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The Effectiveness of Internet and Instant Messaging Approaches in Promoting Intention to Breastfeed

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THE EFFECTIVENESS OF INTERNET AND INSTANT MESSAGING APPROACHES IN PROMOTING INTENTION TO BREASTFEED

by

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Abstract of a Dissertation
Submitted to the Graduate School
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ABSTRACT

THE EFFECTIVENESS OF INTERNET AND INSTANT MESSAGING APPROACHES IN PROMOTING INTENTION TO BREASTFEED

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Breastfeeding rates for the southern portion of the United States are low compared to the rest of the country. This study sought to determine the effectiveness of electronic delivery of breastfeeding education compared to written education in regards to intention to breastfeed in a convenience sample of pregnant women in coastal Louisiana and Mississippi. The final sample included 147 women randomized into one of three groups to complete the six week education intervention study. Questionnaires measuring demographics, Need for Cognition Scale (NFC), the Iowa Infant Feeding Attitude Scale (IIFAS), and the IFI Feeding Intentions Assessment were utilized. MANCOVA was used to determine if differences existed between the experimental groups regarding participants' infant feeding intentions. No significant differences were found between groups; however, all three groups did show improvement in their intention to breastfeed scores. The participants in the text message group also showed more initiative in accessing educational lessons. These findings suggest that more research should be done to focus on ways to utilize text messages as part of breastfeeding educational programs.

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CHAPTER I

INTRODUCTION

Breastfeeding statistics for the southern portion of the United States of America (US) show that mothers from this region are less likely to breastfeed their infants than mothers from other geographic regions within the country. Centers for Disease Control (CDC) report the national average for the percent of babies in the U.S. that were ever breastfed was 76.9% in 2009. Southern states such as Alabama (57.2%), Louisiana (53.5%), and Mississippi (47.2%) are all well below the national average (Centers for Disease Control, 2012). The Healthy People 2020 goal for breastfeeding is to achieve at least 81.9% breastfeeding initiation in the early postpartum period (US Department of Health and Human Services, 2010). The low breastfeeding rates in Louisiana and Mississippi are one example of these states' consistent place at the bottom of health ranking surveys like America's Health Rankings 2011. Louisiana ranks forty-ninth and Mississippi ranks fiftieth on this list due to its high percentage of children who live in poverty, number of uninsured citizens, the high rate of obesity, and the high rate of preventable hospital visits (United Health Foundation, 2012).

Breast milk is the optimal source of nutrition for infants. The benefits for mother and infant are well documented in the literature. The American Academy of Pediatrics (AAP) policy statement from 2012 states that breast milk decreases infant mortality rates in the United States by 21% (Eidelman & Schanler, 2012). Infants fed breast milk also receive many other health benefits, which are reviewed in the accompanying literature review.

Health education interventions to increase breastfeeding initiation have been successful in increasing initiation as well as continuation rates. Interventions range from in-person one on one or group education and use of written education materials to web-based and peer support approaches, both prenatal and postnatal. Bonuck et al. (2002), in a review of 41 breastfeeding interventions, concluded that the most effective interventions are those that included one-on-one lactation support both prior to after delivery.

While a variety of face-to-face intervention approaches have been shown to be effective in promoting breastfeeding, including both individual and group approaches, offering these types of interventions in rural areas may be a challenge where resources such as money and human capital are limited. The internet offers a new way to interact with and educate people about breastfeeding and possibly increase initiation rates. Healthcare organizations like physicians' clinics, public health clinics, and hospitals can implement internet-based health programs that provide clients with life event management. This approach could lead to better client outcomes and increase the quality of life of clients. Internet based programs can provide education, support, and skills training. These approaches could in turn increase self-efficacy for decreasing stress and increase adaption of healthy behaviors (MacStravic, 2001).

There are several examples of successful health behavior interventions utilizing the internet. The accompanying literature review details some of these that may be of use in supporting the use of web-based interventions for breastfeeding promotion as well as a review of research that has been published specifically regarding using web-based interventions to promote initiation of breastfeeding.

