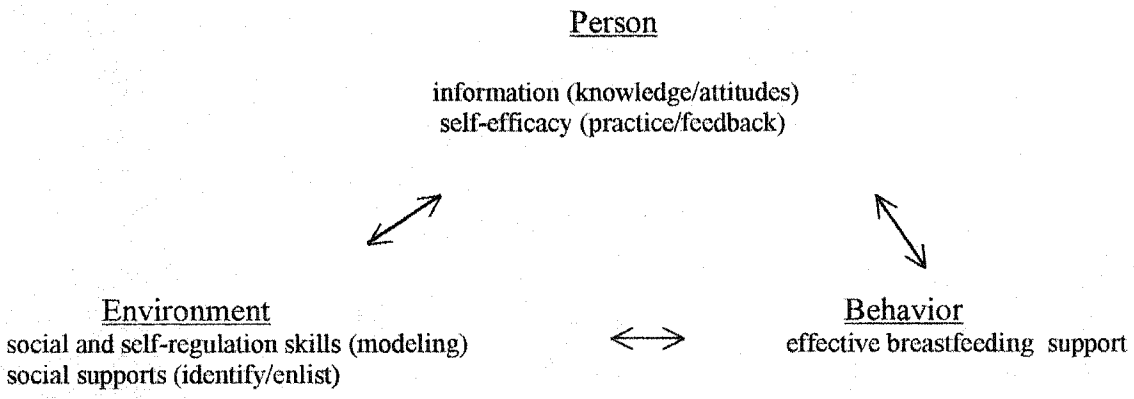


Figure 1 Diagrammatic representation of Bandura's social cognitive theory with the components for effective behavioral change as applied to breastfeeding education.

B. Review of the Related Literature

A thorough review of the relevant literature was conducted using OVID, an internationally recognized service for medical information searches and specifically requesting MEDLINE (health publications from the National Library of Medicine from 1966 to present); CINAHL (a database covering nursing and allied health professionals publications from 1982 to present); and dissertation abstract searches from 1997 to present for the key words breastfeeding education, breastfeeding knowledge, and breastfeeding attitudes. Examination of the literature was organized by looking at the (1) study of breastfeeding education in health care professions other than nursing, (2) studies regarding breastfeeding education in nursing curricula, and finally (3) studies conducted to ascertain nurses' knowledge and attitudes about breastfeeding.

1. The study of breastfeeding education

Outside of the nursing profession, there are several studies that examined breastfeeding education in health care professional programs. All of these studies used a convenience sample and voluntary completion of a written survey. In general, the

findings are of interest because they indicate a deficiency in breastfeeding knowledge and educational experiences for physicians and nutritionists despite those professionals' supportive attitudes toward breastfeeding. The lack of any organizing theoretical framework detracts from these findings by not providing a context for interpretation and further direction of the research problem.

One of three studies published in 1995 surveyed 29 pediatric house staff physicians regarding their breastfeeding attitudes, knowledge, and self-efficacy (Williams & Hammer, 1995). The staff had overall supportive attitudes toward breastfeeding but knowledge deficits about breastfeeding principles, and only 14% identified themselves as confident in their management of common breastfeeding concerns. One question was asked that referred to breastfeeding education: "In your continuity clinic, approximately how many breastfed infants have you followed?" However, the authors did not refer to respondents' answers to this question in their publication. Although Williams and Hammer did not measure or discuss the pediatric residents' opportunities for practice of breastfeeding management or the feedback they received, if one thinks in terms of Bandura's framework, there were probably multiple opportunities for practice and feedback on breastfeeding. If these physicians were unable to take advantage of opportunities for practice and feedback because of a lack of knowledge and modeling, their lack of self-efficacy was a correct reflection of their ineffective breastfeeding support, despite their positive attitudes toward breastfeeding. Measurement of the presence of these opportunities and how breastfeeding was taught to these residents could have provided insight into the cause of their deficiencies.

The American Academy of Pediatrics (AAP, 1995) conducted a survey using a random sample of practicing pediatricians who were fellows in the academy. They assessed attitudes, self-efficacy, and identification of international supports, specifically familiarity with "Ten Steps to Successful Breastfeeding" from the joint statement on breastfeeding developed by the World Health Organization/United Nations International Children's Emergency Fund (WHO/UNICEF, 1989). They also assessed respondents' attitudes towards the following statement: "Formula-fed babies are just as healthy as breastfed babies in the long run." Of the 1,133 respondents, only 38% disagreed with this statement. The majority were either undecided (27%) or agreed (34%) with the statement. This could indicate either a lack of scientific conviction towards breastfeeding or a problem with the question. Individual pediatricians may have interpreted the terms "healthy" and "long run" differently. Self-efficacy was high with 77% reporting feeling very confident or confident in managing common breastfeeding concerns. Awareness of social supports was low; 72% of respondents were not familiar with WHO/UNICEF statements. Breastfeeding knowledge was not assessed directly; however 86% of respondents were interested in receiving further education in breastfeeding management. Use of Bandura's entire behavioral change framework, including measuring breastfeeding knowledge and the availability for modeling along with practice and feedback opportunities, could have provided the information needed to determine the next step in supporting these pediatricians so that they could then support their patients.

Lastly, results from a large national survey of physicians (Freed et al., 1995) assessed breastfeeding knowledge, attitudes, training, and experience. This survey included an assessment of how the physicians were trained. Most received at least one

lecture, but fewer than 25% recalled a clinical episode that included breastfeeding. Of the sample, 70% believed they had received less than adequate preparation to support breastfeeding. Knowledge and attitude assessment indicated a lack of knowledge despite positive attitudes. The 3,275 respondents gave a clear indication that there were marked deficiencies in breastfeeding education for physicians.

More recently, Guise, and Freed (2000) conducted a smaller study looking at resident physicians' knowledge of infant growth. The residents in three North Carolina hospitals were evaluated by a self-administered survey about their knowledge of a breastfeeding infant's growth, although the study did not evaluate the adequacy of their breastfeeding education or how breastfeeding education had been conducted. Only 5% of the 107 residents knew that breastfeeding infants grow at a slower rate than formula-fed infants after 4 months of age. This study could have provided a better understanding of this knowledge deficit if some additional data on breastfeeding education experiences had been gathered. Did the physicians learn about infant growth only from the growth charts provided by the formula companies and then manage the infant's apparent lack of growth by advising formula supplementation?

Prior to these formal studies about physicians' breastfeeding education, the *Journal of Human Lactation* published a commentary by Newton (1992) who based his thoughts on a non-random survey of obstetric and pediatric departments within U.S. medical schools. He charged that the deficiencies in these schools' educational content on breastfeeding were the result of disorganization, misinformation, and lack of motivation. Of the 127 departments surveyed, he found 55% offered no breastfeeding lectures to medical students, and 30% offered no breastfeeding lectures to residents. A

helpful addition to this study would have been a small selective survey of the students and residents of these programs. That data could have identified other possible sources of breastfeeding education and given an indication as to how well prepared the student felt.

The key to the disorganization, misinformation, and lack of motivation toward breastfeeding education in medical schools that Newton discussed could be attributed to the fact that no professional specialty had claimed responsibility for breastfeeding support. Until the volunteer network known as La Leche League International, founded in 1956, joined with others to develop the emerging specialty of the lactation consultant in 1985 (Spangler, 2000), the obstetrician supported the breastfeeding mother and managed any medical problems involving the breast and the pediatrician evaluated the baby's nutritional status and managed any medical problems with the infant. Often the preferred solution to a problem was to begin formula supplementation. Nutritionists and dieticians are currently determining their role in breastfeeding support. Figueroa's doctoral dissertation (2001) explored breastfeeding knowledge, attitudes, and training of nutritionists and dietitians. She explained that these professions had not yet established their role in counseling breastfeeding mothers, but once the role is defined, it must be reflected in the basic education curriculum. Among the 444 professional nutritionists and dieticians surveyed, positive attitudes prevailed, but the survey also revealed that in this profession, too, one could find incorrect breastfeeding information and inadequate breastfeeding training. Professional breastfeeding support requires that the professional have current knowledge of breastfeeding, positive attitudes, the ability to teach, and the

cognizance to make a referral when needed. With basic education, physicians, nurses, nutritionists, and dietitians can all positively contribute to the breastfeeding experience.

An exciting project between Wellstart International (San Diego, California), a private not-for profit organization, and the University of California, San Diego, began in 1994. From 14 years of experience and funding from the Department of Health and Human Services/Maternal and Child Health Bureau (DHHS/MCH), the *Lactation Management Curriculum* was developed. Now in its fourth edition (Wellstart International & University of California, San Diego, 1999), this comprehensive faculty guide provides more than 300 pages of objectives and content for three different levels of expertise for schools of medicine, nursing, and nutrition. The levels are awareness, generalist, and specialist. Awareness is "to be attained by all physicians, nurses, nutritionists/dieticians, and other related disciplines during their initial education. Those who do not go on to specialize in some aspect of perinatal care could stop at this level." (pp. 1-2). The summary of objectives for the awareness level can be found in Appendix C.

2. **Breastfeeding education in nursing curricula**

A broader curricular topic, education on women's health, was evaluated and summarized in the report titled *Women's Health in the Baccalaureate Nursing School Curriculum* (USDHHS, 2000). Five collaborating partners: the Division of Nursing, Bureau of Health Professions, Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services; the Office of the HRSA Senior Advisor for Women's Health; the Office of Research on Women's Health; the National Institute of Nursing Research; and the U.S. Public Health Service's Office on Women's Health

participated in this project. A survey was sent to the deans/directors of the 521 baccalaureate nursing education programs in the U.S. This study was modeled after the medical and dental schools' surveys and omitted questions about breastfeeding. "Nursing curricula, traditionally, have included didactic and clinical courses on maternity care and care of women during pregnancy, delivery, and postpartum as distinct parts of the curriculum. Therefore, many specific topics related to reproduction and pregnancy were not included in the survey instrument" (USDHHS, 2000, p. 15). It is unfortunate that assessment of education about lactation was assumed to be present in nursing curricula and was not considered relevant in this study that assessed nursing education regarding breast health, breast and ovarian cancer, contraception, sexuality, and cultural understanding.

Most of the research to describe how nurses have been educated to provide breastfeeding support is limited to asking students or clinicians if they have received this education and if they thought that it was sufficient. Two studies, however, provided greater detail. It is helpful to examine each of these studies in the context of social cognitive theory, and, more specifically, Bandura's model for behavioral change.

Freed, Clark, Harris, and Lowdermilk (1996) studied the methods and outcomes of breastfeeding instruction for 272 nursing students, noting the concepts of knowledge, attitudes, modeling, practice, and self-efficacy regarding breastfeeding. Only 25% of students reported receiving breastfeeding information during clinical experiences, with 93% of students reporting that this information had been presented during lectures. Modeling of breastfeeding was examined and 60% of students reported viewing videos and attending demonstrations. Extent of experience actually practicing breastfeeding

support was also examined and found to vary widely among students. Of those surveyed, only 25% had at least three or more clinical experiences with breastfeeding, and over 20% had none. The most striking finding was that although 90% of students thought that they were adequately prepared to instruct and support mothers in breastfeeding, basic breastfeeding knowledge as assessed by the survey, was found to be inaccurate. Although social cognitive theory was not overtly utilized in this study, Freed et al.'s findings support the idea that all components of the theory should be examined. Perhaps if they had asked about the feedback that the students received and found this to be lacking, they might have been able to explain why the students were confident in their misinformation.

Tschetter (2001) noted similar findings in her doctoral dissertation, "Graduating Nursing Students' Self-Efficacy Regarding Breastfeeding Management." Along with measuring self-efficacy, including practice and feedback about this practice, Tschetter's research included an assessment of breastfeeding knowledge and the use of modeling to form social and self-regulation skills. However, she did not look at breastfeeding attitudes or the identification and enlistment of social supports. Modeling, practice, and feedback were all found to be somewhat deficient. Half of the students reported observing someone assisting a mother with breastfeeding once or twice, almost 20% had never observed this, and the remaining 30% had observed this three to five or more times. A third of the students had never had the clinical experience of teaching breastfeeding skills to new mothers and 45% had taught these skills only once or twice. Nearly half of the students had never received feedback about their assistance with breastfeeding and 33% received feedback once or twice. Based upon a 70% correct score, the author

concluded that 2/3 of the 249 student nurses in the sample were knowledgeable about breastfeeding. As students' clinical experiences increased, self-efficacy increased. The author also found that there was no significant difference in self-efficacy based upon knowledge scores, indicating that high self-efficacy could be present with low knowledge; unfortunately, there were students who had self-confidence but who were only able to provide incorrect information. Higher self-efficacy was related to the student having received a greater amount of feedback. However, the type of feedback was not examined, and this could be a significant variable. If the students received positive verbal feedback on a random clinical scenario that required minimal assistance, they may have become overconfident in their overall breastfeeding-support skills.

One concept of Bandura's framework for behavioral change that was not a factor in many of the studies reviewed was that of identifying supports and enlisting these supports. While assessing nurses' knowledge of breastfeeding, Anderson and Geden (1991) did ask a question about the presence of written institutional policies for breastfeeding and the availability of lactation consultants. Most of the 293 respondents were aware of written policies for breastfeeding (73.8%) but did not have the availability of lactation consultants (86.6%). With regard to breastfeeding education, 69% of the respondents reported that they had not been taught or did not remember being taught breastfeeding management in their nursing programs.

The remaining four studies that briefly address breastfeeding education may indicate a trend of improvement in at least the presence of breastfeeding education, if not yet the effectiveness of that education. In Lewinski's 1992 survey of 88 nurses who worked with new mothers, fewer than 19% cited their basic professional education as a

source of breastfeeding information. Of the 230 nurse respondents in Patton and colleagues 1996 survey, 26% cited their basic professional education as a source of breastfeeding information. Register, Eren, Loudermilk, Hammond, and Tully (2000) reported that in a survey of 134 pediatric office nursing staff, 46% of the respondents answered that they had received breastfeeding information in their basic professional education. Lastly, Hellings, and Howe (2000) surveyed 405 nurse practitioners. Although 58.6% reported that their undergraduate nursing programs were the source of their information on breastfeeding, most (61.4%) felt "not at all" or "not very well" prepared by their undergraduate programs. Interestingly, 41.3% of these respondents felt that there had been little or no emphasis on breastfeeding during their nurse practitioner education, although this did vary with specialty. Family nurse practitioners felt least prepared in comparison with pediatric nurse practitioners followed by women's health care nurse practitioners, and finally certified nurse-midwives felt most prepared. Perhaps this indicates an assumption on the part of graduate nursing faculty that breastfeeding curriculum is addressed during undergraduate nursing, or it may reflect the availability of clinical opportunities for breastfeeding education.

Along with an increase in the presence of breastfeeding education in baccalaureate nursing programs, correct knowledge, supportive attitudes and effective facilitation of learning (modeling, practice, feedback, and utilization of social supports) will still be needed to adequately promote the behavior of effective breastfeeding education.

3. **Nurses' knowledge and attitudes about breastfeeding**

Crowder (1981) and Hayes (1981) were the first to publish studies about nurses' breastfeeding knowledge. Crowder found from the 53 maternal-newborn nurses

tested, their level of education correlated positively and their length of experience correlated negatively with knowledge scores. Hayes surveyed 203 hospital nurses and concluded that breastfeeding information provided to mothers may not be consistent among the staff and that information gained from professional education, work experience, and personal experience may not provide nurses with the knowledge needed to assist breastfeeding mothers.

Anderson and Geden (1991) developed an original tool to study nurses' knowledge about breastfeeding. After a content domain was established to cover in-hospital breastfeeding management, breastfeeding management when a health problem is present, postpartum anticipatory guidance, and anatomy, physiology, and nutrition, eleven experts evaluated the 20-item tool to establish content validity. A pilot study was not undertaken, but post data psychometric tests to establish internal consistency were completed. The Kuder-Richardson 21 was .53. This result was quite low but formula 21 underestimates reliability unless all questions have approximately the same level of difficulty (Waltz, Strickland, & Lenz, 1991). The difficulty indices reported for this tool ranged from 22.6 to 95.6. Thus, the degree of reliability for this tool was not clear. Six questions that had a discrimination index of less than .20 were dropped from analyses. Based upon 14 questions, a low mean knowledge score of 53.2% correct was demonstrated by the 293 nurse respondents (81.7% RNs, 18.3% LPNs).

A 1992 study by Lewinski also supported the findings that nurses lack breastfeeding knowledge. Of the 88 nurses surveyed who worked with new mothers, only 7 of 16 knowledge-based questions were answered correctly by at least 50% of the respondents. Only four questions in particular were answered correctly by more than 70%

of the respondents. Questions answered correctly included one question each on positioning, frequency of breastfeeding, infant suckling patterns, and importance of night feedings. Questions answered incorrectly included length of a feeding at the breast, milk production physiology, use of glucose water, and use of nipple shields. Lewinski established face validity of her 16-item tool with a panel of four nurses including a lactation consultant. Reliability of the tool prior to the study was not established; reliability was not reported on the data gathered. Establishing a degree of reliability would have provided stronger support for her findings.

Bernaix (2000) used Lewinski's Breastfeeding Survey Tool (1992) to evaluate breastfeeding knowledge when testing Ajzen and Fishbein's (1980) theory of reasoned action. This theory of reasoned action assumes that people consider the implications of their actions before deciding to act or not and that a person's intention to perform or not perform a behavior is the immediate determinant of that action. Bernaix found that attitudes and subjective norms such as personal life experiences, and education did predict intentions to support breastfeeding but, contrary to the theory, these intentions to support breastfeeding did not translate into actual breastfeeding support behavior. The best predictor of this supportive behavior was the nurses' knowledge of breastfeeding and her attitudes towards breastfeeding. Bernaix reported a 0.75 Cronbach's Alpha for Lewiniski's 16-item tool from the data obtained in her study. A more rigorous look at validity for this tool was not discussed.