Statement of the Problem

The purpose of this study was to determine if intention to breastfeed could be increased for mothers of infants born in Louisiana and Mississippi through the use of a web-based educational support program for pregnant females versus a traditional written education program mailed to participants. The information gained through this study provides healthcare providers with another mechanism for achieving education and support for parents. It offers parents a more convenient and efficient way to access information and support for breastfeeding and its related health issues.

Conceptual Framework

The web-based educational program was based on the Elaboration Likelihood Model's (ELM) concept that persuasion is more likely to occur if the issue being communicated has increased personal relevance for an individual. This model as applied to the proposed intervention is diagrammed in Figure 1. Petty and Cacioppo (1981) state that when an attitude is formed under conditions of high personal significance it is more predictive of a desired behavior change. Individuals are more likely to engage in central route processing when they are able and motivated to think about an issue. Central route processing, the thoughtful contemplation of presented information, increases the likelihood of a long term attitude and behavior change (Petty & Caccioppo, 1986b). Individuals who are in high need for cognition are also more likely to contemplate an issue through central route processing, which would increase their persuasion to adopt the desired behavior. The ELM also states that individuals seek to hold correct attitudes. The information presented to them through this intervention may persuade them that breastfeeding is the correct choice.

The ELM also asserts that individuals involved in high elaboration cognitive processing examine the quality of arguments in a message more thoroughly and that they are more motivated to process higher quality arguments versus low quality arguments. Argument quality is defined as the perception of the message recipient that the argument is strong and logical as opposed to weak and false (Petty & Cacioppo, 1986a). Therefore, pregnant women will be motivated to engage in central processing of information provided on breastfeeding in all groups due to increased personal relevance of impending infant feeding issues; however, the web-based group with text messaging will encourage the most central route processing due to the increased awareness of message relevance from frequent text message reminders. Webb, Joseph, Yardley, and Michie (2010), in a systematic review and meta-analysis of studies using the internet to promote health behavior change, found that health interventions that use additional methods of interacting with subjects (especially text messaging) increased the effectiveness of those interventions. Increasing the message's personal relevance of the importance of the decision of infant feeding method will increase intention to breastfeed.

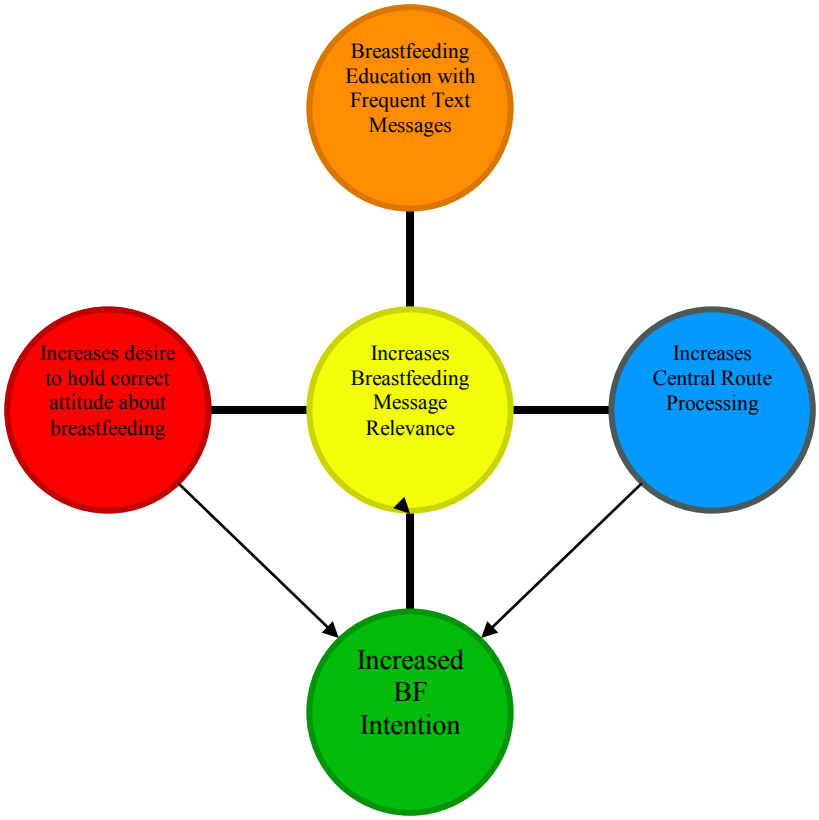


Figure 1. Conceptual Framework. (Scott, 2013)

Research Objectives

The study attempted to:

1. Determine if a web-based intervention and text messaging based on postulates of the Elaboration Likelihood Model is effective at increasing intention to breastfeed compared to a traditional educational approach.
2. Participants who are older, white, married, have higher educational level, and high income level will have increased intention to breastfeed and will have higher scores on the Iowa Infant Feeding Attitude Scale.
3. Determine if Need for Cognition is related to change in intention to breastfeed.

Hypotheses

1. Change in intention to breastfeed will be higher in the web-based intervention groups than the traditional education group.

2. Change in intention to breastfeed will be higher in the web-based intervention with text messages group versus the web-based group without text messages.

3. Intention to breastfeed and infant feeding attitude is greater among those who are married, white, have breastfeeding experience, are older, or are more educated.

4. Web-based lesson completion will be higher in the web-based plus text message condition.

Limitations

Potential threats to validity of the study included internal and external validity issues. A possible limitation would include selection bias which might have occurred due to the sample being selected from women seeking prenatal care. Women not receiving prenatal care were not sampled. History may also have been a threat to validity because participants may have had varying amounts of infant feeding experience. Participants also received prenatal care by different physicians and healthcare providers, which may affect the amounts and types of infant feeding advice they received during their pregnancies. These could have caused bias among participants. Participants may have also had different levels of computer and internet skills. Diffusion of treatment was also a concern. Participants in one of the experimental groups may have interacted with a participant in the in-person education group (control) and influenced these women's infant feeding choices.

Significance of the Study

This study added to the current body of literature by increasing the research available on web-based breastfeeding promotion and the use of text messaging for health education interventions. There are very few studies that utilize this format for promotion of breastfeeding at the individual level. The model used (ELM) is also not widely studied in the context of breastfeeding, but it has been utilized successfully in other health-related studies to determine the best route of elaboration to persuade individuals to perform certain behaviors. This study could help health care providers interested in breastfeeding promotion to implement web-based education and support that expectant parents can access at convenient times. This could also potentially increase breastfeeding initiation rates in Louisiana and Mississippi.

Definition of Terms

Breastfeeding - The infant has received breast milk (World Health Organization [WHO], 2009).

Exclusive Breastfeeding -The infant has received only breast milk (no other liquids or solids except for drops consisting of vitamins, minerals, or medicine) (WHO, 2009).

Predominant Breastfeeding - The child's predominant source of nutrition comes from breast milk, but she/he may also consume other food (WHO, 2009).

Full Breastfeeding - Refers to exclusive and predominant breastfeeding (WHO, 2009)

Complementary feeding - Child consumes breast milk and other solid/semi-solid food (WHO, 2009).

Bottle feeding - Child consumes liquid or semi-solid food from a bottle with a nipple (WHO, 2009).

Intention to Breastfeed – the mother plans on offering breast milk to her infant (Nommsen-Rivers & Dewey, 2009).

Breastfeeding initiation – the infant received any breast milk during the hospital stay (Merewood, Phillip, Chawla, & Cimo, 2003).

Persuasion – "to move by argument, entreaty, or expostulation to a belief, position, or course of action" (Merriam-Webster, 2010).