Breastfeeding knowledge was found to be lacking in a study of 272 nursing students in 5 North Carolina programs (Freed, Clark, Harris, & Lowdermilk, 1996). The 15-item questionnaire was based upon a questionnaire developed to assess physicians'

breastfeeding knowledge (Freed et al., 1995). This survey was not developed to be a tool for the measurement of breastfeeding knowledge; instead, data from each question were presented and correlated with clinical or personal experience. Despite two of the four authors being nurses, several of the knowledge questions were more medically oriented. Asking the student nurse when he or she would tell a mother to stop breastfeeding in the case of mastitis, insufficient milk supply, or breast abscess may be assessing breastfeeding management in terms of medical management, but not in terms of nursing practice. Students may have responded to these questions based on what they had observed physicians telling their patients who were diagnosed and being treated for these conditions. A more appropriate use of this survey was in a study by Hellings and Howe (2000) where 405 nurse practitioners were the respondents. The majority of nurse practitioners answered correctly that a mother would not need to stop breastfeeding during mastitis or insufficient milk supply, but answered incorrectly that a mother would need to stop nursing with a breast abscess. Again, this finding may be more of an indication of the scope of practice rather than a valid assessment of the nurse practitioner's breastfeeding knowledge since nurse practitioners very likely manage mastitis and insufficient milk supply but most likely refer breast abscess for surgical evaluation and treatment.

A modification of the Nursing Education Pilot Questionnaire (Freed et al.,1996) was used in a study of 134 pediatric office nurses knowledge and attitudes about breastfeeding (Register, Eren, Lowdermilk, Hammond, & Tully, 2000). No validity or reliability testing was completed during the development of this 42-item survey. The

authors concluded from descriptive analysis that many of the nurses surveyed had incorrect information about breastfeeding.

The most recent study assessed nurses' breastfeeding knowledge (Tschetter, 2001). Tschetter examined 249 graduating nursing students' level of self-efficacy regarding breastfeeding management based upon Albert Bandura's theory of self-efficacy. A 57-item questionnaire, which included a 20-item Breastfeeding Knowledge Survey based upon Lewinski's Breastfeeding Survey Tool (1992) and the Nursing Education Pilot Questionnaire by Freed et al. (1996) was used. Tschetter did address content validity of her Breastfeeding Knowledge Survey by providing an item matrix with references supporting the answers to the survey knowledge questions although it was not clear if the domain of breastfeeding knowledge was adequately represented. Reliability was not reported. Based on a score of 70% correct, 2/3 of the students surveyed were considered knowledgeable about breastfeeding.

Most tools available for evaluating nurses' breastfeeding knowledge lack a discussion of the instrument's psychometric properties. Evaluation tools for nurses' attitudes towards breastfeeding do not offer clear psychometric support (Freed et al., 1996; Hellings & Howe, 2000; Register et al., 2000). While the authors of these studies refer to their methodology for data collection as surveys or questionnaires and not tools or instruments, the reader expects a degree of confidence in concept measurement. Reported findings such as "overall supportive attitudes" and "knowledge deficient" require substantiation.

Most studies find that health care professionals have positive attitudes toward breastfeeding (American Academy of Pediatrics, 1995; Bernaix, 2000; Figueroa, 2001;

Freed et al., 1995; Freed et al., 1996; Hellings & Howe, 2000; Patton et al. 1996; Williams and Hammer, 1995). However, Barnett, Sienkiewicz, and Roholt (1995) as well as Register et al. (2000) concluded that many nurses had negative attitudes towards breastfeeding. In the first study the authors created an original tool to ascertain health care professional beliefs about breastfeeding. Two thousand, five hundred and eight respondents of whom 79% were nurses completed the 10-item survey. Nutritionists held the most positive beliefs and the nurse, the least positive. Validity of the survey was not discussed. An alpha of 0.64 was reported. Several of the belief statements such as items addressing the health of the breastfed infant, nipple confusion, maternal smoking, infant weight gain, and maternal milk supply could be measuring breastfeeding knowledge rather than attitudes and therefore may reflect a knowledge deficiency rather than a negative attitude toward breastfeeding.

The second study indicating that nurses had negative attitudes towards breastfeeding (Register et al., 2000) consisted of administering a 42-item questionnaire to pediatric office nurses. Six of these items pertained to attitudes. Validity and reliability were not discussed. The authors concluded that many of the nurses surveyed had negative attitudes towards breastfeeding, even though 89% or greater of the nurses surveyed answered 5 of the 6 questions with a positive or neutral response. The only negative response was to the question "does supplementing with formula in the first 2 weeks cause breastfeeding failure?" More than one-third of the respondents thought that supplementing with formula would not cause breastfeeding failure. This item may have been measuring breastfeeding knowledge rather than attitudes.

Three studies support the idea that nurses have positive attitudes towards breastfeeding (Bernaix, 2000; Freed et al., 1996; Hellings & Howe, 2000). Bernaix (2000) developed an original 8-item attitude scale. A panel of experts established content validity and an alpha of 0 .75 was reported. Maternity nurse respondents had a moderately positive attitude toward providing breastfeeding support. Bernaix's scale did not confuse knowledge items with attitude items. Her scope was somewhat limited though by asking a one stem question of "to me, providing support to breastfeeding mothers is:" and several qualifiers such as "unnecessary-necessary, embarrassing-not embarrassing, tiring-energizing" to be rated on a 7 point Likert-type scale. However, a nurse may have a very positive attitude toward breastfeeding but find that providing breastfeeding support is tiring. That particular qualifier may not be accurately measuring breastfeeding attitude.

The evaluation of nursing students' breastfeeding attitudes (Freed et al., 1996) and the evaluation of nurse practitioners' breastfeeding attitudes (Hellings & Howe, 2000) based upon Freed et al. (1995) survey did not included information on the instrument's validity or reliability. The authors from both studies reported that overall positive attitudes towards breastfeeding existed. Attitude inquiry was limited to the respondents perception of their role in breastfeeding promotion and their agreement with the statement that exclusive breastfeeding is the most beneficial form of infant nutrition.

A final study conducted by a nutritionist included a 32-item knowledge scale and a 17-item attitude scale (Figueroa, 2001). Validity of this instrument was established by literature review, international and national standards review, expert review, and a focus group. A 0.82 Cronbach's alpha was reported for each scale from the 457 nutritionists

and dieticians. Figueroa reported that positive breastfeeding attitudes did prevail among nutrition professionals but that many had incorrect breastfeeding information and inadequate breastfeeding training.

4. **Summary and conclusion**

The review of this literature indicates a less than optimal breastfeeding educational experience among health care professionals and a lack of breastfeeding knowledge despite positive attitudes towards breastfeeding. Non-comparable instruments used to measure the concepts of breastfeeding education and constrained geographic samples limit the ability to generalize these conclusions. Further research is warranted.

Women are exposed to health care professionals throughout pregnancy and lactation experiences and look to them for emotional and informational breastfeeding support (Hong, Callister, & Schwartz, 2003). The interaction between the health care provider and the woman may have either a positive or negative influence on the initiation and continuation of breastfeeding (Humenick, Hill, & Spiegelberg, 1998). Health care providers need to be proactive in breastfeeding assessment and support as well as competent in breastfeeding management. The research suggests that, practitioners have not forgotten the correct information needed to assist and support breastfeeding mothers. Rather, professional programs have not provided effective breastfeeding education in their curricula, and after graduation, practitioners' experiences do not appear to compensate for these deficiencies (AAP, 1995; Anderson & Geden, 1991; Figueroa, 2001; Freed, 1993; Freed et al., 1995,1996; Guise & Freed, 2000; Hellings & Howe, 2000; Lewinski, 1992; Newton, 1992; Patton et al., 1996; Register et al., 2000; Tschetter, 2001; Williams & Hammer, 1995). Reasons for this disconnect need further exploration.

Bandura's theory is appropriate for nursing education research involving behavior change towards competent support for breastfeeding. A major gap in current studies is the lack of a guiding conceptual framework to ensure inclusion of all relevant variables. Examination of the degree to which university nursing programs provide students with optimal knowledge and unbiased attitudes, and opportunities for observing instruction to breastfeeding mothers, availability for clinical practice and feedback, and utilization of social supports will help to identify exemplary models of breastfeeding education. These exemplary models will provide practical guidance for increasing student nurses' preparation to support breastfeeding.

The review of the literature and status of breastfeeding rates in the United States support the need for examining the current educational preparation received by university nursing students and identifying exemplary methods. With an effective model for breastfeeding education in place, nurses, the largest group of health care professionals, will possess the competency needed to support the families they care for and help achieve the United States goals for breastfeeding.

III. METHODOLOGY

The methodology chosen for this study was guided by Bandura's social cognitive theory as applied to behavioral change, survey methodology used by other researchers for this topic, and the availability of online technology for data collection ease and cost-effectiveness. The study design, setting, instrumentation, procedure for implementing a web survey, and description of analysis are discussed. Sample selection strategy along with response rate and demographic information about the final sample (N=385) are presented.

A. Design

This study used a descriptive design and descriptive correlational design to identify the breastfeeding education experiences of baccalaureate nursing students (research question 1) A descriptive design was used to identify their breastfeeding knowledge and attitudes (research question 2). An exploratory predictive design was used to answer research question 3 regarding what factors affect breastfeeding knowledge and attitude scores. A descriptive correlational design was used to present the relationship between knowledge and attitude scores with the student's evaluation of their program or their confidence in their ability to provide breastfeeding support (research question 4).

Survey items measured knowledge, attitude, self-efficacy, modeling, practice, feedback, and utilization of social supports. Because of the simultaneous, interactive nature of this framework the measurements of these concepts indicated the likelihood that the practice of effective breastfeeding support would be the behavioral outcome.

B. Setting

United State's baccalaureate nursing programs accredited by the Commission on Collegiate Nursing Education (CCNE) or the National League for Nursing Accrediting Commission (NLN-AC) and listed at their web sites as of October 1, 2003 were the population for the study. If a program was accredited by both agencies it was counted only once.

C. Instrumentation

1. Survey development

The first task was to identify a tool that measured most or all of the concepts found in Bandura's framework. A review of the literature showed several instruments that addressed some of the concepts (see Appendix D). The main purpose of these studies was to describe a professional's current knowledge level about breastfeeding and identify where this knowledge was obtained. All tools included assessment of breastfeeding knowledge. However emphasis on knowledge assessment alone does not indicate the best method for breastfeeding education. No instrument considered all components of Bandura's behavioral theory. By examining all components of this theory a better description of what constitutes effective breastfeeding education could be made.

Development of a new tool began with a careful review of Williams' and Hammer's (1995) 84-item survey of pediatricians in training and Freed, Clark, Harris, and Lowdermilk's (1996) brief 15-item questionnaire of nursing students with regard to breastfeeding education. Williams' and Hammer's survey was chosen for its breadth in content and Freed et al.'s for its likeness in purpose to this research. After contacting

these authors, permission was received to use or modify their tools for this research (Appendix E). The supporting documents described previously, as well as review of the current recommendations for breastfeeding support from the Association of Women's Health, Obstetric, and Neonatal Nursing practice guideline and monograph (AWHONN, 2000), Lawrence's (1997) review of the medical benefits and contraindications to breastfeeding in the United States, and the International Lactation Consultant Association's (ILCA, 1999) "Evidence-Based Guidelines for Breastfeeding Management during the First Fourteen Days" identified the domain for the tool and item content thus completing the first step to establishing content validity (Lynn, 1986). Further questions were developed to assess the components of Bandura's framework for behavioral change and answer the questions about mode of instruction. Several demographic items were included such as gender and personal involvement with breastfeeding.

Along with the development of a more comprehensive breastfeeding education assessment tool that incorporated Bandura's framework, experience with web survey methodology was obtained. Two 1 semester hour courses on web survey design and web survey implementation at the 55th Summer Institute in Survey Research Techniques (University of Michigan, 2002) provided an overview of the knowledge, skills, and beginning research findings for administering surveys using this newer technology.

To avoid author bias and strengthen the content validity, the pilot survey was deployed via the World Wide Web to 10 experts in the field of lactation or maternity nursing education. Experts were chosen based upon their current clinical roles with breastfeeding mothers or nursing students and evidence of scholarly work. During this second step, the experts indicated on the electronic form whether the item was relevant,

relevant but needing revision, unable to assess as written, or not relevant. A space was also provided for comments on each item and for suggestions about overall content omission. All comments received were taken into consideration and 7 out of 10 experts needed to endorse the item for it to be considered valid. Only endorsed items were retained. Minor modifications and additions to the tool were not resubmitted to the group of experts but were discussed individually with select experts who expressed interest in the development of this survey.

A small pilot study was conducted to establish instrument reliability for the attitude and knowledge tool and test the web survey administration method. After receiving the University of Illinois' Institutional Review Board's (UIC-IRB) approval for a claim of exemption, the senior nursing students attending "Introduction to Nursing Research and Statistics for Evidence-Based Practice" were given the opportunity to provide their e-mail address and participate in the survey. Thirty-five students were given an index card to indicate their e-mail address if they wished to participate or turn in a blank index card if they did not wish to participate. E-mail addresses were obtained for 30 students and the survey was deployed to them. The survey was available for one week and two thank you/reminder e-mails were sent 3 days apart during this time. Twenty-two of the 30 students responded with 19 of these 22 completing the survey. The results were reported in an Excel spreadsheet and recoding was completed prior to importing the data into an SPSS® (Chicago, IL) program. An acceptable degree of reliability was described using the Cronbach's alpha coefficient. (alpha = .84 for the attitude scale, alpha = .78 for the knowledge scale). Item analysis identified one attitude statement that did not correlate.

On further review of this item, "Mothers know instinctively how to breastfeed" was determined to be a knowledge statement and was placed in that portion of the tool.

Limitations to this test project were the small numbers of respondents, which restricted statistical analysis to descriptive summaries. Overall, the 19 students who completed this survey demonstrated positive attitudes towards breastfeeding and an average of 76% on the knowledge scale. Modeling, which provides social and self-regulative skills, and practice with feedback, which develops self-efficacy, were reported for about 75% of students. Students' reports of their own sense of self-efficacy were higher for discussing breastfeeding with the mother and lower for assisting the mother with breastfeeding initiation. The identification and enlistment of social supports was addressed in only one knowledge item on this pilot survey and only 26% of students correctly answered that the American Academy of Pediatrics (AAP) advises that infants continue to be breastfed for at least one year. That item was retained as a knowledge scale item and the concept of social supports was expanded in the revised survey to include identification and utilization for eight social supports.

Further modifications were made to the final survey (Appendix F) to more accurately reflect the concepts of Bandura's framework. Self-efficacy is an individual's perceived ability to perform a specific behavior and serves as a predictor of performance (Bandura, 1986). Self-efficacy is developed through practicing the behavior and feedback on that practice. A self-report was used in this study to measure self-efficacy so that a comparison could be made between the theoretical development of self-efficacy (practice and feedback) and student perception. The student's evaluation of how well their program prepared them to provide breastfeeding support may influence their

confidence in their ability to explain the benefits of breastfeeding and their confidence in helping a mother initiate breastfeeding. The survey item regarding how well the student felt their program prepared them to support breastfeeding was recoded from a 4-point scale to a 3-point scale to be consistent with the other two items used to measure self-efficacy. The concepts and operational measures in the survey are found in Table 1.

Table 1 *Breastfeeding Education Survey Characteristics Based Upon Bandura's (1994) Concepts for Effective Behavioral Change*

Concept/ Conceptual Definition	Question # in survey	Possible Range of scores
Knowledge the fact or condition of knowing something with familiarity gained through experience or association	39 Knowledge questions C1-C36 D1,D2,D3	0-100
Attitudes a mental position, feeling, or emotion with regard to a fact or state	18 Attitude questions B1-B18 not supportive, less supportive, more supportive, very supportive	1-4
Modeling to construct or fashion in imitation	A2 video, modeling in the classroom, modeling in the clinical setting A5 how often the student observed a mother breastfeeding: never, once or twice, three or four times, five or more times	0-6
Practice to do or perform often; to perform or work at repeatedly so as to become proficient	A2 role-play A4 hospital maternity setting, hospital pediatric setting, ambulatory care setting, "Baby Friendly" hospital, home care setting A6 how often the student taught a mother breastfeeding techniques: never, once or twice, three or four times, five or more times	0-9

Table 1 *Continues*

Concept/ Conceptual Definition	Question # in survey	Possible Range of scores
Feedback the transmission of evaluative or corrective information to the original source about an action, event, or process	A3 written exam questions, care plan, paper, presentation, instructor observation, self-learning module completion	0-6
Social Supports like-minded individuals within groups who provide confidence and approval	A19 La Leche League, IBCLC, Baby Friendly hospital, 10 Steps to Successful Breastfeeding, International Code, Evidence-based guidelines, Innocenti Declaration, a written policy at the clinical site	identify 0-8 explain 0-8 enlist 0-8
Self-efficacy an individual's perceived ability to perform a specific behavior which serves as a predictor of performance; this ability is developed through practice and feedback (Bandura, 1986)	A7 how well has program prepared you: less than adequate, adequate, good, excellent. Recoded to 3 point scale A8 how confident in explaining benefits: not confident, confident, very confident A9 ability to assist initiation: not confident, confident, very confident Combined A7,A8,A9: not confident, confident, very confident	.75-3 1-3 1-3 1-3
Personal Breastfeeding Intent actual or planned involvement with breastfeeding	A11 plan to use or have used most/all formula, plan to breastfeed, have provided child with most/all breastfeeding	1-3

Table 2 lists the variables for the program characteristics, instructional characteristics, and student characteristics that were examined to describe knowledge and attitude score variances. Social supports, as described in the framework are part of the environment and are operationalized as instructional characteristics. The student will most likely be made aware of these supports during their educational program and the ability of the student to identify and enlist these supports will, according to the framework, impact their knowledge and attitude scores as well as impact the behavior of

effective breastfeeding support. Non-instructional social supports such as support from the student's family, church group, or peers were not measured in this study but would be a helpful addition to future work.

Program characteristics data were provided by the dean or designate at each institution or found on that institution's web site. Instructional and student characteristics were provided by the student.