Web-based Education – education provided to the participant through an electronic means of delivery (e.g. the internet)

Central Route Processing – thinking that occurs with considerable cognitive effort (Petty & Cacioppo, 1986b)

Peripheral Route Processing – thinking that occurs without considerable cognitive effort (Petty & Cacioppo, 1986b)

Need for Cognition – a person's tendency to engage in and enjoy thinking (Cacioppo, Petty & Kao, 1984)

Elaboration – thinking about a topic (Petty & Cacioppo, 1986b)

CHAPTER II

REVIEW OF LITERATURE

This literature review includes information regarding the methodology of previous studies, theoretical perspectives, and practical programs in order to investigate possible behavioral interventions to increase women's decisions to initiate breastfeeding.

It is important to note that the definition of breastfeeding and other related terminology in the research literature is often different from one study to the next. This can be confusing for those reading the research currently available. The official definitions for breastfeeding programs and research can be standardized using the World Health Organization's (WHO, 2009) various definitions (Table 1).

Table 1

WHO Breastfeeding Definitions (WHO, 2009)

Breastfeeding Terminology	World Health Organization Official Definition
Breastfeeding	The infant has received breast milk.
Exclusive Breastfeeding	The infant has received only breast milk (no other liquids or solids except for drops consisting of vitamins, minerals, or medicine).
Predominant Breastfeeding	The child's predominant source of nutrition comes from breast milk, but she/he may also consume other food.
Full Breastfeeding	Refers to exclusive and predominant breastfeeding
Complementary feeding	Child consumes breast milk and other solid/semi-solid food
Bottle feeding	Child consumes liquid or semi-solid food from a bottle with a nipple.

Breastfeeding Prevalence

Current literature reports several successful breastfeeding interventions and promotion efforts; however, breastfeeding statistics for the southern portion of the United States of America show that mothers from this region are less likely to breastfeed their infants than mothers from other geographic regions within the country. Centers for Disease Control (CDC) report the national average for the percent of babies who were ever breast fed was 76.9% in 2009. In 2009 Southern states such as Alabama (57.2%), Louisiana (53.5%), and Mississippi (47.2%) were all well below the national average (US Department of Health and Human Services, 2010).

The ELM argues that if a person does not have the ability or motivation to process a message that the peripheral route of message delivery may be more effective to persuade or to encourage more central route processing of an argument (Petty & Cacioppo, 1986b). A breastfeeding demographic study of nine metropolitan hospitals in New Orleans delivering infants over a 12 month period was conducted using historical data. The number of births at participating hospitals was between 400-2,000 per year. The researchers found that between 20-75% of women who delivered at New Orleans-based hospitals initiated breastfeeding, depending on the facility. Only one of the hospitals met the Healthy People 2010 goal for 75% breast feeding initiation (Cropley & Herwehe, 2002). The Healthy People 2020 goal for breastfeeding is to achieve at least 81.9% breastfeeding initiation in the early postpartum period. The Healthy People 2020 objectives point out that “increasing the rate of breastfeeding, particularly among the low-income, racial, and ethnic populations less likely to begin breastfeeding during the early postpartum period and/or to sustain it throughout the infant’s first year, is an

important public health goal" (US Department of Health and Human Services, 2010, p. 16).

It is the mission of the United States Breastfeeding Committee (USBC) "to protect, and support breastfeeding in the United States . . . and to ensure the rightful place of breastfeeding in society" (United States Breastfeeding Committee, 2002, p. 1). This organization is a policy group composed of 40 breastfeeding support organizations. The USBC follows federal and state public policy, supports breastfeeding research, and promotes breastfeeding through various research based position statements on different aspects of breast feeding. The group has four goals including a) ensuring access to lactation care for all, b) ensuring that breastfeeding is acknowledged as the normal and preferred feeding method, c) ensuring that laws at all levels of government support breastfeeding practices, and d) ensuring protection, promotion, and support for breastfeeding in the workplace (United States Breastfeeding Committee, 2002). It is also the position of the Academy of Nutrition and Dietetics (formerly American Dietetic Association [2009]) that infants should be exclusively breastfed for the first six months of life and breast milk should continue to be a part of the infant's nutrition for the next six months. The Academy also affirms that breastfeeding improves the health of the infant and mother, thus helping to control healthcare costs, and that breast milk is a renewable resource, which is beneficial for the environment (James & Lesson, 2009). In February 2005 and again in 2012, the American Academy of Pediatrics (AAP) altered its 1997 policy to reflect the increase in knowledge in the area of breastfeeding and lactation. The AAP recommends breastfeeding infants exclusively for a minimum of six months and also recognizes that children may be breastfed well into the third year of life without any