Table 2 *Characteristics to Describe Knowledge and Attitude Score Variances*

Program characteristics	Instructional characteristics	Student characteristics
-Public or private -Religious affiliation -Presence of a graduate program in nursing -Number of senior nursing students	-Modeling -Practice -Feedback -Social supports	-Gender -Age -Ethnic group -Place where born and raised -Observation of breastfeeding in life -Personal breastfeeding intent

Tables 3, 4, and 5 categorize the knowledge survey items according to three broad categories of content: anatomy and physiology of lactation, risks of not breastfeeding and contraindications to breastfeeding, and breastfeeding support skills. Students were given the choice of responding True, False, or "not sure". The "not sure" choice was provided to avoid counting a guess as correct. The number of items correct out of the 39 items possible was then converted to a percentage for clarity.

Table 3 *Knowledge Items about Anatomy and Physiology of Lactation Science*

Survey Item	Statement (12 items)	Correct Answer
C1	Either the infant or a breast pump must remove milk from the breast to establish and maintain milk production.	True
C2	Nearly every breastfeeding mother can expect to experience painful engorgement when her milk comes in.	False
C4	Supplemental feeding with water or formula can be detrimental to the establishment of a good milk supply.	True
C5	Should a mother's milk supply be low, providing a bottle of formula after each breastfeeding will resolve the problem.	False
C6	During the period of breast engorgement, it is helpful for the infant to be formula fed.	False
C8	If a woman has flat nipples, she is unable to breastfeed.	False
C15	Glucose water or formula should be offered to breastfeeding infants until the mother's milk comes in.	False
C16	Mothers should be helped to initiate breastfeeding within the first 30 minutes of birth.	True
C17	If a mother plans to use a bottle to feed her baby expressed breast milk or formula on occasion, the baby should begin practicing on a bottle before hospital discharge.	False
C19	If the mother needs to remove the infant from the breast, breaking the suction between the nipple and the infant's mouth is necessary only after the milk is in.	False
C30	Partners of breastfeeding mothers should be encouraged to give their newborn a bottle of formula at least once a day in order to allow the mother to rest.	False

Table 4 *Knowledge Items about the Risks of Not Breastfeeding and Contraindications to Breastfeeding*

Survey Item	Statement (13 items)	Correct Answer
C3	About 25% of women are physically incapable of breastfeeding.	False
C7	Lactation can be successful in many cases following augmentation mammoplasty.	True
C9	Colostrum is not "real milk" and has only minimal benefits for the infant.	False
C10	Formula fed infants have more ear infections than breastfed babies.	True
C11	Formula fed infants are constipated more often than breastfed babies.	True
C12	Mothers who smoke cigarettes should not breastfeed.	False
C13	In most cases, breastfeeding must end if a mother requires a prescription medication.	False
C14	Mothers who breastfeed should avoid all spicy foods.	False
C29	Formula supplementation is required for newborns that appear jaundiced.	False
C31	A mother may continue breastfeeding if she has developed mastitis.	True
C32	A mother should stop breastfeeding once her infant has teeth.	False
C33	If a mother or her infant requires hospitalization, breastfeeding should stop.	False
C36	Low birthweight and premature infants require fortified formula exclusively.	False

Table 5 *Knowledge Items about Breastfeeding Support Skills*

Survey Item	Statement (14 items)	Correct Answer
C18	An infant's cry is often the first sign that he or she is ready to breastfeed.	False
C20	Mothers intending to breastfeed should expect their nipples to be sore during and between feedings.	False
C21	A breastfed infant should be offered a pacifier as a way of preventing the mother from getting sore nipples.	False
C22	The most common cause of sore nipples related to breastfeeding is allowing the infant to nurse too much the first day or so.	False
C23	Mothers know instinctively how to breastfeed.	False
C24	One way to check for milk transfer from mother to infant is to listen for the sound of the infant swallowing.	True
C25	Initially a breastfeeding newborn should nurse for only 3-5 minutes at each breast per feeding.	False
C26	A breastfed newborn should nurse every 4 hours.	False
C27	It is normal for a breastfed infant to stool several times a day after the mother's milk has come in.	True
C28	Three wet diapers in a 24-hour period is a sign of adequate intake in a breastfed newborn older than 1 week.	False
C35	If the primary care provider diagnoses thrush in a breastfed infant, the mother should be treated as well.	True
D1	The American Academy of Pediatrics has advised that infants receive breast milk for at least:	1 year
D2	Which picture **above** is showing an effective latch?	#1
D3	Which picture **above** is showing an effective position?	#1

Tables 6 and 7 categorize the attitude survey items into two categories. Five items address attitudes about the nurse's role in breastfeeding support and 13 items address personal attitudes about breastfeeding in general. Students were given the four choices of strongly disagree, disagree, agree, or strongly agree to indicate their attitude towards the statement. A neutral category was omitted to avoid complacency.

Table 6 *Attitude Items About the Nurse's Role in Breastfeeding Support*

Survey Item	Statement (5 items)	Supportive Answer
B1	I prefer that the babies that I take care of are breastfed.	Agree
B6	Nurses should provide information to mothers about breastfeeding even if the mother has stated her intentions to formula feed her baby.	Agree
B10	It is the nurse's role to assist mothers in breastfeeding.	Agree
B16	Within the nursing profession, only maternity nurses need knowledge about breastfeeding.	Disagree
B18	As a nurse, I have minimal influence on a mother's success in initiating or continuing breastfeeding.	Disagree

Table 7 *Attitude Items About Breastfeeding*

Survey Item	Statement (13 items)	Supportive Answer
B2	I believe that the partners of breastfeeding mothers often feel left out if the mother breastfeeds.	Disagree
B3	I would be embarrassed if a mother breastfed her toddler in front of me.	Disagree
B4	Breastfeeding does not fit in with today's active lifestyles.	Disagree
B5	I would be embarrassed if a mother breastfed her infant in front of me.	Disagree
B7	Breastfeeding is more time consuming than bottle-feeding.	Disagree
B8	Formula is as good as breast milk.	Disagree
B9	Mothers who breastfeed are likely to be more fatigued than mothers who formula-feed.	Disagree
B11	It is helpful to formula-feed a newborn at night so the mother can rest following birth.	Disagree
B12	Breastfeeding is less expensive than formula feeding.	Agree
B13	Breastfeeding is easier than formula preparation and bottle-feeding.	Agree
B14	In industrialized countries such as the United States, it doesn't really make a difference if an infant is breastfed or formula-fed.	Disagree
B15	Breastfeeding is a current trend and not scientifically supported.	Disagree
B17	Breastfeeding and formula feeding are equally acceptable methods for feeding infants.	Disagree

The final 78-item survey consisted of 8 instructional methods questions, 3 self-efficacy questions, 9 demographic questions, 18 attitude statements, one multi-part social supports question, and 39 knowledge statements. Instructions for the web survey were provided to the programmers at the Center for the Advancement of Distance Education (CADE), a division of the School of Public Health at the University of Illinois at Chicago. The design included a vertically scrollable set of 22 pages with one or two banks of questions on each page. Browser-friendly colors were limited to two selections to keep the survey presentation consistent when opened in various hardware and software systems. Images were also limited to avoid longer download times. A dynamic progress bar remained at the top of the screen to provide the student with an indication of how much more of the survey was to be completed. A submit button was placed at the bottom of each page along with a backward button to allow the student to change an answer, if necessary, and resubmit the page. If a question was not answered when the student submitted the page a message appeared asking the student if they wished to answer the question or continue with the survey. This assisted survey completion rates while allowing the respondent to retain the option of not answering a question. The compatibility with different browsers and the mode of connectivity was tested on several operating system configurations to evaluate the retrieval time and visual presentation of the survey.

2. **Procedure**

Program recruitment for student participation was achieved over a period of three weeks through e-mail correspondence with each individual program dean or

director and "The Breastfeeding Education Survey" was administered online via the World Wide Web through a secure site. Survey programming, link hosting, and collection of data was done with the assistance from CADE. Confidentiality of data was assured by having no systems data collected from the student's computer during survey transmission and a password protected secure site was used for retrieving collected data.

There were several advantages in using a web survey for collection of data. When compared to traditional paper surveys these advantages included savings in the time and related cost involved in distributing the survey, sending follow-up reminders, and entering the data into a program for analysis. Web survey response rates are found to be somewhat lower than mail surveys although this may be changing rapidly with better access to technology and improved compatibility of systems (Couper, 2001). By considering the sample population and the aims of the study, the selection of survey methodology was determined. In this case, a population of computer literate students with access to this technology and a study designed for gathering descriptive data seemed appropriate for a web survey.

D. **Analysis**

Analysis proceeded in stages from simple descriptive psychometric analysis to more complex analyses. Data were reported from the web survey in an SPSS® (Chicago, IL) file for analysis. Data were recoded as needed, examined for errors and completeness, and the measures were constructed. Missing data for the 30 surveys that did not have a complete knowledge score were replaced by the mean. Due to the exploratory nature of this study a significance level of .10 was used and the exact probability values were reported to allow the reader to evaluate the significance of the findings. Statistics were

performed using the SPSS® (Chicago, IL) program. The variables in this study were considered to be either continuous, interval-level measures (knowledge scale, attitude scale, modeling, practice, feedback, social supports, self-efficacy, personal breastfeeding intent, number of students, and age) or dichotomous, nominal-level measures (gender, ethnicity, birthplace, program funding, religious affiliation, and presence of a graduate nursing program). These dichotomous variables were treated as "dummy variables" and included in the multiple regression (Pedahazur, 1997). Reliability for the attitude scale using Cronbach's alpha coefficient of internal consistency was .82 and for the knowledge scale, alpha= .79

Non-parametric methods (frequency counts and percentages) as well as parametric methods (means and standard deviations) were used for the descriptive statistics. Parametric methods were also used for the Pearson product moment correlation when both scales were considered interval measurements and for multiple regression. The Point-biserial correlation was used when one scale was naturally dichotomous and one scale interval.

To answer research question 1, "What the breastfeeding educational experiences of U.S. baccalaureate nursing students in their senior year are as measured by an online survey?" frequency counts, percentages, means, and standard deviations were calculated. The Pearson correlation coefficient was chosen to examine if there was a relationship between an instructional variable and the other variables and to measure the degree and direction of those relationships. The assumptions for the Pearson correlation are interval measurement of both variables, normal distribution of at least one variable, linearity, independence of observational pairs, and homoscedasticity. To satisfy the first

assumption of interval measures for both variables the Point Biserial Correlation Coefficient was reported for relationships between one dichotomous variable and one non-dichotomous variable. Histograms were examined for normalcy and scatterplots were examined for linearity, homoscedasticity and outliers. Outliers were evaluated by looking at the 5% trimmed mean, which is calculated by removing the top and bottom 5% of the cases then recalculating the mean. This statistic is provided in the SPSS® (Chicago, IL) descriptives output and was used to determine if outliers would be retained. Few outliers were identified and the mean and trimmed mean were almost identical, therefore no cases were eliminated. The assumption of independence of observational pairs was met by the research design by offering the survey to each individual student. The data met the assumptions.

A decision was made to report only those correlations greater or equal to $r = .30$. This decision rule was based on the popular opinion among researchers that is a correlation of $r = .30$ is considered to be of "moderate strength" (Cohen, 1988). All of the correlations reported were significant at $p=.01$.

To answer research question 2, " What the knowledge and attitudes of these students are as measured by an online survey?" knowledge scores were converted to percent correct and frequency counts, percentages, means, and standard deviations were calculated.

To answer research question 3, "What factors affect senior undergraduate nursing students' breastfeeding knowledge and attitude scores?" multiple regression was chosen to explore the relationships between each group of characteristics and knowledge and attitude scores, and the relationships between all of the characteristics and knowledge and

attitude scores. By using variables based upon Bandura's framework, the amount of variance in knowledge and attitude scores was explained.

Standard multiple regression was chosen to identify which category of variables best predicted knowledge and attitude scores and to identify the unique contribution of each variable. Backward elimination regression was used to provide the explanation of variance when considering all variables and to identify the variables that were significant for prediction of knowledge and attitude scores. In backward elimination regression, all variables were entered at the same time for the analysis. Then the variable that would lead to the smallest reduction of R^2 was removed. This process was repeated until only variables that were meaningful for prediction remained (Pedhazur, 1997). Bandura's framework (1994) described the person, the environment, and the behavior as simultaneously interacting concepts. This description guided the selection of backward elimination regression since all variables were initially entered at the same time for the analysis.

The assumptions of multiple regression are that the variables do not demonstrate multicollinearity, the regression is linear, there is homoscedasticity, and there is independence of residuals. The residual statistics were examined on the multiple regression analysis to check for collinearity and the tolerance values were acceptable. Residual scatterplots and Normal Probability Plots were examined to check for normality, linearity, and homoscedasticity. The assumptions were met. A significance level of $p=.10$ was used and exact probability values were reported.

To answer research question 4, "Do breastfeeding knowledge and attitude scores correlate with the student's evaluation of the program with regard to breastfeeding

education or the student's evaluation of their own confidence in their ability to provide breastfeeding support?" the Pearson correlation was chosen to examine if there was a relationship between two variables and to measure the degree and direction of linear relationships between two variables. Statistical significance was reported for $p=.05$ and $p<.01$.

E. Sample and Response Rate

1. Selection criteria

a. 150 randomly selected programs from the 621 U.S. accredited baccalaureate nursing programs

b. senior baccalaureate nursing students (not RN-BSN completion)

c. obstetrical nursing course completed

2. Selection strategy

An invitation to participate in this voluntary study, including a research abstract, biosketch, and Institutional Review Board (IRB) approval (see Appendix G) was sent via the World Wide Web to the 150 deans whose programs were randomly selected from the 621 accredited U.S. baccalaureate nursing programs. Randomization was achieved by using an online retrieval of a unique set of 150 numbers (Research Randomizer.org, retrieved September 1, 2003). Of the 150 invitations to the deans, 103 responses were received.

Fifty eligible programs agreed to participate, 28 programs were not eligible due to the program closing (1), no seniors (2), no senior designation (1), offering RN-BSN only programs (14), requirement of their institution's IRB approval (6), or no list-serve (4). Ten programs forwarded the invitation and did not reach a decision. Fifteen programs

declined to participate for reasons such as moving, accreditation visit, too busy, or too many requests for student research. Forty-seven programs did not respond despite three e-mail contacts at one-week intervals (Table 8).

Table 8 *Program Recruitment Response Rate*

Number of Programs	Description
150	number of randomly selected programs from 621 accredited U.S. baccalaureate nursing programs 103(69%) provided some type of response: 28 were not eligible 15 declined 10 forwarded the request and did not come to a decision 47 programs had no response after 3 contacts 50 agreed to participate
122	number of randomly selected programs eligible for participation
50 (41%)	programs agreed to participate
36 (30%)	programs with student respondents

The dean or a designate of the 50 programs agreeing to participate then posted the student invitation that stated their support for the research, to the senior nursing student list-serve (Appendix H). The student received the invitation and voluntarily and anonymously either chose to link to the survey or not participate. Once linked to the survey the student then chose to not begin the survey, partially complete the survey, or complete the survey. The dean or a designate received two follow-up e-mails to post to the senior students that included a thank you for participating and a reminder to those students who had not taken part in the survey (Appendix I).

3. **Sample size**

The initial invitation to the deans of the 150 U.S. baccalaureate nursing programs asked the deans to provide the approximate number of senior nursing students in their programs. Thirty-six of the 50 participating programs that had at least one respondent, provided this number for a sample size of 1,861 students. The population size of U.S. baccalaureate senior nursing students is approximately 25, 806 based upon the number of U.S. educated candidates taking the NCLEX-RN Exam for the first time in 2002 (American Association of Colleges of Nursing, 2003). Following the initial invitation, two student e-mail reminders sent at 3-day intervals to the program designate resulted in a total of 516 student participants. Students meeting the criteria of non-RN senior nursing student having completed an obstetrical nursing course numbered 385 with 355 of these being completed surveys. By replacing the knowledge score with the knowledge score mean for 30 cases with missing data, the final sample size for analysis was 385 (see Table 9).

Table 9 *Final Sample Size (N=385) of Student Respondents Used for Data Analysis*

Number of Students	Description
516 (28%)	total respondents from the 1,861 seniors from 36 programs
-42	BSN completion students/already an RN were excluded
-52	senior nursing students who had not completed a maternity nursing course were excluded
-37	senior nursing students who completed a maternity nursing course but who did not complete at least one-half (the attitude portion of the survey) were excluded
385 (21%)	senior nursing students who completed a maternity nursing course and more than one- half of the survey (began the knowledge portion of the survey)
<355>	senior nursing students who completed a maternity nursing course and the survey
30	number of surveys with missing data which were replaced by the knowledge score mean

4. **Response rate**

The response rates for this research included one rate for program recruitment (30%), and one rate for student participation (28%). Low response rates can be attributed to the two levels of participant recruitment, contact with the student respondents only through postings distributed by the program designee, no incentive/reward for participation, no structured time, such as class time, for the students to complete the survey, and research involving a "test-like" experience. Programs with up to 20 senior nursing students had three times the response rate of programs with 61 or

more seniors (see Table 10). Freed et al. (1996) reported a 100% response rate for a 15-item survey administered in class to 272 nursing students from 5 North Carolina programs. Tschetter (2001) administered a 57-item survey to 316 graduating nursing students in 10 South Dakota nursing programs. She received 249 (79%) completed surveys from 7 sites where students completed the survey in class and submitted them directly to her along with 3 distance sites where students completed the survey in class and then returned them by mail. The results from the 385 surveys used for analysis were from a national random sample with a 5% error and a 95% confidence level based upon the estimated population size of 25,806 (CustomInsight.com Random Sample Calculator, retrieved September 1, 2003). This sample size was large enough to provide statistically stable results with low standard error. Unfortunately, no database exists for the 621 U.S. baccalaureate nursing programs to facilitate evaluation of how well this random sample represents the population based upon program characteristics.

Table 10 *Student Response Rate by Program Size (N=516)*

Program size	Total number of seniors	Total number of respondents	Percent
Up to 20 seniors (n=8)	134	82	61%
21-35 seniors (n=10)	300	107	36%
36-60 seniors (n=10)	456	137	30%
61+ seniors (n=8)	971	190	20%

5. **Demographics**

The selected program demographics that students were equally split between public and private universities, 40% had a religious affiliation, the majority attended a program with graduate level nursing and were from classes with 36 or more

seniors is useful information for this study but is not known for the general population of baccalaureate nursing students. The National Sample Survey of Registered Nurses reported that men in nursing accounted for 5.4% of nurses and 88% of all nurses identified themselves as white/Caucasian (Spratley, Johnson, Sochalski, Fritz, & Spencer, 2001). Thus, gender and ethnicity ratios from this sample were similar to these registered nurse population demographics.

When asked if they had ever observed a mother breastfeeding at any time in their life, only 3.9% responded negatively; 59.2% responded they had observed a mother breastfeeding on five or more occasions. Most of the respondents in the sample (93.8%) were female, and all were nursing students at the time they participated in the survey (100.0%). The most common race/ethnicity was Caucasian (85.2%). The majority of students in this sample were personally supportive of breastfeeding and either provided their child with breastfeeding (17.1%) or planned to provide their child with breastfeeding in the future (74.5%). Most of the students (73%) were 25 years old or younger and almost all were born (93.2%) and raised (97.1%) in the United States (see Table 11).

Table 11 *Descriptive Statistics for Program and Student Characteristics (N=385)*

	n	%
Program Funding		
Public	209	54.3
Private	176	45.7
Religious Affiliation		
No	230	59.7
Yes	155	40.3
Graduate Program		
No	89	23.1
Yes	296	76.9
Number of Seniors		
Up to 20	70	18.2
21-35	94	24.4
36-60	57	14.8
61 and up	164	42.6
Observed Breastfeeding		
Never	15	3.9
1–2 times	75	19.5
3–4 times	67	17.4
5 or more times	228	59.2
Self or Partner Breastfed		
Yes, a few days	2	0.5
Yes, a few weeks	4	1.0
Yes, 2 months	10	2.6
Yes, 4 months	7	1.8
Yes, 6 months	13	3.4
Yes, 8 months	8	2.1
Yes, 10 months	7	1.8
1 year or more	15	3.9
No children, will breastfeed	287	74.5
No children, will use formula	14	3.6
No children, undecided	8	2.1
Had children, formula fed	10	2.6

Table 11 *Continues*

	n	%
Gender		
Male	24	6.2
Female	361	93.8
Type of Student		
Nursing student	385	100.0
Completed a maternity nursing course	385	100.0
Age		
21 or younger	3	0.8
21–25	278	72.2
26–30	50	13.0
31–35	28	7.3
36–40	11	2.9
41–45	8	2.1
46–50	5	1.3
51 and older	2	0.5
Race/Ethnicity		
Caucasian	328	85.2
African-American	25	6.5
Hispanic	4	1.0
Asian	15	3.9
Other	13	3.4
Born in USA		
No	26	6.8
Yes	359	93.2
Grew Up in USA		
No	11	2.9
Yes	374	97.1

IV. RESULTS

The overall purpose of this study was to identify exemplary methods for teaching breastfeeding content that related with higher knowledge and attitude scores. Bandura's social cognitive theory describing the simultaneous interaction between the person, environment, and behavior was used as a framework. Senior nursing students (person), their breastfeeding education (environment), and the likelihood of the student being able to provide effective breastfeeding support (behavior) were the concepts of interest. The data were first analyzed using descriptive statistics and correlation. Standard multiple regression was then used to identify which characteristics accounted for the greatest amount of variance and backward multiple regression was used to identify independent variables that were best at predicting knowledge and attitude scores.

Results are presented in the order of the research questions. First the breastfeeding educational experiences of senior U.S. baccalaureate nursing students are described. Then the breastfeeding knowledge and attitude scores of these students are examined. Factors affecting senior undergraduate nursing students' breastfeeding knowledge and attitude scores are presented as well as the relationship between breastfeeding knowledge and attitude scores and the student's evaluation of their self-efficacy.

A. Research Question 1 : Breastfeeding Educational Experiences

The first dimension of breastfeeding education to be explored was who provided breastfeeding information to students. Nearly all of the students received information from nursing faculty (99.0%) followed by nurses at the clinical sites (86.2%), and

lactation consultants (62.1%). Table 12 displays the sources of breastfeeding information, sorted by the highest frequency.

Table 12 *Sources of Breastfeeding Information. Sorted by Highest Frequency (N=385)*

	n	%
Nursing Faculty	381	99.0
RNs at Clinical Sites	332	86.2
Lactation Consultants	239	62.1
Other Nursing Students	182	47.3
CNMs/NPs at Clinical Sites	93	24.2
Pharmacology Faculty	81	21.0
Anatomy/Physiology Faculty	76	19.7
MDs at Clinical Sites	41	10.6
Registered Dieticians	38	9.9
Psychology/Sociology Faculty	32	8.3
Other Information Source	21	5.5
Literature/Arts/History/Anthro Faculty	11	2.9

Note. Multiple response question. Total frequency greater than 100% of sample.

The next aspect of breastfeeding education that was examined was how the students were taught about breastfeeding. Three of the theoretical concepts were measured in this item. Modeling in the clinical or classroom setting and video observation are data that were used to measure the amount of modeling available to students in their environments. Role-play responses indicated practice that the student had which along with feedback develops self-efficacy. Table 13 displays the responses for breastfeeding presentation formats. Nearly all of the students received information from textbook (96.6%) and lecture (95.8%). However of the other teaching methods that

were used, only about half reported modeling in the clinical setting (54.5%), one-third had modeling in the classroom, and only 10% were involved in role-play.

Table 13 *Sources of Breastfeeding Presentation Formats. Sorted by Highest Frequency (N=385)*

	n	%
Textbook	372	96.6
Lecture	369	95.8
Modeling in the Clinical Setting	210	54.5
Journal Articles	187	48.6
Video/CD ROM/Observation	185	48.1
Modeling in the Classroom	138	35.8
Role-play	40	10.4
Self-learning Module	36	9.4
Other Presentation Format	26	6.8

Note. Multiple response question. Total frequency greater than 100% of sample.

Another important concept as described in Bandura's framework was feedback along with practice that develops the student's self-efficacy. Table 14 displays information regarding feedback methods. The most common methods of feedback included written examination questions (85.2%), care plans (49.9%), and instructor observation (37.7%). Almost 10% were not given any feedback at all with regard to their breastfeeding knowledge and skills.

Data were collected to provide an overall description of the student's environment where modeling and the use of social supports such as lactation consultants, occurs. Table 15 displays the clinical experience settings with the most frequent setting being the hospital maternity area (93.2%); a much lower frequency of experience occurred in the

hospital pediatric care unit (12.2%), and the home care setting (11.9%). Even though 100% of respondents had completed their maternity course, 6% reported no clinical opportunity for an experience with breastfeeding.

Table 14 *Sources of Breastfeeding Feedback Methods. Sorted by Highest Frequency (N=385)*

	n	%
Written Examination Questions	328	85.2
Care Plan	192	49.9
Instructor Observation	145	37.7
Paper/Report	59	15.3
Oral Presentation	53	13.8
Not Given Feedback	36	9.4
Self-learning Module Completion	28	7.3

Note. Multiple response question. Total frequency greater than 100% of sample.

Table 15 *Sources of Breastfeeding Clinical Experience Setting. Sorted by Highest Frequency (N=385)*

	n	%
Some Clinical Experience		
Yes	362	94.0
No	23	6.0
Type of Clinical Experience		
Hospital Maternity Area	359	93.2
Hospital Pediatric Care	47	12.2
Home Care Setting	46	11.9
No Clinical Experience	23	6.0
"Baby Friendly" Hospital	20	5.2
Ambulatory Care Setting	15	3.9

Note. Multiple response question. Total frequency greater than 100% of sample.

Table 16 presents the percentage of students who could identify, explain, or had enlisted social supports. Most students had heard of La Leche League but less than half could explain the function of the group to someone else. Less than one-fourth of the students could explain the function of a lactation consultant and less than 5% had heard of the World Health Organization's International Code of Marketing of Breastmilk Substitutes (1981). According to Bandura's framework, social supports are important because they provide confidence and approval for the desired behavioral change, in this case, effective breastfeeding support.

Table 16 *Social Supports for Breastfeeding. Sorted by Highest Frequency (N=385)*

	% identify	% explain	% enlist
La Leche League	73.5%	43.6%	13.2%
Written breastfeeding policy at site	42.9%	31.6%	26.2%
International Board Certified Lactation Consultant	39.1%	23.1%	14.3%
10 Steps to Successful Breastfeeding	34.8%	21.8%	15.0%
Evidence-Based Guidelines	23.8%	17.6%	11.0%
Baby Friendly Hospital	18.7%	11.2%	5.4%
Innocenti Declaration	5.7%	1.8%	1.5%
International Code of Marketing	4.4%	1.0%	1.0%

Note: Multiple response question. Total frequency greater than 100% of sample.

The observation of a breastfeeding baby was considered a measure of modeling and the experience of teaching breastfeeding techniques to mothers was considered a measure of practice. Table 17 displays the frequency counts for these educational experiences. Students who had observed a mother breastfeeding two times or less accounted for 40% of the sample and included 8.6% of respondents who never observed

the practice of breastfeeding in a clinical setting. For the respondents who had taught breastfeeding techniques, a total of 31.4% reported they had never taught the practice; another 51.7% reported they had taught breastfeeding techniques only once or twice.

Table 17 *Breastfeeding Educational Experiences: Modeling and Practice (N=385)*

	n	%
Times Observed Breastfeeding		
Never	33	8.6
1–2 times	122	31.7
3–4 times	118	30.6
5 or more times	112	29.1
Times Taught Breastfeeding Techniques		
Never	121	31.4
1–2 times	199	51.7
3–4 times	43	11.2
5 or more times	22	5.7

Table 18 displays the descriptive statistics for selected variables, including knowledge, attitude, modeling, practice, feedback, three levels of mastery for social support use (identify, explain, and enlist), rating of program preparation, confidence to explain as well as confidence to assist breastfeeding, and the self-efficacy scale. Findings for student characteristics were that breastfeeding knowledge is low, attitudes are supportive, and students are confident in their abilities. Instructional characteristic findings indicated that the students reported a moderate amount of modeling and low levels of practice, feedback, and social support mastery.

Table 18 *Descriptive Statistics for Breastfeeding Knowledge, Attitude, and Other Conceptual Variables (N = 385)*

	M	*SD*	Low	High	Possible Range
Total Knowledge	66.21	13.94	15.38	97.44	0-100
Total Attitude	3.23	0.33	2.39	4.00	1-4
Modeling	3.19	1.52	0.00	6.00	0-6
Practice	2.28	1.36	0.00	8.00	0-9
Feedback	2.09	1.28	0.00	6.00	0-6
Social Supports–Identify	2.15	1.57	0.00	8.00	0-8
Social Supports–Explain	1.53	1.43	0.00	7.00	0-8
Social Supports –Enlist	0.88	1.19	0.00	6.00	0-8
Program Preparation[a]	1.94	0.66	0.75	3.00	.75-3
Confident Explaining	2.31	0.60	1.00	3.00	1-3
Confident Assisting	1.94	0.62	1.00	3.00	1-3
Self-Efficacy Scale[a]	2.06	0.49	0.92	3.00	.75-3

[a]This item was converted from a 4 point scale to a 3 point scale to create the "Self-Efficacy Scale"; due to this mathematical conversion the range is .75-3

Correlations for instructional characteristics (modeling, practice, feedback, social supports) were examined and reported only for those correlations greater or equal to $r = .30$. All of these correlations were significant at $p=.01$.

It was found that a nursing student's modeling score was higher when: a lactation consultant provided information ($r = .32$), clinical experience occurred in the hospital maternity area ($r = .36$), and the student had taught breastfeeding techniques more times ($r = .49$). However, lower modeling scores were noted in situations where the student had no breastfeeding clinical experience ($r = -.38$). Students gave significantly higher scores for program preparation when written examination questions were used for feedback ($r = .31$). In addition, the number of times a student taught breastfeeding

techniques was positively correlated with the ability to explain various social supports (r = .30), the students' ability to enlist social supports (r = .32), the student nurse's rating of their confidence in assisting breastfeeding initiation (r = .33), and the overall self-efficacy scale (r = .34).

B. Research Question 2 : Breastfeeding Knowledge and Attitudes

An accurate knowledge base is needed for effective breastfeeding support, and positive attitudes will facilitate this support. However, the behavior of providing effective breastfeeding support will also influence the student's attitudes as well as build upon their knowledge. It is this simultaneous interactive dynamic described in Bandura's framework that is important to keep in mind, particularly when developing interventions to improve breastfeeding education.

Knowledge and attitude were positively correlated (r = .30). For the 39-item knowledge scale, Cronbach's alpha coefficient was .79 and the average breastfeeding knowledge score was 66.21% correct, with a standard deviation of 13.94. Based on a common grading system of 92% or above being an 'A' grade, only six of the respondents (1.6%) would have achieved the 'A' grade level on the knowledge test and 90% would have achieved a 'C' or below. Breastfeeding attitude scores for an 18-item attitude scale with a Cronbach's alpha coefficient of .82 revealed that 25.5% of the student nurses would be considered "very supportive," and 51.9% would be considered to have a "more supportive" attitude (Table 19).

Table 19 *"Report Card" for Breastfeeding Knowledge [a] and Attitude [b] (N=385)*

	n	%
Knowledge (Percent Correct) [a]		
'F' grade (below 65%)	166	43.1
'D' grade (65 – 73%)	95	24.7
'C' grade (74 – 82%)	85	22.1
'B' grade (83 – 91%)	33	8.6
'A' grade (92 – 100%)	6	1.6
Breastfeeding Attitude [a]		
Not supportive (1.00 – 2.00)	0	0.0
Less supportive (2.01 – 2.99)	87	22.6
More supportive (3.00 – 3.49)	200	51.9
Very supportive (3.50 – 4.00)	98	25.5

[a] Knowledge: $M = 66.21$, $SD = 13.94$
[b] Attitude: $M = 3.23$, $SD = 0.33$

Tables 20, 21, and 22 provide the percentage of students with the correct responses for each knowledge statement in order of decreasing percent. Students' correct responses to knowledge statements were grouped into the three categories of anatomy and physiology of lactation, risks of not breastfeeding and contraindications to breastfeeding, and breastfeeding support skills.

Table 20 *Ranking of Knowledge Item Responses about Anatomy and Physiology of Lactation Science (N=385)*

Survey Item	Statement (12 items)	% Correct
C34	Mothers of premature infants can initiate and maintain lactogenesis (making of milk) using a breast pump. (T)	93.8
C8	If a woman has flat nipples, she is unable to breastfeed. (F)	91.0
C16	Mothers should be helped to initiate breastfeeding within the first 30 minutes of birth. (T)	88.0
C6	During the period of breast engorgement, it is helpful for the infant to be formula fed. (F)	87.9
C1	Either the infant or a breast pump must remove milk from the breast to establish and maintain milk production. (T)	80.1
C30	Partners of breastfeeding mothers should be encouraged to give their newborn a bottle of formula at least once a day in order to allow the mother to rest. (F)	79.2
C19	If the mother needs to remove the infant from the breast, breaking the suction between the nipple and the infant's mouth is necessary only after the milk is in. (F)	71.7
C5	Should a mother's milk supply be low, providing a bottle of formula after each breastfeeding will resolve the problem. (F)	66.1
C15	Glucose water or formula should be offered to breastfeeding infants until the mother's milk comes in. (F)	59.6
C4	Supplemental feeding with water or formula can be detrimental to the establishment of a good milk supply. (T)	50.3
C2	Nearly every breastfeeding mother can expect to experience painful engorgement when her milk comes in. (F)	49.5
C17	If a mother plans to use a bottle to feed her baby expressed breast milk or formula on occasion, the baby should begin practicing on a bottle before hospital discharge. (F)	34.0

Table 21 *Ranking of Knowledge Item Responses about the Risks of Not Breastfeeding and Contraindications to Breastfeeding (N=385)*

Survey Item	Statement (13 items)	% Correct
C9	Colostrum is not "real milk" and has only minimal benefits for the infant. (F)	93.4
C33	If a mother or her infant requires hospitalization, breastfeeding should stop. (F)	90.7
C32	A mother should stop breastfeeding once her infant has teeth. (F)	77.0
C10	Formula fed infants have more ear infections than breastfed babies. (T)	76.7
C36	Low birth weight and premature infants require fortified formula exclusively. (F)	75.0
C11	Formula fed infants are constipated more often than breastfed babies. (T)	65.9
C29	Formula supplementation is required for newborns that appear jaundiced. (F)	62.6
C13	In most cases, breastfeeding must end if a mother requires a prescription medication. (F)	59.1
C14	Mothers who breastfeed should avoid all spicy foods. (F)	59.1
C7	Lactation can be successful in many cases following augmentation mammoplasty. (T)	42.7
C12	Mothers who smoke cigarettes should not breastfeed. (F)	41.8
C3	About 25% of women are physically incapable of breastfeeding. (F)	40.4
C31	A mother may continue breastfeeding if she has developed mastitis. (T)	37.4

Table 22 *Ranking of Knowledge Item Responses about Breastfeeding Support Skills (N=385)*

Survey Item	Statement (14 items)	% Correct
C23	Mothers know instinctively how to breastfeed. (F)	93.6
C27	It is normal for a breastfed infant to stool several times a day after the mother's milk has come in. (T)	91.3
C22	The most common cause of sore nipples related to breastfeeding is allowing the infant to nurse too much the first day or so. (F)	81.8
C24	One way to check for milk transfer from mother to infant is to listen for the sound of the infant swallowing. (T)	78.2
C21	A breastfed infant should be offered a pacifier as a way of preventing the mother from getting sore nipples. (F)	77.1
D2	Which picture above is showing an effective latch? (#1)	76.9
C28	Three wet diapers in a 24-hour period is a sign of adequate intake in a breastfed newborn older than 1 week. (F)	71.9
C35	If the primary care provider diagnoses thrush in a breastfed infant, the mother should be treated as well. (T)	61.8
C25	Initially a breastfeeding newborn should nurse for only 3-5 minutes at each breast per feeding. (F)	52.9
C20	Mothers intending to breastfeed should expect their nipples to be sore during and between feedings. (F)	52.1
C18	An infant's cry is often the first sign that he or she is ready to breastfeed. (F)	51.4
C26	A breastfed newborn should nurse every 4 hours. (F)	45.8
D3	Which picture above is showing an effective position? (#1)	40.3
D1	The American Academy of Pediatrics has advised that infants receive breast milk for at least: (#3, 1year)	32.6

One-half of the students knew that supplemental feeding with water or formula can be detrimental to the establishment of a good milk supply (item C4) and 60% did not know that smoking cigarettes is not a contraindication to breastfeeding (item C12). Sixty percent also incorrectly indicated that 1 out of 4 women are physically incapable of lactating (item C3). For all three categories more than half of all students "failed" the category based upon a cut-off point of 74% correct.