detriment (Eidelman & Schanler, 2012; Gartner et al., 2005). A review of the literature which included 20 studies on the optimal duration of breastfeeding by Kramer and Kakuma (2009) also reiterates that six months of exclusive breastfeeding is optimal for infant growth and development.

Benefits of Breastfeeding

Breast milk is the optimal source of nutrition for infants. The benefits for mother and infant are well documented in the literature. The composition of human milk adapts to the nutritional needs of the child as it grows. The first milk produced after the birth of the child is called colostrum, which is an antibody rich liquid that helps build the infant's immunity to infectious agents. It contains the precise balance of macronutrients, especially essential fatty acids, necessary for proper development of the brain and eyes (Heinig & Dewey, 1996). Mature breast milk also provides a source of protection against several infectious illnesses. The AAP policy statement from 2005 references a study by Dewey and Nommsen-Rivers, which states that breast milk decreases infant mortality rates in the United States by 21%. Other illnesses that have been shown to be reduced in breastfed infants include otitis media (70% lower rate than formula-fed infants) (Dewey, Heinig, Nommsen, Peerson, & Lonnerdal, 1993; Scariati, Grummer-Strawn, & Fein, 1997), sudden infant death syndrome (Horne, Parslow, Ferens, Watts, & Adamson, 2004; Venneman, Bajanowski, Brinkman, Jorch, & Yucesan, 2009), insulin dependent diabetes mellitus (Sadauskaite-Kuehne, Ludvigsson, Padaiga, & Jasinskiene, 2004) and non-insulin dependent diabetes mellitus (Pettit, Forman, & Hanson, 1997), diarrhea (80% lower rate compared to formula-fed [Scariati, Grummer-Strawn, & Fein, 1997]), food allergies (Garcia-Careaga & Kerner, 2005; Saarinen & Kajosaari, 1995), asthma

(Chulada, Arbes, Dunson, & Zeldin, 2003), hypercholesterolemia (Plancoulaine et al., 2000), leukemia (Kwan, Buffler, Abrams, & Kiley, 2004), lymphoma, Hodgkin's disease (Beral, Alexander, & Appleby, 2000), atopic dermatitis (Gdalevich, Mimouni, David, & Mimouni, 2001; Saarinen & Kajosaari, 1995) and overweight/obesity (Balaban & Silva, 2004; Dewey et al., 1993).

There are also many benefits of breastfeeding for the mother. It promotes bonding between the mother and infant. It can also increase calorie expenditure to promote a healthy body weight. Increased oxytocin levels occur in lactating mothers, which increase involution of the uterus and decrease postpartum bleeding (Chua, Arulkumaran, Lim, Selamat, & Ratnam, 1994). Breastfeeding produces favorable blood glucose levels in gestational diabetics as well as decreases a woman's risk of osteoporosis, and premenopausal breast and ovarian cancers. Breastfeeding can also serve as a form of birth control through lactational amenorrhea when breastfeeding is exclusive (Nnakwe, 2009). Breastfeeding is also economical because the only monetary cost is food to supply the mother with an additional 500 calories per day. This cost increase in food purchases is far below the cost of infant formula. The US Breastfeeding Committee (2002) reports that US families purchase $2 million worth of infant formula every year and that the United States government spends $578 million each year to purchase formula for non-breastfed infants participating in the Women, Infants, and Children (WIC) program.