The senior baccalaureate students in this study were supportive of breastfeeding. No student scores reflected non-supportive attitudes and less than one-quarter of student scores reflected less supportive attitudes towards breastfeeding. In regard to the student's perception of the nurse's role in breastfeeding, 98% of students agreed with the statement, "it is the nurse's role to assist mothers in breastfeeding" and 97% of students disagreed with the following statements: "Within the nursing profession, only maternity nurses need knowledge about breastfeeding" and "as a nurse, I have minimal influence on a mother's success in initiating or continuing breastfeeding". Student attitudes about breast milk versus formula indicated support of breastfeeding with 94% of students disagreeing with the statement "formula is as good as breast milk". No attitude item scored as low as any item on the knowledge scale. The attitude item with the least number of students (42%) indicating a supportive answer was "breastfeeding and formula feeding are equally acceptable methods for feeding infants". Two knowledge statements that had the lowest percent correct concur with this attitude: "If a mother plans to use a bottle to feed her baby expressed breast milk or formula on occasion, the baby should begin practicing on a bottle before hospital discharge" and "The American Academy of Pediatrics has advised that infants receive breast milk for at least: (1 year)". Tables 23 and 24 provide the percentage of students with supportive responses for each attitude statement in order of decreasing percent.

Table 23 *Ranking of Attitude Item Responses about the Nurse's Role in Breastfeeding Support (N=385)*

Survey Item	Statement (5 items)	Supportive Answer	% Supportive
B10	It is the nurse's role to assist mothers in breastfeeding.	Agree	97.6
B18	As a nurse, I have minimal influence on a mother's success in initiating or continuing breastfeeding.	Disagree	97.3
B16	Within the nursing profession, only maternity nurses need knowledge about breastfeeding.	Disagree	96.8
B6	Nurses should provide information to mothers about breastfeeding even if the mother has stated her intentions to formula feed her baby.	Agree	91.2
B1	I prefer that the babies that I take care of are breastfed.	Agree	79.3

Table 24 *Ranking of Attitude Item Responses about Breastfeeding (N=385)*

Survey Item	Statement (13 items)	Supportive Answer	% Supportive
B15	Breastfeeding is a current trend and not scientifically supported.	Disagree	98.7
B5	I would be embarrassed if a mother breastfed her infant in front of me.	Disagree	97.4
B12	Breastfeeding is less expensive than formula feeding.	Agree	96.2
B8	Formula is as good as breast milk.	Disagree	94.1
B4	Breastfeeding does not fit in with today's active lifestyles.	Disagree	92.6
B14	In industrialized countries such as the United States, it doesn't really make a difference if an infant is breastfed or formula-fed.	Disagree	87.0
B11	It is helpful to formula-feed a newborn at night so the mother can rest following birth.	Disagree	86.5
B9	Mothers who breastfeed are likely to be more fatigued than mothers who formula-feed.	Disagree	79.1
B13	Breastfeeding is easier than formula preparation and bottle-feeding.	Agree	73.7
B2	I believe that the partners of breastfeeding mothers often feel left out if the mother breastfeeds.	Disagree	69.5
B3	I would be embarrassed if a mother breastfed her toddler in front of me.	Disagree	69.5
B7	Breastfeeding is more time consuming than bottle-feeding.	Disagree	68.4
B17	Breastfeeding and formula feeding are equally acceptable methods for feeding infants.	Disagree	42.1

C. Research Question 3 : Factors Affecting Breastfeeding Knowledge and Attitude Scores

The effects of student characteristics, instructional characteristics, and program characteristics on knowledge and attitude scores are presented. Each group of characteristics is analyzed to present the amount of variance in knowledge and attitude scores and then all characteristics are analyzed to determine which of these variables predicts knowledge and attitude best.

1. Effects of student characteristics on knowledge and attitude scores

The statistical analysis of multiple regression was used to determine the best predictors for knowledge and attitude scores. When reviewing a multiple regression table it is helpful to keep in mind that the B stands for the unstandardized coefficient and is the multiplier for each respondent's score in the prediction equation. The SE stands for the standard error of estimate and the Beta, the standardized coefficients or the predicted equation multiplier based upon Z scores. The *p* is the probability statistic and indicates the level of significance for each variable in the model. The sr is the semi-partial or effect size which can be squared to indicate how much of the model a variable can account for or explain. The term "explain" is used to describe the model and does not connote a cause and effect relationship. Standard multiple regression was used to determine the overall variance accounted for based on a set of characteristics and the unique contribution for each variable. Backward elimination regression was used to provide the maximum explanation of variance and account for the maximum potential partial correlations.

Table 25 displays the regression model predicting knowledge, based on student characteristics. These six variables accounted for 14.5% of the variance in knowledge (p = .001). Inspection of the beta weights in Table 28 demonstrated that a higher level of knowledge was found in female nurses (p = .001), nursing students who were older (p = .002), Caucasian nursing students (p = .02), and those students who had more personal breastfeeding intent (p = .001).

Table 25 *Student Characteristics Predicting Knowledge (N=385)*

	B	*SE*	β	*p*	*sr*
Gender [a]	9.30	2.78	.16	.001	.16
Age	2.05	0.64	.16	.002	.15
Race/Ethnicity [b]	4.75	2.10	.12	.024	.11
Born in USA [c]	2.39	2.97	.04	.420	.04
Observed breastfeeding	0.57	0.76	.04	.454	.04
Personal breastfeeding intent	6.14	1.42	.22	.001	.21

F (6, 378) = 10.68, p = .001. R^2 = .145.

[a] Gender: "1" = "Male" and "2" = "Female"
[b] Race/Ethnicity: "0" = "Non-Caucasian" and "1" = "Caucasian"
[c] Born in USA: "0" = "No" and "1" = "Yes"

sr = Semi-partial (Part) Correlation

Table 26 displays the regression model for student characteristics, predicting attitude. This overall model accounted for 13.7% of the variance (p = .001). Inspection

of the individual beta weights found that attitude was significantly higher in those students who had observed the practice of breastfeeding more often in their lifetime (p = .04), and for those students who had a greater amount of personal breastfeeding intent (p = .001).

Table 26 *Student Characteristics Predicting Attitude (N=385)*

	B	*SE*	β	*p*	*sr*
Gender [a]	0.10	0.07	.08	.123	.07
Age	0.01	0.02	.02	.704	.02
Race/Ethnicity [b]	0.08	0.05	.08	.123	.07
Born in USA [c]	-0.09	0.07	-.07	.193	-.06
Observed breastfeeding	0.04	0.02	.10	.038	.10
Personal breastfeeding intent	0.20	0.03	.30	.001	.28

F (6, 378) = 10.01, p = .001. R^2 = .137.

[a] Gender: "1" = "Male" and "2" = "Female"
[b] Race/Ethnicity: "0" = "Non-Caucasian" and "1" = "Caucasian"
[c] Born in USA: "0" = "No" and "1" = "Yes"

sr = Semi-partial (Part) Correlation

2. **Effects of instructional characteristics on knowledge and attitude scores**

The six instructional variables accounted for 7.0% of the variance in knowledge (p = .001). An inspection of the beta weights in Table 27 revealed that the

breastfeeding knowledge was better when there were higher practice scores ($p = .06$), and when there was a greater ability to explain social support ($p = .03$).

Table 27 *Instructional Characteristics Predicting Knowledge (N=385)*

	B	*SE*	β	*p*	*sr*
Modeling	-0.18	-0.56	-.02	.749	-.02
Practice	1.25	0.65	.12	.056	.10
Feedback	-0.53	0.61	-.05	.384	-.04
Social Supports –Identify	0.59	0.66	.07	.374	.04
Social Supports–Explanation	1.86	0.84	.19	.027	.11
Social Supports–Enlist	-0.31	0.87	-.03	.720	-.02

F (6, 378) = 4.76, $p = .001$. $R^2 = .070$.

sr = Semi-partial (Part) Correlation

Table 28 displays the regression model for instructional characteristics predicting attitude, and these six variables accounted for 7.3% of the variance in attitude ($p = .001$). Inspection of the beta weights in Table 28 revealed that no individual beta weight was significant.

Table 28 *Instructional Characteristics Predicting Attitude (N=385)*

	B	*SE*	β	*p*	*sr*
Modeling	0.02	0.01	.08	.200	.06
Practice	0.02	0.02	.07	.278	.05
Feedback	0.01	0.01	.05	.349	.05
Social Supports –Identify	0.01	0.02	.03	.658	.02
Social Supports–Explain	0.02	0.02	.08	.377	.04
Social Supports–Enlist	0.02	0.02	.08	.273	.05

F (6, 378) = 4.97, p = .001. R^2 = .073.

sr = Semi-partial (Part) Correlation

3. **Effects of program characteristics on knowledge and attitude scores**

Table 29 displays the standard regression model for the four program characteristics predicting knowledge. The overall model accounted for 5.9% of the variance in breastfeeding knowledge (p = .001). Inspection of the beta weights found that knowledge was greater in the students who attended public institutions (p = .04), and in the programs, which did not offer a graduate nursing degree (p = .007), as well as those programs, which were larger (p = .003).

Table 29 *Program Characteristics Predicting Knowledge (N=385)*

	B	*SE*	β	*p*	*sr*
Funding [a]	-6.51	3.13	-.23	.038	-.10
Religious Affiliation [b]	1.49	3.19	.05	.642	.02
Graduate Program [c]	-5.17	1.91	-.16	.007	-.14
Number of Seniors	2.01	0.68	.17	.003	.15

$F(4, 380) = 5.99$, $p = .001$. $R^2 = .059$.

[a] Funding: "1" = "Public" and "2" = "Private"
[b] Religious Affiliation: "0" = "No" and "1" = "Yes"
[c] Graduate Program: "0" = "No" and "1" = "Yes"

sr = Semi-partial (Part) Correlation

Table 30 displays the regression model of program characteristics predicting attitude, and the overall model accounted for 4.7% of the variance in attitude ($p = .001$). Inspection of the beta weights revealed that attitude was significantly higher for students in larger programs ($p = .001$).

4. **Combined effects of student, instructional, and program characteristics on knowledge and attitude scores**

Table 31 displays the backward elimination regression model predicting knowledge, based on 16 potential variables. The final model accounted for 22.0% of the variance in knowledge ($p = .001$). The final model had eight variables that revealed knowledge to be significantly higher for those at public institutions ($p = .001$), those who

Table 30 *Program Characteristics Predicting Attitude (N=385)*

	B	*SE*	β	*p*	*sr*
Funding [a]	0.11	0.08	.17	.136	.08
Religious Affiliation [b]	-0.13	0.08	-.19	.091	-.09
Graduate Program [c]	-0.06	0.05	-.08	.166	-.07
Number of Seniors	0.06	0.02	.21	.001	.19

$F(4, 380) = 4.66$, $p = .001$. $R^2 = .047$.

[a] Funding: "1" = "Public" and "2" = "Private"
[b] Religious Affiliation: "0" = "No" and "1" = "Yes"
[c] Graduate Program: "0" = "No" and "1" = "Yes"
sr = Semi-partial (Part) Correlation

participated in programs that did not offer a graduate nursing degree ($p = .01$), and those from larger programs ($p = .01$). The only instructional characteristic that reached significance for knowledge was nursing students' ability to explain various social supports ($p = .001$). Higher knowledge scores were present with the following student characteristics: female ($p = .001$), older ($p = .03$), Caucasian ($p = .001$), and greater amounts of personal breastfeeding intent ($p = .001$).

Table 31 *Predicting Knowledge, Based on Selected Variables. Backward Elimination Regression (N=385)*

	B	*SE*	β	*p*	*sr*
Gender [a]	10.85	2.67	.19	.001	.19
Age	1.32	0.62	.11	.034	.10
Race/Ethnicity [b]	5.93	1.81	.15	.001	.15
Personal Breastfeeding Intent	5.26	1.35	.19	.001	.18
Funding [c]	-4.51	1.35	-.16	.001	-.15
Graduate Program [d]	-4.43	1.77	-.13	.013	-.11
Number of Seniors	1.53	0.62	.13	.014	.11
Social Supports–Explain	1.99	0.46	.21	.001	.20

Final Model: $F(8, 376) = 13.29$, $p = .001$. $R^2 = .220$.

[a] Gender: "1" = "Male" and "2" = "Female"
[b] Race/Ethnicity: "0" = "Non-Caucasian" and "1" = "Caucasian"
[c] Funding: "1" = "Public" and "2" = "Private"
[d] Graduate Program: "0" = "No" and "1" = "Yes"

sr = Semi-partial (Part) Correlation

Table 32 displays the backward elimination model predicting attitude. The final model accounted for 19.7% of the variance in breastfeeding attitude ($p = .001$). Program characteristics that were significant for attitude scores were nursing students who attended privately funded programs ($p = .05$), those who attended non-religious affiliated institutions ($p = .07$), and those schools which had greater numbers of senior nursing students ($p = .001$). Two instructional characteristics correlated with higher attitude

scores: students who were able to enlist higher amounts of social support ($p = .01$) and those who had higher feedback scores ($p = .006$). Student characteristics that predicted higher attitude scores were for females ($p = .04$), and those who had a greater amount of personal breastfeeding intent ($p = .001$).

Table 32 *Predicting Attitude, Based on Selected Variables. Backward Elimination Regression (N=385)*

	B	*SE*	β	*p*	*sr*
Gender [a]	0.13	0.06	.10	.042	.09
Personal Breastfeeding Intent	0.21	0.03	.31	.001	.31
Funding [b]	0.13	0.07	.20	.052	.09
Religious Affiliation [c]	-0.13	0.07	-.19	.065	-.09
Number of Seniors	0.05	0.01	.17	.001	.17
Feedback	0.03	0.01	.13	.006	.13
Social Supports–Enlist	0.04	0.01	.13	.010	.12

Final Model: $F(7, 377) = 13.22$, $p = .001$. $R^2 = .197$.

[a] Gender: "1" = "Male" and "2" = "Female"
[b] Funding: "1" = "Public" and "2" = "Private"
[c] Religious Affiliation: "0" = "No" and "1" = "Yes"

sr = Semi-partial (Part) Correlation

D. Research Question 4 : Self-Efficacy and Breastfeeding Knowledge and Attitudes

Senior nursing students' self-efficacy scores regarding breastfeeding were a measurement for the likelihood that the student would provide breastfeeding support. Correlations between breastfeeding knowledge scores and attitude scores with the student's evaluation of the program's breastfeeding education, and the student's self-evaluation regarding confidence in providing breastfeeding support were examined. Only 10% of nursing students felt their program preparation was "less than adequate". The majority of students (93%) were confident that they could explain the benefits of breastfeeding and 78% were confident that they could assist a mother with the initiation of breastfeeding. Overall, 80% of the students were considered "confident" or "very confident" as measured by the self-efficacy scale (Table 33).

Table 34 displays the correlations of the breastfeeding knowledge and attitude scores with the self-efficacy variables. Scores for breastfeeding knowledge do not correlate significantly with the student's evaluation of how well their program prepared them for providing breastfeeding support. Knowledge scores had small significant correlations with the student's confidence in explaining the benefits of breastfeeding ($r=.20$), assisting the mother with initiating breastfeeding ($r = .12$) and the overall self-efficacy scale ($r = .14$), which combined these three variables.

Scores for breastfeeding attitude do have small significant correlations with the student's evaluation of how well their program prepared them for providing breastfeeding support ($r = .12$), their confidence in explaining the benefits of breastfeeding ($r = .28$),

their confidence in assisting the mother with initiating breastfeeding (r = .22) and the overall self-efficacy scale (r = .26).

Table 33 *Descriptive Statistics for Self-Efficacy Variables (N=385)*

	n	%
Program Preparation		
Less than adequate	38	9.9
Adequate	149	38.7
Good	134	34.8
Excellent	64	16.6
Confident Explanations		
Not confident	27	7.0
Confident	211	54.8
Very confident	147	38.2
Confident Assistance		
Not confident	85	22.1
Confident	237	61.6
Very confident	63	16.4
Self-Efficacy Scale		
Not confident (1.00 – 1.74)	76	19.7
Confident (1.75 – 2.49)	233	60.5
Very confident (2.50 – 3.00)	76	19.7

Table 34 *Correlations of Self-Efficacy Scores with Selected Variables (N=385)*

	Program Preparation	Confident Explanations	Confident Assistance	Self-Efficacy Scale
Knowledge	.02	.20**	.12*	.14**
Attitude	.12*	.28**	.22**	.26**

* $p = .05$. ** $p < .01$.

Results of this study indicated that breastfeeding education in U.S. university nursing programs was provided in a traditional manner with nursing faculty lectures, textbook readings, and written exam questions for evaluation. Student respondent breastfeeding knowledge scores were low (M= 66.2%) and attitudes were supportive (M= 3.23 on a 4-point scale). Breastfeeding knowledge and attitude scores did vary between program, instructional, and student characteristics. Program characteristics accounted for 5.9% of the knowledge variance and 4.7% of the attitude variance while instructional characteristics accounted for 7% of the knowledge variance and 7.3% of the attitude variance. Student characteristics however accounted for the greatest amount of variance in knowledge (14.5%) and attitude (13.7%) scores.

The overall best predictors of breastfeeding knowledge scores were being older, white, and female with a higher personal breastfeeding. Attendance at a public institution with a larger nursing program but no graduate nursing program and the ability to explain various social supports were also identified as significant. The overall best predictors of breastfeeding attitude scores were being female with higher personal breastfeeding intent,

and attending a privately funded non-religious affiliated institution with a larger nursing program. The nursing program that provided a greater amount of feedback and the student who could enlist various social supports were significant. The instructional characteristic common to both knowledge and attitude prediction was either the ability to explain or enlist social supports.

Despite low knowledge scores, students' self-efficacy scores regarding their ability to provide breastfeeding support (M=2.06 on a 3-point scale) indicated that they were confident.

V. DISCUSSION

Breastfeeding education in U.S. university nursing programs is described according to Bandura's framework for behavioral change. A brief summary of the findings is presented followed by a discussion of breastfeeding educational experiences, breastfeeding knowledge and attitudes, the factors that influence breastfeeding knowledge and attitudes, and student self-efficacy. Limitations and strengths of the study are explained, implications for nursing education, practice, and research are presented, and final conclusions are made.

Findings from this study indicate that breastfeeding education in U.S. university nursing programs is ineffective as measured by senior nursing student knowledge scores. However, senior nursing student attitude scores are supportive of the nurse's role in breastfeeding support as well as for breastfeeding in general. Student characteristics account for the greatest variance in both knowledge and attitude scores followed by instructional characteristics and finally program characteristics. Significant factors identified for teaching breastfeeding content are increased utilization of social supports and increased amount of feedback. Despite low knowledge scores, 80% of the students were confident in their abilities. This contradiction may in part be due to faculty and therefore student perception of breastfeeding support as an unimportant nursing skill. Some may view the natural process of breastfeeding as a less critical topic in nursing education. Students receive low levels of practice, inadequate feedback on this practice, and lack awareness of how to use social supports important to breastfeeding promotion. Students may not have enough learning opportunities to be able to recognize what they

do not know. A deliberate plan for modeling, practice, and feedback is needed in a clinical or laboratory setting.

A. Breastfeeding Educational Experiences

Breastfeeding education continues to be a component of maternal child nursing education and thus reflects that breastfeeding support continues to be a part of nursing practice. Nearly all programs use traditional lecture and textbook modalities for imparting information, and a maternity hospital setting for clinical experience. Modeling in the clinical setting and the use of journal articles and videos are used in about half of the programs. Nursing faculty are the main educators along with other health care professionals at the clinical sites including RNs, lactation consultants, CNMs/NPs, MDs, and Registered Dieticians. With the majority of clinical experiences in the maternity setting, students are limited to observing the initial breastfeeding phase. This finding indicates that breastfeeding support is practiced as an isolated specialty skill rather than integrated throughout the curriculum. Moreover, this lack of integration may be due to didactic and clinical time being devoted to skills that are perceived as more important.

Tschetter's (2001) study of South Dakota nursing students did not address the specific strategies for breastfeeding education. Freed et al. (1996) had almost identical findings for who presented breastfeeding information and how this was presented to the 272 North Carolina nursing students. These similarities in statistics between data collected in 1993 and data collected in 2003 indicate that the approach to breastfeeding education has remained stagnant.

This current study found that in addition to the professionals who provided breastfeeding information in the clinical setting, other tutors came from a variety of

sources. Nearly half of the students cited other nursing students as sources of breastfeeding information and this may mean that other students had greater life experience with breastfeeding. Students received information from other disciplines such as pharmacology, anatomy and physiology, and psychology and sociology. These findings indicate that some of the implementation for nurses' breastfeeding education may be shared and nursing faculty may wish to explore and then complement the specific content that is presented or omitted by other disciplines.

Students in this sample had moderate amounts of modeling, which develops the social and self-regulation skills needed to carry through the learned behavior of effective breastfeeding support. Modeling can occur in a laboratory or classroom simulation, while attending and observing a breastfeeding support group meeting, through multi-media or during clinical experiences. No clinical experience was reported for 6% of students even though all students had completed a maternity course. This may not reflect an omission by nursing faculty but rather the lack of available clinical experiences due to the low incidence of exclusive breastfeeding in the United States.

The frequency of breastfeeding clinical practice encounters was low. Only 16.9% of students had three or more breastfeeding teaching encounters, 31.4% had no experiences teaching mothers breastfeeding techniques and 8.6% had never seen a breastfeeding infant. Tschetter (2001) reported a similar rate of clinical encounters for teaching breastfeeding. Data collected by Freed et al. (1996) 10 years prior to this study had slightly better findings with 25% of students having three or more teaching experiences, 20% having no teaching experiences, and 8% having never seen a breastfeeding infant. Although no standard exists as to what constitutes the minimal

amount of practice necessary to gain competency, Freed et al. (1996) used a self-report of at least three clinical encounters. A deliberate mechanism for clinical encounters would be beneficial to this important component of practice.

The majority of feedback was provided by written examination questions that may or may not foster critical thinking about this skill. About half of the students completed a care plan and less than half had their breastfeeding support skills observed by their instructors. These three feedback methods represent a range from static to interactive. Although the use of exam questions indicates a level of significance given to the topic and encourages accountability from students for particular knowledge, interactive feedback will likely have a component of modeling and may be more effective for behavioral change.

The ability to identify, explain, and utilize various breastfeeding social supports such as La Leche League and evidence-based guidelines is lacking. These supports need to be included in the didactic curriculum as well as modeled and practiced in a clinical setting or simulation. A deliberate plan for modeling, practice, and feedback is needed in a clinical or laboratory setting.

Overall, students' responses indicate moderate levels of modeling and low levels of practice, feedback, and social support identification, explanation, and use. Deficiencies in these key components of Bandura's social cognitive theory as applied to behavioral change (1994) partially explain the student's low level of knowledge with regard to breastfeeding. Effective breastfeeding education is not being received in their generic professional program.

Several implications for nursing education are suggested by looking at which variables had moderate correlations with the instructional characteristics (modeling, practice, feedback, and social supports). There was a positive correlation between the nursing student's modeling score and the use of information provided by a lactation consultant. This correlation may indicate the professional's comfort level with breastfeeding, as would be expected, and their clinical teaching style with patients. The lactation consultant also has a focused topic to present to the nursing student unlike the nursing instructor who has many other topics to address. Modeling and clinical experience occurring in the hospital maternity area is a correlation indicating the environment where the student has exposure to this concept. Conversely, lower modeling scores were noted where the student had no breastfeeding clinical experience. This modeling score was defined as video/CD-ROM observation, modeling in the clinical setting or the classroom, and how many times breastfeeding was observed. For this group of students to have modeling of breastfeeding, the hospital setting was the environment. Other environments need to be explored to provide the student with increased clinical encounters of broader modeling examples.

Feedback and practice, two components that develop self-efficacy in the person, were positively correlated with several variables. Feedback scores were significantly higher when journal articles were used to present information. This may indicate that faculty who make available current information on the science of lactation value the topic and also implement more mechanisms of feedback to measure learning. This importance placed upon breastfeeding by the individual professional may also be a reason that when CNMs or NPs provided breastfeeding information at clinical sites, feedback scores

increased. Feedback was significantly correlated with the number of times a student had taught breastfeeding techniques indicating that an activity encouraged feedback rather than a passive lecture or reading. The interactive, reciprocal nature of Bandura's framework between modeling in the environment and the person practicing the behavior can be seen when examining the correlation that practice scores were higher when instructor observation was used for feedback and when the student observed breastfeeding a greater number of times.

Students gave significantly higher scores for program preparation when written examination questions were used for feedback. This type of concrete accountability may have indicated to the student a greater importance about the topic of breastfeeding. In addition, the times that the student taught breastfeeding techniques was positively correlated with the ability to explain various social supports, the students' ability to enlist social supports, the student nurse's rating of their confidence in assisting breastfeeding initiation, and the overall self-efficacy scale. These correlations help to explain the relationship between the person and the environment and support the interactive nature of the theoretical framework.

B. **Breastfeeding Knowledge and Attitudes**

Senior baccalaureate nursing students in this study had low knowledge scores and supportive attitude scores. Freed et al. (1996) had the same conclusion after examining surveys from 272 North Carolina nursing students. Anderson and Geden (1991), Crowder (1981), and Lewinski (1992) studied practicing nurses' breastfeeding knowledge and concluded that a deficiency existed. Tschetter (2001) concluded that the majority of nursing students in her sample were knowledgeable since 66% of the 249

South Dakota nursing students scored a 70% or better on the scale. Using the common grading system of 74% for passing, only 1/3 of the students in this study could be considered knowledgeable. Confidence in the "Breastfeeding Education Survey" exists due to the degree of validity established through literature review, expert review and pilot testing as well as the degree of reliability indicated by a Cronbach's alpha of .79 for the knowledge scale and .82 for the attitude scale. With attitude scores indicating overall support for breastfeeding, resources for breastfeeding education interventions should be focused on improving knowledge.

C. Prediction of Breastfeeding Knowledge and Attitude Scores

At first glance the findings from the models used to predict knowledge and attitude scores, standard regression and backward elimination regression, appear to be contradictory for some variables. For example, when looking at the semi-partials for instructional methods and attitude, none of the variables are statistically significant within this model (Table 28). But when looking at the semi-partials in the backward elimination regression model that considered all variables, the instructional variables "amount of feedback" and "the ability to enlist social supports" are significant (Table 32). The first standard regression model examined only instructional methods and attitude. Within the 6 instructional variables none were statistically significant for explaining the amount of variance in attitude scores. This finding was due to the intercorrelations between these instructional variables as evidenced by the similar Beta (standardized coefficients) statistics even though these independent variables were not found to be highly correlated when examined prior to the regression analysis . When student, program, and instructional variables were examined in the backward elimination regression, the least

significant predictors were eliminated until all of the remaining predictors were significant at the p=.10 level. Two of the eight significant predictors were instructional variables. The standard regression identified which group of characteristics explained the most variance in scores while the backward elimination regression identified which variables among all of the variables were significant.

Using standard multiple regression, student characteristics predict the greatest amount of knowledge variance (14.5%) followed by instructional characteristics (7%) and program characteristics (5.9%). Using backward elimination regression, the final model that considers all variables explains 22% of the knowledge variance with the variables female, personal intent to breastfeed, and the ability to explain social supports each accounting for 4% of the variance. These statistically significant student variables account for the experience and motivation that the student brings to the learning situation. The nursing program's breastfeeding education curriculum is contributing only a small amount to the student's knowledge about breastfeeding.

Being older and Caucasian, from a large, public school with no graduate nursing program are statistically significant variables related to knowledge, with very small effect sizes that are not clinically meaningful. However, these mature students may be attending nursing programs that have a greater degree of focus on their undergraduate program. This focus may attract faculty with strong clinical and teaching interests.

Nursing education needs to become the variable that explains the most variance in breastfeeding knowledge scores. The one nursing education instructional variable that is statistically significant is the student's ability to explain social supports, such as La Leche League or the "Ten Steps to Successful Breastfeeding". This instructional characteristic

requires further study. Can students demonstrate this ability once they have received a lecture on social supports or read a journal article? Or, do students need to see this modeled and then have practice and feedback in a clinical setting? The number of times a student taught breastfeeding techniques was positively correlated with the ability to explain social supports. This significant relationship may indicate that the behavior of effective breastfeeding support as measured by knowledge and attitude is an active psychomotor skill and needs to be actively taught (modeling and practice) and actively evaluated (observation for feedback).

Using standard multiple regression for data analysis, student characteristics predict the greatest amount of attitude variance (13.7%) followed by instructional characteristics (7.3%) and program characteristics (4.7%). Using backward elimination regression, the final model that considers all variables explains 19.7% of the attitude variance with the variable of personal breastfeeding intent accounting for nearly 10% of the variance. Being female from a larger school with greater amounts of feedback in the program are statistically significant variables with very small effect sizes. For feedback, the one significant instructional variable, it is not known if the nursing educational program provided a greater amount of feedback and subsequently higher supportive attitudes or if students with higher supportive attitudes sought out more feedback from their instructors. According to Bandura's interactive framework, either scenario would contribute positively to effective breastfeeding support.

D. Self-Efficacy and Breastfeeding Knowledge and Attitude Scores

The majority of students in this sample were confident in their program preparation for providing breastfeeding support (90.1%), in their ability to explain the

benefits of breastfeeding (93%), and in their ability to assist the mother with initiating breastfeeding (78%). Freed et al. (1996) had identical results related to self-efficacy and also found a lack of breastfeeding knowledge. Of the 272 students from North Carolina nursing programs, 90% reported that they were adequately prepared to instruct and support mothers in breastfeeding and 75% of these students were confident in their ability to assist breastfeeding mothers. Within this national random study, less than half of the students could identify a correct breastfeeding position or answer how often a newborn infant should nurse. Almost half would erroneously advise the mother to limit her newborn to 3-5 minutes feeding time on each breast and instruct a mother that sore nipples are to be expected.

Although a positive significant correlation was expected, scores for breastfeeding knowledge did not correlate significantly with the student's evaluation of how well their program prepared them for providing breastfeeding support. There are small significant correlations between knowledge scores and the student's confidence in explaining the benefits of breastfeeding, assisting the mother with initiating breastfeeding and the overall self-efficacy scale which combined these three variables. Nursing students do not know what they need to learn about breastfeeding and may be assuming that their program is providing what is necessary.

Scores for breastfeeding attitude do have small significant correlations with the student's evaluation of how well their program prepared them for providing breastfeeding support, their confidence in explaining the benefits of breastfeeding, their confidence in assisting the mother with initiating breastfeeding and the overall self-efficacy scale. All instructional variables (modeling, practice, feedback, and social supports) were

significantly correlated with attitude while only practice and social supports correlated significantly with knowledge. The student may be receiving the message that supportive attitudes are sufficient for effective breastfeeding support.

Referring to Bandura's model, it is surprising that self-efficacy should be so high with low levels of practice and feedback since, according to the model, practice and feedback are the components of self-efficacy. A possible explanation for this is that students are relying on their educational programs to provide them with "what is needed" or to be made aware of their program's limitations. The data from this study indicate that nursing students received neither.

E. Strengths and Limitations of the Study

This research was guided by a conceptual framework based upon Albert Bandura's social cognitive theory as applied to behavioral change. It is the first study in nursing education to evaluate all components of the framework and therefore the results can be interpreted using this previously tested theory. It is important that effective models for behavior change guide nursing education, like patient education.

This is also the first study of nursing students' breastfeeding educational experiences to use a randomized national sample and a web survey, which allowed for the timely collection of data from multiple sites. The web survey approach is ecologically friendly and beneficial for cost savings in postage, paper, printing, and data entry time. While these innovations were strengths of the study, there were difficulties with the response rate. Questions can be raised regarding the representativeness of those who responded compared to the overall sample.

As discussed in Chapter 3, two similar studies provided high response rates. These studies represented survey data derived from either North Carolina (Freed et al., 1996), or South Dakota (Tschetter, 2001) associate and baccalaureate degree nursing students. For this study, a random sample provided 385 senior baccalaureate student respondents from rural and urban settings across the nation but had a trade-off of lower response rates. However, the relatively low response rate for program recruitment (30%), student participation (28%), and final qualified sample size (21%) also indicates some degree of self-selection. The two entry points to this sample were when the program designate decided to participate in the study and when the individual student completed the survey. Most likely, only those with some degree of interest in breastfeeding education or breastfeeding support became involved. Therefore, due to nonresponse error, the sample bias was most likely toward respondents with a higher degree of effective breastfeeding education. This sample most likely had students with a higher degree of breastfeeding knowledge and breastfeeding attitudes than the population. This probable bias makes the low knowledge scores even more of a concern.

The quality of this random national sample can be evaluated by examining the limitations and strengths of the sample selection strategy. A major limitation was the lack of a database for the 621 U.S. baccalaureate nursing programs that are accredited by the Commission on Collegiate Nursing Education (CCNE) or the National League for Nursing Accrediting Commission (NLN-AC) or both. Program demographic data such as institutional funding, religious affiliation, and presence of a graduate nursing program were available by searching each institution's web site. These data were gathered for the 36 programs that had student respondents in the survey. Data for student characteristics,

such as gender, ethnicity, age and particularly number of generic BSN graduates from the previous year could have been used to stratify the randomization but they were not available. Due to this lack of information the demographics of the final sample of 385 respondents could not be compared to the demographics of the population.

Since no information to stratify the sample was readily available, the programs were randomly selected and a student sample size relative to the population size was obtained. To ensure that means could be estimated, a sample of at least 379 students was needed to provide statistically stable results with low random error. The final sample of 516 respondents with 385 eligible surveys provided an overall level of 5% error with a 95% level of confidence.

Sample characteristics were compared to characteristics of the RN population to examine the sample's representativeness since no national characteristics of BSN students are available. The sample characteristics were similar to the gender and ethnic demographic characteristics found in the RN population and thus reflect a likeness to that population.

Another factor influencing this low response rate aside from a possible lack of interest in the topic was the lack of control for contacting the prospective respondents. Evidence of the break down in communication was seen when only 36 of the 50 programs who initially agreed to participate in the study had at least one respondent despite follow-up reminders. These reminders may or may not have been forwarded to the students. The ease of communicating with computer technology also permits an ease of not completing the communication due to "undeliverable" e-mail. Also, there were no stacks of surveys sitting on a faculty member's desk waiting for distribution and serving

as a tangible reminder of the agreement to participate. Likewise, the student could most likely delete the survey with greater ease than throw away a personally signed invitation with return postage.

In the future, a national database for U.S. accredited baccalaureate nursing programs is a prerequisite for nursing education research to establish the representativeness of the sample. To enhance response rates for web survey nursing education research, a personalized approach is needed and the faculty responsible for the nursing research course at each program may be a helpful contact. A printed announcement could be sent to the participating programs and posted for students to become aware of the project before the student invitations are sent. This may alert the student to the authenticity of the e-mail invitation and avoid inadvertent deletion because the invitation was thought to be spam. The deployment of the survey could then be coordinated with the faculty member. Surveys could be completed voluntarily and anonymously in a computer lab during class time. Another option would be to maintain confidentiality of the participants but not anonymity. By assigning a password and identification number for each anticipated participant, individualized follow-up e-mails could be sent to remind students about the survey and to request completion of partial surveys. An incentive such as a bookstore coupon could then be provided upon survey completion.

This study used a newly created tool for data collection. Measures can be improved by expanding the self-efficacy scale to more than three items and evaluating this new scale with psychometric testing. The concept of social supports can also be expanded to include social supports found in the environment that are student

characteristics such as family and peers rather than just the knowledge and use of supporting organizations and standards. Data quality can be improved by making modifications to the survey questions. Quantification of breastfeeding presentation formats such as how many chapters, articles, or lectures were dedicated to the topic of breastfeeding would be useful as well as qualification of the materials to determine if they are current. Another concept that could be explored would be for the student to indicate the source of their knowledge or attitude response. This data could help distinguish between the nursing program's contribution to student breastfeeding knowledge and attitude scores and other sources of breastfeeding information or misinformation.