Society greatly benefits from the practice of breastfeeding. It promotes food security because it is a renewable resource. The mother will continue to produce more milk as long as the infant is suckling and the mother is properly nourished. This also makes it an environmentally responsible alternative to infant formula because it requires

no production and landfill costs like packaging, disposal, and shipping. Breastfeeding saves money by decreasing health care costs during infancy and possibly throughout life. In 2001 the United States Department of Agriculture estimated that $1.3 billion dollars more per year is spent to treat sick formula fed infants than breastfed infants by Medicaid (Weimer, 2001). Ball and Wright (1999) write that $3.6 - 7 billion are spent annually on illnesses that can be prevented by breastfeeding. Further, USBC suggests that increases in breastfeeding would mean not only a decrease in the monetary demand placed on the public taxpayer, but also increased health for the general public (United States Breastfeeding Committee, 2002).

There is some evidence to suggest that breastfeeding also decreases costs for employers. Cohen, Mrtek, and Mrtek (1995) conducted a quasi-experimental study using a convenience sample of female employees of two corporations. The sample consisted of 101 mothers (59 breastfeeding and 42 formula feeding). Maternal absenteeism due to a sick infant was 75% more likely for non-breastfeeding mothers in this sample. According to Freed (1993) breastfeeding is linked to decreased employer costs. In a 2000 survey by Mezzacappa, Guethlien, Vaz, and Bagiella (2000) of a convenience sample of 168 breastfeeding mothers and 65 weaned mothers using a web-based survey, breastfeeding women self-reported fewer gastrointestinal disturbances, doctor visits, and cardiac problems than their formula feeding counterparts . The increased illness of formula feeding mothers could lead to increased employer cost in the form of decreased work output or efficiency, or hiring and training of a new employee. Breastfeeding benefits all involved parties.

Breastfeeding Barriers

There are many barriers to breastfeeding. In the literature these barriers are often referred to as perceived barriers since they may only be seen as a barrier by the person holding the belief and not all of society. McCann, Baydar, and Williams (2007) conducted a one year longitudinal survey of a nationally representative sample of WIC mothers (n = 874). In this study 56% initiated breastfeeding, although not all were exclusively breastfeeding. Mothers in this study identified the idea of not knowing if the baby was getting enough to eat as the main barrier to continued breastfeeding. They also identified not wanting to breastfeed in public as a common barrier. Other examples of barriers identified included being the only person who could feed the baby, breast leakage, being tied down, pain, breastfeeding being time consuming, fathers' feelings of being left out, sagging breasts, and not having the proper clothing for breastfeeding. The study participants also identified specific problems that they experienced during breastfeeding. These included not having enough milk, sore/cracked nipples, engorged breasts, and breast infections. Smoking was also identified as a reason why some women decide not to initiate or discontinue breastfeeding early (McCann et al., 2007). A cross sectional analysis of women residing in Arkansas during 2000-2003 was conducted by Ogbuanu et al. (2009). The data used for analysis was from the Arkansas Pregnancy Risk Assessment Monitoring System (PRAMS). Sixty-two percent of the women in the sample initiated breastfeeding. Barriers to breastfeeding indicated by the women in this study included that they did not like it, had to go back to work/school, other children needed to be taken care of, household duties, embarrassment, wanting body back to self, not

wanting to be tied down, and partners did not want them to breastfeed the baby (Ogbuanu et al., 2009).

Since some women do cite returning to work as a barrier it is important to look at the reasons. Zinn (2000) notes that only 25% of working mothers of children under one year old breastfeed for at least one month. Literature on the perceptions of employers toward breastfeeding reveals that many employers may not know that breast milk is more beneficial for babies. They also tend to believe that lactating mothers would be absent more often. Employers also tend to be concerned with productivity reduction due to the time needed for expressing milk (Stewart-Glenn, 2008). Privacy is also a barrier; about 74% of the employers in a study by McPhillips et al. (2007) provided mothers with a lactation facility. However, a retrospective review by Ortiz, McGilligan, and Kelly (2004) studied employed mothers (n = 462) in five corporations who were offered one of three lactation programs. Breastfeeding was initiated by approximately 98% of the participants and 58% of these mothers continued to breastfeed for six months. The average mother in the study expressed milk for nine months. The authors concluded that a company lactation program can have a profound effect on a woman's ability to maintain breastfeeding while working (Ortiz et al., 2004).

Factors that Influence Initiation of Breastfeeding

The literature documents several factors that influence the initiation of breastfeeding. Initiation increases with a mother's age, income, marriage, and educational level. Higher rates of breastfeeding initiation also exist among Caucasian and some groups of un-acculturated Hispanic mothers than in their African American counterparts (McLaughlin, Burstein, Tao, & Fox, 2004; Wagner et al., 2006). These factors are also

representative of the demographic description of Louisiana women who are more likely to breastfeed (Chin, Myers, & Magnus, 2008). In studies of predictors of breastfeeding initiation and intention, researchers found that women with smaller families and those with previous experience breastfeeding were more likely to breastfeed (Meyerink & Marquis, 2002; Mitra, Khoury, Hinton, & Carothers, 2004). One research group, using a prospective observational study with a convenience sample of 87 mothers of varied ethnicity, found that the mother's personality was also related to breastfeeding initiation. Wagner et al. (2006) reported that mothers who were scored as extroverted or open on a personality test were more likely to breastfeed compared to introverts.

Two studies of intention to breastfeed suggest that the decision to breastfeed typically occurs either prior to conception or early on in the pregnancy (Earle, 2002; Humphreys, Thompson, & Miner, 1998). Bryant, Coreil, D'Angelo, Bailey, and Lazarov (1992) conducted qualitative interviews with 35 focus groups consisting of women of various ages and ethnicities. The researchers stated that "the ultimate attraction to breastfeeding is a close and loving relationship (p.725)." Initiating feeding at the breast soon after delivery, early mother-infant contact, especially skin to skin, and the practice of rooming-in have been shown to increase the duration of breastfeeding by 50% (Lindenberg, Cabrera, & Jimenez, 1990). Social support from the infant's father, the maternal grandmother, other family members, and lactation consultants also increased the likelihood of breastfeeding in samples of women of Caucasian, African American, Hispanic, and Native American ethnicities (Grassley & Eschiti, 2008; Humphreys et al., 1998; Wagner et al., 2006). A study of 84 adolescent Louisiana mothers found that these mothers were more likely to mention the baby's father as having the most influence over

their choice of infant feeding method than other family members, friends, or professionals. Only eight of the mothers had attempted breastfeeding (Robinson, Hunt, Pope, & Gerner, 1993). In a convenience sample of 87 women, those who reported having planned the pregnancy more often chose breastfeeding than those reporting unplanned pregnancies (Wagner et al., 2006).

The hospital experience has also been found to be an influential factor for breastfeeding initiation. Several surveys using various samples and designs, ranging from a longitudinal mail survey based on hospital discharge records, a chart review of 200 randomly selected women delivering at a major urban medical center over three years, a review of 545,837 electronic birth certificate records, and a literature review on birth setting practices, suggest that hospital implementation and adherence to the Baby-Friendly Hospital Initiative framework and a positive breastfeeding attitude from staff increase initiation rates at discharge (DiGirolamo, Grummer-Strawn, & Fein, 2003; Forster and MacLachlan, 2007; Kruse, Denk, Feldman-Winter, & Rotondo, 2005; Phillip, Malone, Cimo, & Merewood, 2003).