F. Conclusions and Implications

The purpose of this study was to identify exemplary methods for teaching breastfeeding content. To do this the current state of breastfeeding education in U.S. baccalaureate nursing programs was described and factors associated with higher knowledge and attitude scores were identified.

There continues to be a disconnect between baccalaureate nursing education with regard to breastfeeding, the measured outcome of breastfeeding knowledge, and the nursing student's perception of this education. Utilizing Bandura's framework to identify components for behavioral change, baccalaureate nursing programs are providing breastfeeding education with a moderate amount of modeling and with minimal amounts of practice, feedback, and social support utilization. Therefore, it is not surprising that low knowledge scores reflect this effort. It is also not surprising but rather disconcerting that students are confident in their breastfeeding support education and in themselves to

provide this support. The student is not recognizing their lack of knowledge or the amount of preparation needed to be effective. This shortcoming will continue into the graduate nurse's career and expectations from employers and patients will not be met. Eventually, since the majority of students plan to be personally involved with breastfeeding, their breastfeeding knowledge deficits will become evident and hopefully rectified.

The finding of supportive breastfeeding attitudes is an asset for future improvement of breastfeeding knowledge and ultimately breastfeeding support. Student responses indicate that they view formula as inferior to breast milk and the nurse as an instrumental part of breastfeeding support. With improved knowledge gained through standardized modeling and the use of social supports and accurate self-efficacy from practice and dynamic feedback, nursing students will have the prerequisites needed for effective breastfeeding support.

This study suggests that nursing science in the area of breastfeeding education has not progressed in the past 10 years. What was expected prior to conducting this research was that instructional characteristics would explain a greater portion of the variance in breastfeeding knowledge and attitudes. Then, from those circumstances, exemplary teaching methods would be identified. Instead, other unidentified factors account for a large amount of this variance. Implementing exemplary teaching methods will only address a small portion of what is needed to promote effective breastfeeding support. Fortunately, due to the interactive nature of Bandura's model, these small interventions can be part of the catalyst needed for change.

The expectation that breastfeeding support will be provided by nurses continues but U.S. breastfeeding education does not provide the curriculum necessary to ensure foundational knowledge and skills. Recommendations for education, policy, and future research are made based upon this statement.

Breastfeeding education requires active learning modalities and skill demonstration. Breastfeeding education should include simulated patient situations to provide standardized structured modeling, practice, and feedback. Social supports related to breastfeeding should be included in didactic material as well as during modeling of breastfeeding interactions. Coordination with other disciplines such as pharmacology, nutrition science, psychology, and sociology will provide a synergistic approach to learning. Expectations for students to utilize these social supports during practice in a clinical or simulated situation will be made and appropriate feedback provided. Utilizing the expertise of lactation consultants and nurse-midwives or nurse practitioners can also enhance the learning experience. Most importantly, nursing faculty must clarify what is covered and what is not covered in the breastfeeding education curricula. This must be done to guard against inflated self-efficacy with regard to breastfeeding support.

It is time for a joint policy recommendation through professional organizations such as AWHONN and AACN to set competencies for breastfeeding education outcomes for the U.S. baccalaureate prepared nurse. This would provide nursing faculty with an educational social support to promote a behavioral change towards the provision of effective breastfeeding education.

Future research will include implementation of educational recommendations. In addition, a qualitative examination of programs with the highest knowledge scores would

be helpful to identify any unique instructional methods. A separate but related study could look at nursing program motivators such as the number of NCLEX items on the national nursing exam, awareness of the Wellstart International and University of California lactation management curriculum (1999), and emphasis on the maternal-child health component in undergraduate nursing education. An examination of faculty attitudes about breastfeeding and breastfeeding education could help to further explain the variance in student scores. Finally, to improve the strength of any future baccalaureate nursing education studies, a demographic database of program characteristics must be established.

The largest group of health care professionals can make an impact on breastfeeding initiation and continuation rates. U.S. senior baccalaureate nursing students have the message that "breast is best" and now need their educational programs to ensure that they will have a scientific foundation to effectively support new families in this endeavor.

APPENDICES

Appendix A

Essential messages about breastfeeding from a Joint WHO/UNICEF Statement Protecting, Promoting and Supporting Breastfeeding, 1989, p. 6.

Breastfeeding is an unequalled way of providing ideal food for the healthy growth and development of all normal infants. Ideally, exclusive breastfeeding will be the norm for the first 4-6 months of life.

Virtually all women can lactate; genuine physiopathological reasons for not being able to breastfeed are rare.

Anxiety associated with unfounded fears of lactation failure (the inability to produce milk) and of milk insufficiency (the inadequacy of breast milk for meeting the nutritional needs of the normal infant) is one of the most common reasons for mothers' failing to initiate breastfeeding, interrupting it prematurely, or beginning complementary feeding before it is nutritionally required. Emotional support will strengthen a mother's confidence that she can successfully breastfeed.

Anaesthesia, strong sedation, prolonged labour, surgical intervention, and other sources of stress, discomfort and fatigue for mothers and infants impede the initiation of lactation.

Close mother-child contact immediately following birth and frequent sucking at the breast are the best stimulus for milk secretion.

The correct positioning of the infant at the breast is important to facilitate feeding, ensure milk supply and help prevent sore or cracked nipples and breast engorgement.

The first milk – colostrums – is of particular nutritional and health value to the infant given its high content of proteins and fat-soluble vitamins and its anti-infective properties. It is the infant's first immunization.

Under normal circumstances the neonate requires no water or other food whatsoever during the first 2-4 days after birth while lactation is being initiated.

Giving any other food or drink to the breast-fed infant before about 4 months of age is usually unnecessary and may entail risks, for example making the infant more vulnerable to diarrhoeal and other diseases. Because of its effect on sucking and milk secretion, any other food or drink given before complementary feeding is nutritionally required may interfere with the initiation or maintenance of breastfeeding.

A Joint WHO/UNICEF Statement. (1989). *Protecting, promoting and supporting breast-feeding: the special role of maternity services*. Geneva, World Health Organization.

Appendix B

The Ten Steps to Successful Breastfeeding from a Joint WHO/UNICEF Statement Protecting, Promoting and Supporting Breastfeeding, 1989, p. iv.

Every facility providing maternity services and care for newborn infants should:

1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within a half-hour of birth.
5. Show mothers how to breastfeed, and how to maintain lactation even if they should be separated from their infants.
6. Give newborn infants no food or drink other than breast milk, unless *medically* indicated.
7. Practice rooming-in – allow mothers and infants to remain together – 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

A Joint WHO/UNICEF Statement. (1989). *Protecting, promoting and supporting breast-feeding: the special role of maternity services.* Geneva, World Health Organization.

Appendix C

Wellstart International /University of California at San Diego
Lactation Management Curriculum, 1999

Scientific Basis
Level I Awareness

Discuss in general terms, findings from the basic and social sciences of lactation:

1. Describe the general benefits of breastfeeding for the infant.
2. Describe the general benefits of breastfeeding for the mother.
3. Describe the benefits of breastfeeding for the community-at-large.
4. Identify mammary structures involved in milk production and transfer.
5. Describe the process of milk production and removal.
6. Describe the ways the suckling process differs between breast and bottle feeding.
7. Describe in general terms the impact of maternal nutrition on lactation.
8. Describe the growth pattern of the breastfed infant.
9. Describe the relative impact of age, ethnicity, socioeconomic status, and geographic region on breastfeeding rates in your country.
10. Identify cultural and psychosocial factors that impact breastfeeding rates.

Clinical Management
Level I Awareness

Provide clinical care consistent with the initiation and maintenance of lactation:

1. Identify factors that contribute to the breastfeeding decision.
2. Conduct a breastfeeding history and examination of the breasts.
3. Identify components of anticipatory guidance for all women.
4. Identify components of anticipatory guidance and support for women with special needs.
5. Recognize the impact of intrapartum and immediate postpartum procedures/medications on lactation.
6. Recognize correct attachment and effective suckling at the breast.
7. Recognize when and how lactation needs to be maintained during separation and refer mother for assistance.
8. Discuss basic nutrition recommendations for the lactating woman.
9. Describe the current recommendations for introducing complementary foods and supplements.
10. Discuss causes and prevention of common breastfeeding problems.
11. Recognize that infants with special health care needs can breastfeed.
12. Prescribe/recommend medications and treatment options which are compatible with lactation.
13. Discuss family planning options for the lactating woman.

Appendix C (continued)

Professional Practice Issues

Level I Awareness

Coordinate services with, and provide appropriate referral to, other professionals, laypersons, and community groups:

1. Identify various professionals who contribute to the support and management of the breastfeeding mother/infant pair.
2. Discuss, in general terms, the roles of the various professionals as members of a lactation management team.
3. Identify community and professional groups and activities that promote breastfeeding.
4. Make appropriate referrals for women needing assistance with breastfeeding.

Support policies, which promote breastfeeding:

1. Discuss your professional organization's policy statements regarding breastfeeding.
2. Discuss your country's policies and goals for breastfeeding.

Wellstart International and University of California, San Diego. (1999). *Lactation Management Curriculum*. San Diego, California.

Appendix D

Assessment, utilizing Bandura's framework, of the tools available to measure breastfeeding education

Title, Author, Date	Items	Know-ledge	Attitudes	Modeling	Practice	Feedback	Self-efficacy	Identify supports	Enlist supports
Nurses' Knowledge of Breastfeeding, Anderson and Geden, 1991	20 item tool within a paper survey	X						X	
Lewinski, 1992	16 item paper survey	X							
National Assessment of Physicians' Breast-feeding Knowledge, Attitudes, Training, and Experience, Freed, Clark, Sorenson, Lohr, Cefalo, and Curtis, 1995	24 item paper survey	X	X	X	X		X		
Breastfeeding Attitudes and Knowledge of Pediatricians-in-Training, Williams and Hammer, 1995	81 item paper survey	X	X						
Methods and Outcomes of Breastfeeding Instruction for Nursing Students, Freed, Clark, Harris, and Lowdermilk, 1996	15 item paper survey	X	X	X	X		X		
The Breastfeeding Knowledge, Attitudes, and Training of Nutritionists and Dieticians, Figueroa, 2001	77 item mail survey	X	X	X					
Graduating Nursing Students' Self-Efficacy Regarding Breastfeeding Management, Tschetter, 2001	57 item paper survey	X		X	X	X	X		
Author's Tool, Marzalik, 2003	78 item web survey	X	X	X	X	X	X	X	X

Appendix E

April 12, 2002

Gary L. Freed, MD, MPH
University of Michigan
300 NIB 6E08
Ann Arbor, Michigan 48109-0456

Dear Dr. Freed,

I am a doctoral student in nursing at the University of Illinois at Chicago and am planning a measurement project for this fall. I have a copy of the "Nursing Education Pilot Questionnaire" that you previously provided for my review and I am now requesting your permission to use this questionnaire for my measurement project and dissertation research.

I will be applying to the Institutional Review Board in May and will provide them with a copy of the questionnaire along with your permission for its use.

Thank you for your time.

Sincerely,

Penny Rall Marzalik, CNM, IBCLC

(708) 246-9176
pmarza1@uic.edu

Permission is hereby granted to copy the "Nursing Education Pilot Questionnaire" for use in the research described above.

Gary L. Freed

4/19/02
Date

Appendix E (continued)

July18, 2002

Elizabeth L. Williams, M.D.
Family Practice
301 Old San Francisco Rd.
Sunnyvale, CA 94086

Dear Dr. Williams,

I am a doctoral student in nursing at the University of Illinois at Chicago. My dissertation topic is "Breastfeeding Education in University Nursing Programs". I will be examining the teaching practices at the "Big Ten" universities and senior nursing students' attitude and knowledge scores.

I would like to obtain permission from you to modify and use the breastfeeding questionnaire that you published in the American Journal of Preventive Medicine 1995:11(1).

Thank you for your time.

Sincerely,

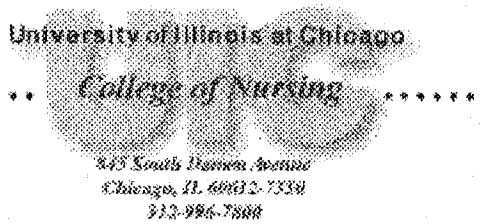
Penny Rall Marzalik, CNM, IBCLC
3927 Linden Avenue
Western Springs, Illinois 60558
(708) 246-9176
pmarza1@uic.edu

Permission is hereby granted to modify and use the "Breastfeeding Questionnaire" for use in the research described above.

Elizabeth L. Williams, M.D. , MD

7/29/02
Date

Good luck!



Thank you for volunteering to complete this survey!

The survey begins with questions about the breastfeeding education that you have received, then asks you to indicate your amount of agreement with attitude statements, and lastly asks you to respond to knowledge questions.

Please complete the survey in one session (about 15 minutes). Your responses are anonymous and I have no way of contacting you personally for a partially completed form.

Thanks again, and please contact me with any questions that you may have.

Penny R. Marzalik, MS, CNM, IBCLC
(708) 246-9176
pmarza1@uic.edu

Enter Survey

THIS IS A SAMPLE OF THE BREASTFEEDING EDUCATION SURVEY – YOUR ANSWERS WILL NOT BE RECORDED

A0. Which school do you attend?

Select

A1a. Have you completed a course that included obstetrical nursing?

- ☐ Yes
- ☐ No

A1b. During your nursing education, please indicate all individuals who provided you with information about breastfeeding:

- ☐ Nursing faculty
- ☐ Anatomy/physiology faculty
- ☐ Psychology/sociology faculty
- ☐ Pharmacology faculty
- ☐ Literature/arts/history anthropology faculty
- ☐ Lactation consultants
- ☐ RNs at clinical sites
- ☐ CNMs/NPs at clinical sites
- ☐ Registered dieticians
- ☐ Other nursing students
- ☐ MDs at clinical sites
- ☐ Other Specify:

A2. Please indicate all formats that have been used to present breastfeeding information:	
☐	Text book
☐	Journal articles
☐	Lecture
☐	Video/CD Rom observation
☐	Modeling in the classroom
☐	Modeling in the clinical setting
☐	Role-play
☐	Self-learning module
☐	Other Specify:

A3. During your nursing education please indicate all of the ways that you were given feedback about your knowledge of breastfeeding:	
☐	Written exam questions
☐	Care plan
☐	Paper/report
☐	Oral presentation
☐	Instructor observation
☐	Self-learning module completion
☐	I have not been given feedback about my knowledge of breastfeeding

A4. Where did your clinical experience with breastfeeding occur (please select all that apply):

- ☐ Hospital maternity area
- ☐ Hospital pediatric care
- ☐ Ambulatory care setting
- ☐ "Baby Friendly" Hospital
- ☐ Home care setting
- ☐ I have not had any clinical experience with breastfeeding

A5. During your nursing education, please indicate how often you have observed a mother breastfeeding.

Select

A6. During your nursing education, please indicate how often you have taught a mother breastfeeding techniques.

Select

A7. How well has your nursing program prepared you to support breastfeeding mothers? Has it given you...

Select

A8. Regarding your ability to explain to a mother the benefits of breastfeeding would you say you are

Select

A9. Regarding your ability to assist a mother in initiating breastfeeding would you say you are

Select

A10. During your life experience (do not include your nursing education) please indicate how often you have observed a mother breastfeed:

Select

A11. Have you or your partner ever breastfed an infant?

Select

A12. Would you describe this breastfeeding experience as:

- Positive
- Negative
- I have never had a breastfeeding experience

A13. Are you

- Male
- Female

A14. Are you a:

- Nursing student
- BSN completion student (already an RN)

A15. Age

Select

A16. Ethnic group that you identify yourself with

- ○ White, non-Hispanic
- ○ Black, non-Hispanic
- ○ Hispanic
- ○ Asian
- ○ Other Specify: _____

A17. Country where you were born?

- ○ United States
- ○ Other Specify: _____

A18. Country or countries where you grew up?

- ☐ United States
- ☐ Other(s) Specify: _____

If you select a response in the first column, please respond to the corresponding questions in columns 2 and 3.

Please check if you have heard of the following:	Could you explain the function of this to someone else?	Have you utilized any of their resources?
☐ La Leche League	○ Yes ○ No	○ Yes ○ No
☐ IBCLC (International Board Certified Lactation Consultant)	○ Yes ○ No	○ Yes ○ No
☐ Baby Friendly Hospital	○ Yes ○ No	○ Yes ○ No
☐ 10 Steps to Successful Breastfeeding	○ Yes ○ No	○ Yes ○ No
☐ International Code of Marketing of Breast-milk Substitutes	○ Yes ○ No	○ Yes ○ No
☐ Evidenced-based guidelines for breastfeeding management during the first 14 days of life	○ Yes ○ No	○ Yes ○ No
☐ Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding	○ Yes ○ No	○ Yes ○ No
☐ A written breastfeeding policy at your clinical site	○ Yes ○ No	○ Yes ○ No

Please indicate if you strongly agree, agree, disagree or strongly disagree with the following statements.

	Strongly agree	Agree	Disagree	Strongly disagree
B1. I prefer that the babies that I take care of are breastfed.	○	○	○	○
B2. I believe that the partners of breastfeeding mothers often feel left out if the mother breastfeeds.	○	○	○	○
B3. I would be embarrassed if a mother breastfed her toddler in front of me.	○	○	○	○
B4. Breastfeeding does not fit in with today's active lifestyles.	○	○	○	○
B5. I would be embarrassed if a mother breastfed her infant in front of me.	○	○	○	○

Please indicate if you strongly agree, agree, disagree, or strongly disagree with the following statements.

	Strongly agree	Agree	Disagree	Strongly disagree
B6. Nurses should provide information to mothers about breastfeeding even if the mother has stated her intentions to formula feed her baby.	○	○	○	○
B7. Breastfeeding is more time consuming than bottle feeding.	○	○	○	○
B8. Formula is as good as breast milk.	○	○	○	○
B9. Mothers who breastfeed are likely to be more fatigued than mothers who formula-feed.	○	○	○	○
B10. It is the nurse's role to assist mothers in breastfeeding.	○	○	○	○

Please indicate if you strongly agree, agree, disagree or strongly disagree with the following statements.

	Strongly agree	Agree	Disagree	Strongly disagree
B11. It is helpful to formula-feed a newborn at night so the mother can rest following birth.	○	○	○	○
B12. Breastfeeding is less expensive than formula feeding.	○	○	○	○
B13. Breastfeeding is easier than formula preparation and bottle-feeding.	○	○	○	○
B14. In industrialized countries such as the United States, it doesn't really make a difference if an infant is breastfed or formula-fed.	○	○	○	○
B15. Breastfeeding is a current trend and not scientifically supported.	○	○	○	○

Please indicate if you strongly agree, agree, disagree, or strongly disagree with the following statements.

	Strongly agree	Agree	Disagree	Strongly disagree
B16. Within the nursing profession, only maternity nurses need knowledge about breastfeeding.	○	○	○	○
B17. Breastfeeding and formula feeding are equally acceptable methods for feeding infants.	○	○	○	○
B18. As a nurse, I have minimal influence on a mother's success in initiating or continuing breastfeeding.	○	○	○	○

Please indicate your answer by selecting true, false, or not sure

	True	False	Not sure
C1. Either the infant or a breast pump must remove milk from the breast to establish and maintain milk production.	○	○	○
C2. Nearly every breastfeeding mother can expect to experience painful engorgement when her milk comes in.	○	○	○
C3. About 25% of women are physically incapable of breastfeeding.	○	○	○
C4. Supplemental feeding with water or formula can be detrimental to the establishment of a good milk supply.	○	○	○
C5. Should a mother's milk supply be low, providing a bottle of formula after each breastfeeding will resolve the problem.	○	○	○

Please indicate your answer by selecting true, false, or not sure.

	True	False	Not sure
C6. During the period of breast engorgement, it is helpful for the infant to be formula fed.	○	○	○
C7. Lactation can be successful in many cases following augmentation mammoplasty.	○	○	○
C8. If a woman has flat nipples, she is unable to breastfeed.	○	○	○
C9. Colostrum is not "real milk" and has only minimal benefits for the infant.	○	○	○
C10. Formula fed infants have more ear infections that breastfed babies.	○	○	○

Please indicate your answer by selecting true, false, or not sure.

	True	False	Not sure
C11. Formula fed infants are constipated more often than breastfed babies.	○	○	○
C12. Mothers who smoke cigarettes should not breastfeed.	○	○	○
C13. In most cases, breastfeeding must end if a mother requires a prescription medication.	○	○	○
C14. Mothers who breastfeed should avoid all spicy foods.	○	○	○
C15. Glucose water or formula should be offered to breastfeeding infants until the mother's milk comes in.	○	○	○

Please indicate your answer by selecting true, false, or not sure.

	True	False	Not sure
C16. Mothers should be helped to initiate breastfeeding within the first 30 minutes of birth.	○	○	○
C17. If a mother plans to use a bottle to feed her baby expressed breast milk or formula on occasion, the baby should begin practicing on a bottle before hospital discharge.	○	○	○
C18. An infant's cry is often the first sign that he or she is ready to breastfeed.	○	○	○
C19. If the mother needs to remove the infant from the breast, breaking the suction between the nipple and the infant's mouth is necessary only after the milk is in.	○	○	○
C20. Mothers intending to breastfeed should expect their nipples to be sore during and between feedings.	○	○	○

Please indicate your answer by selecting true, false, or not sure.

	True	False	Not sure
C21. A breastfed infant should be offered a pacifier as a way of preventing the mother from getting sore nipples.	○	○	○
C22. The most common cause of sore nipples related to breastfeeding is allowing the infant to nurse too much the first day or so.	○	○	○
C23. Mothers know instinctively how to breastfeed.	○	○	○
C24. One way to check for milk transfer from mother to infant is to listen for the sound of the infant swallowing.	○	○	○
C25. Initially a breastfeeding newborn should nurse for only 3-5 minutes at each breast per feeding.	○	○	○

Please indicate your answer by selecting true, false, or not sure.

	True	False	Not sure
C26. A breastfed newborn should nurse every 4 hours.	○	○	○
C27. It is normal for a breastfed infant to stool several times a day after the mother's milk has come in.	○	○	○
C28. Three wet diapers in a 24-hour period is a sign of adequate intake in a breastfed newborn older than 1 week.	○	○	○
C29. Formula supplementation is required for newborns that appear jaundiced.	○	○	○
C30. Partners of breastfeeding mothers should be encouraged to give their newborn a bottle of formula at least once a day in order to allow the mother to rest.	○	○	○

Please indicate your answer by selecting true, false, or not sure.

	True	False	Not sure
C31. A mother may continue breastfeeding if she has developed mastitis.	○	○	○
C32. A mother should stop breastfeeding once her infant has teeth.	○	○	○
C33. If a mother or her infant requires hospitalization, breastfeeding should stop.	○	○	○
C34. Mothers of premature infants can initiate and maintain lactogenesis (making of milk) using a breast pump.	○	○	○
C35. If the primary care provider diagnosed thrush in a breastfed infant, the mother should be treated as well.	○	○	○
C36. Low birth weight and premature infants require fortified formula exclusively.	○	○	○

Please choose from the following answers:

D1. The American Academy of Pediatrics has advised that infants receive breast milk for at least:	
○	3 months
○	6 months
○	1 year
○	2 years
○	Not sure

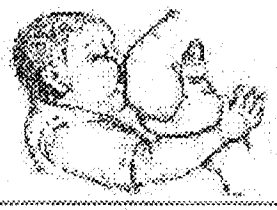
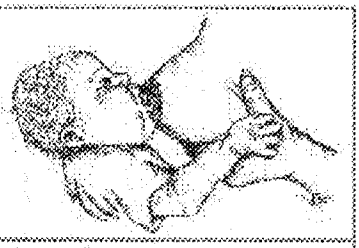
	

Image 1	**Image 2**

D2. Which picture above is showing an effective latch?

- ○ Image 1
- ○ Image 2
- ○ Both are correct
- ○ Neither are correct
- ○ Not sure

Image 1

Image 2

D3. Which picture above is showing an effective position?

- ○ Image 1
- ○ Image 2
- ○ Both are correct
- ○ Neither are correct
- ○ Not sure

Thank you for completing this survey!

Penny R. Marzalik, MS, CNM, IBCLC
pmarza1@uic.edu
(708) 246-9176

UNIVERSITY OF ILLINOIS
AT CHICAGO

I, along with two of my committee members am writing to you today to request your, or your designee's assistance in distributing my on-line survey to senior nursing students for my doctoral dissertation entitled, "Breastfeeding Education in University Nursing Programs". As a nurse-educator, midwife, and lactation consultant I have become aware of health care providers' omissions and inconsistencies concerning breastfeeding support. It is my intent to examine the largest group of health care providers, nurses', professional education regarding breastfeeding. This will be the first national study on this topic and will describe how nursing students are prepared to support breastfeeding and their attitudes and knowledge about breastfeeding. Along with the opportunity for your students to participate in a national nursing research survey, a profile of your program's information will be available to you upon request.

If you agree to participate, I will e-mail you or your designate the invitation to be posted to the list-serve for all senior nursing students. When the student receives the e-mail, he or she will be invited to participate in the 15-minute survey by clicking on the link to the survey. Approximately four days later I will send another e-mail to you or your designate to post to all senior nursing students. This will extend a final invitation to complete the survey if the student has not done so and thank the student if they have completed the survey.

Students cannot be identified individually. I will be asking the students to indicate the name of their university. Any reference made in my publication or presentation of this information will refer to the region of the program. For example, the University of Illinois at Chicago would be referred to as a mid-western nursing program.

Following this letter, I have included a brief abstract, my biosketch, and statement of Institutional Review Board approval.

I encourage you, or your designate to facilitate the participation of your senior nursing students in my study. Please feel free to contact me with any questions that you may have and I invite you to take a look at my survey http://128.248.232.70/research/nursingsurvey/index.html and reply affirmatively to my e-mail.

Sincerely,

Penny R. Marzalik, CNM, IBCLC
Doctoral Candidate
(708) 246-9176 pmarza1@uic.edu

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Penny Rall Marzalik
University of Illinois at Chicago
Breastfeeding Education in University Nursing Programs
Abstract
September 2003

Because the goal of increasing breastfeeding rates is a national public health priority that has made little progress, the need to address the topic of breastfeeding education in university nursing programs is vital (United States Department of Health and Human Services, 2000). Currently, less than half of the babies born in the United States are given the opportunity to breastfeed exclusively (Ryan, Wenjan, and Acosta, 2002).

The problem of the disparity between scientific knowledge that "breast is best" and the appropriate professional nursing support for promotion, initiation, and continuation of breastfeeding is significant for the optimal health and well being of infants and mothers. Uninformed opinions from family and friends, restrictive work situations, and successful formula marketing campaigns may negatively influence a mother's decision to breastfeed. However, scientifically based, consistent information, emotional support, and practical help from nursing professionals should be the positive influence that will promote breastfeeding initiation and continuation in the United States.

Nurses are the largest group of health care professionals and they have direct contact with pregnant women and new mothers and parenting families. Nurses are in a position to make a difference in breastfeeding success. For the largest group of health care professionals to make an impact on breastfeeding initiation and continuation rates, nursing students need to acquire correct breastfeeding knowledge and effective breastfeeding skills. The few studies on breastfeeding education indicate that breastfeeding education in nursing programs is less than adequate but provide no insight about what educational strategies can improve nursing students' capacity for breastfeeding promotion.

A national survey of senior nursing students from baccalaureate-nursing programs will be conducted to examine the educational experiences, and current knowledge, attitudes, and self-efficacy regarding breastfeeding. Albert Bandura's social cognitive learning model provides a framework for examining educational experiences in terms of didactic content, role modeling by instruction and opportunities to rehearse skills and receive corrective feedback. The study will examine what aspects of nursing education regarding breastfeeding relate most strongly to nursing students' accurate knowledge and attitudes and confidence in their capacity to support breastfeeding mothers.

United States Department of Health and Human Services (2000). *Healthy people 2010 understanding and improving health.* (Revised ed.) Boston: Jones and Bartlett Publishers.

Ryan, A., Wenjun, Z., & Acosta, A. (2002). Breastfeeding continues to increase into the new millennium. *Pediatrics, 110,* 1103-1109.

Penny R. Marzalik, CNM, IBCLC
Doctoral Candidate
Fall 2003
Biosketch

My nursing career began with a Bachelor of Science degree in Nursing from The Ohio State University (1981) and a Master of Science degree with a specialty in nurse-midwifery from the University of Illinois at Chicago (1984). I am currently completing my fifth year of the doctoral program at the University of Illinois at Chicago and anticipate defending my dissertation in 2004. My research has been greatly facilitated by receipt of a nationally competitive award from the National League for Nursing Foundation for Nursing Education. On completion of my doctoral studies I plan to seek an appointment within a college of nursing as an educator, researcher, and practitioner in maternal/child health.

Since my interests have always centered on the birth of new families, and to complement my academic credentials, I have completed certification as a childbirth educator and International Board Certified Lactation Consultant. My interests also have allowed me to pursue my adventurous nature by providing holiday coverage for the nurse-midwives at the Indian Health Service in Chinle, Arizona and by becoming the first nurse-midwife in a hospital practice and subsequent private practice in Naperville, Illinois. I have also enjoyed being a faculty member at Rush University, Chicago, Illinois and Lewis University, Romeoville, Illinois. Currently, I am on staff as a lactation consultant at Hinsdale Hospital (level III neonatal unit with over 3000 births per year) in Hinsdale, Illinois.

Along with pursuing my professional goals, I have a good life with my husband Kevin and my three sons Peter, Jake, and Luke (ages 11,11,and 10). We are a musical family who all enjoy playing the piano and listening to Peter on the saxophone and Luke on the cello. For family vacations or trips on my own, I like any type of travel where I can see how people live and work. At home, I appreciate long walks with my Mom for mutual exercise and conversation.

Approval Notice
Amendment to Research Protocol and/or Consent Document – Expedited Review
UIC Amendment # 1

September 23, 2003

Penny R. Marzalik, BSN, MS
Maternal Child Nursing
C/O: Kathleen Norr, PhD, Faculty Sponsor
845 S. Damen Avenue, M/C 802
Chicago, IL 60612
Phone: (708) 246-9176

RE: Protocol # 2002-0596
"Breastfeeding Education in University Nursing Programs"

Dear Dr. Marzalik:

Members of Institutional Review Board (IRB) #3 have reviewed the amendment to your research and/or consent form on September 23, 2003 under expedited procedures for minor changes to previously approved research allowed by Federal regulations [45 CFR 46.110(b)(2) and 21 CFR 56.110(b)(2)]. The amendment to your research was determined to be acceptable and may now be implemented.

Please note the following information about your approved amendment:

This amendment does not alter the Exemption Category under 45 CFR 46.101(b):

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

- Amendment: UIC Amendment #1 dated August 26, 2003 is an investigator-initiated amendment expanding the sample size of the research.
- Research Protocol: "Breastfeeding Education in University Nursing Programs",
  Amendment #1, 08/26/2003

Please note the Review History of this submission:

Receipt Date	Submission Type	Review Process	Review Date	Review Action
08/29/2003	Amendment	Expedited	09/08/2003	Modifications Required
09/18/2003	Response To Modifications	Expedited	09/23/2003	Approved

Please be sure to:

→ Use your research protocol number (2002-0596) on any documents or correspondence with the IRB concerning your research protocol.

→ Review and comply with all requirements of the,"**UIC Investigator Responsibilities, Protection of Human Research Subjects**"

Please note that the UIC IRB has the right to ask further questions, seek additional information, or monitor the conduct of your research and the consent process.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact the OPRS office at (312) 996-1711 or me at (312) 355-4006. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,

Cynthia C. Tom-Klebba, M.A.
Assistant Director, IRB # 3
Office for the Protection of Research Subjects

Enclosure(s): (1) **UIC Investigator Responsibilities, Protection of Human Research Subjects**

cc: Kathleen F. Norr, Maternal Child Nursing, M/C 802

Rosemary C. White-Traut, Maternal Child Nursing, M/C 802

To:	"Dr.
From:	pmarza1@uic.edu Add to Address Book
Subject:	Research Invitation for Senior Nursing Students
Status:	Urgent New Update
Message:	Dear Dr. Here is the research invitation for the senior nursing students. Please post at your earliest convenience and thank you for facilitating my survey! Hello! My name is Penny Marzalik and I am a doctoral student in nursing at the University of Illinois at Chicago (UIC). My dissertation research involves describing breastfeeding education in university nursing programs, senior nursing students' knowledge and attitudes about breastfeeding, and identifying exemplary models of breastfeeding education. The National League for Nursing has funded my research and your school has posted this invitation to you after your institution was randomly selected from all U.S. accredited baccalaureate nursing programs. By clicking on the link and completing my 15-minute survey, you will be providing your consent to participate in this study. There is no way of identifying you individually and any reference made to your nursing program will be generalized to the regional location of your school. For example students from the University of Illinois at Chicago would be described as students from a mid-western nursing program. I do hope you will participate in this important research that will benefit families and nursing education. Please contact me with any questions that you may have. If you do not have 15 minutes now, just do not delete this message and you can enter the survey at a more convenient time 24 hours a day. (one technical hint for answering the survey : when selecting your school and all other drop-box choices, please remember to select with a click and then click again to lock your answer)

Here is the link to enter the survey
http://128.248.232.70/research/nursingsurvey/nursingsurvey.html

Thanks again!

Sincerely,

Penny R. Marzalik, MS, CNM, IBCLC

(708) 246-9176
pmarza1@uic.edu

This research has been approved by UIC's Institutional Review Board (IRB), Office for Protection of Research Subjects (OPRS). Phone: (312) 996-1711
www.http://oprs.ovcr.uic.edu

Message No:	3 of 33
Date Sent:	Thursday, November 13, 2003 10:24 AM
To:	"Dr.
From:	pmarza1@uic.edu Add to Address Book
Subject:	Reminder for Research Invitation/ Senior Nursing Students
Status:	Urgent New Update

Message:

Dear Dr.,
Here is a thank you/reminder e-mail for the senior nursing students. Please post at your earliest convenience. So far I have surveys from 20 University students. Thanks!
Penny Marzalik

Hello again!

This is a reminder to you regarding the invitation to participate in my breastfeeding education survey. If you have already completed this, I thank you. If you have not, this is another opportunity to complete the 15-minute survey by clicking on the following link anytime.

Within the survey, when answering which school do you attend, please scroll down the list. University is after the University of State.

https://webmail.uic.edu/redirect?http://128.248.232.70/research/nursingsurvey/nursingsurvey.html

YOU are important to this research. Your nursing program was randomly selected from all U.S. accredited nursing programs so your responses are needed and highly valued.

The following is the first e-mail invitation that I sent to you. If you are having any technical difficulty with the survey please let me know.

Thanks again for your time and consideration,

Penny R. Marzalik, MS, CNM, IBCLC

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VITA

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EDUCATION: B.S., Nursing, The Ohio State University, Columbus, Ohio, 1981
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Adventist Health System
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University of Illinois at Chicago, 1990-1992

Edward Hospital's Women's Center for Health,
Naperville, Illinois, 1987-1989

Indian Health Service, Chinle, Arizona,, December 1988

Lewis University, Romeoville, Illinois, 1986-1989

Rush-Presbyterian-St. Luke Medical Center, Chicago, Illinois,
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1983-1984

University of Illinois Hospital, Chicago, Illinois,
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AWARDS: National League for Nursing Foundation for Nursing Education Fellowship, 2003

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Illinois Society for Advanced Practice Nursing
International Lactation Consultant Association
Midwest Nursing Research Society
Sigma Theta Tau International Honor Society of Nursing

PUBLICATIONS:

Rall, P., Kirchhoff, K., & Roberts, J. (1984). Professional attire at delivery, part II: delivery attire in Chicago-area hospitals. *J Nurse Midwifery, 29,* 257-260.

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