Community attitude toward breastfeeding may also influence the choice of feeding method. People's attitudes toward breastfeeding were found to be more positive in the western and north central portions of the United States. These states also were found to have the highest rates of breastfeeding, based on the 1999-2001 Health Styles Survey conducted by the Centers for Disease Control, indicating that the overall healthy attitude of the community may positively influence a mother's choice toward breast milk (Hannan, Ruowei, Denton-Davis, & Grummer-Strawn, 2005).

There are also several factors that influence the decision not to breastfeed. Characteristics of women who are less likely to breastfeed or to wean early include smoking, age less than 20 years old, low socioeconomic status, African American race, lower education level (< 12 years), women returning to work and women participating in the Women Infant and Children (WIC) Supplemental Nutrition Program (Ahluwalia, Morrow, Hsia, & Grummer-Strawn, 2003; Mahoney & James, 2000; Ross Products Division, 2002; Ryan, Wenjun, & Acosta, 2002; Scott & Binns, 1999). Rose, Bodor, and Chilton (2006) tested the hypothesis that WIC infant formula distribution decreases breastfeeding initiation and duration by evaluating state WIC data on the amount of formula distributed and breastfeeding rates in 50 states. The results of their regression analysis illustrate a negative relationship between the amount of free formula distributed and the state's breastfeeding rate at discharge and six months, controlling for demographic characteristics typically related to breastfeeding initiation. Advertising campaigns as well as free formula samples in the hospital/pediatrician's office were also found to be barriers to breastfeeding. The majority of formula-feeding mothers in surveys of predictors of anticipated breastfeeding, community attitudes, and knowledge of breastfeeding thought that breastfeeding was too complicated and that it would limit their activities (Mahoney & James, 2000; McIntyre, Hiller, & Turnbull, 2001; Zimmerman & Guttman, 2001). A multivariate analysis of breastfeeding rates in all 50 states, and the existence of breastfeeding legislation in those states, revealed that children born in states without protective breastfeeding legislation were more likely to not be breastfed (Kogan, Singh, Dee, Belanoff, & Grummer-Strawn, 2008).

Promotion of Breastfeeding

The literature contains many examples of effective breastfeeding promotion interventions. In a literature review of 10 breastfeeding interventions on a variety of groups spanning the racial and socioeconomic spectrum, Bonuck et al. (2002) concluded that the most effective interventions are those that "include in-person, individualized lactation support spanning the pre- and post-natal periods (p. 78)." Health education interventions to increase breastfeeding initiation have been successful. A review of 11 breastfeeding initiation intervention trials (1,553 women) by Dyson, McCormick, and Renfrew (2009) concluded that health education interventions increase the number of women who initiate breastfeeding. This review did not examine duration of breastfeeding. Ryser (2004) conducted a randomized controlled trial health education intervention to determine the effectiveness of the Best Start program, commonly used by the WIC program in some states. The experimental group received four individual counseling sessions, viewed a video, and received written materials. The results revealed that of the women in the experimental group ($n = 26$), 60.9% initiated breastfeeding as compared to only 14.8% of the control group ($n = 28$) ($p<.01$). A study by Leger-Leblanc and Rioux (2008) incorporated a nutrition education intervention to assess its effect on breastfeeding initiation. The intervention included Canadian mothers receiving a home visit from a nutritionist. Twenty-five mothers completed all aspects of the study (with eight other women dropping-out). Twenty (62%) of the original participants initiated breastfeeding (Leger-Leblanc & Rioux, 2008). Sandy, Anisfield, and Ramirez, (2009) implemented a randomized controlled trial to determine the effectiveness of a prenatal health education intervention among Latin American immigrants to the United

States. The intervention increased exclusive breastfeeding among the study sample. Thirty-two percent of those exposed to the health education (n = 137) reported exclusive breastfeeding compared to 20% of the control group (n = 101) (Sandy et al., 2009). Another health education intervention study by Lin, Chien, Tai, & Lee (2007) employed a quasi-experimental design and consisted of an experimental group (n = 46) and a control group (n = 46) of matched participants. At the intervention conclusion, the experimental group exhibited higher knowledge and positive attitude measure scores regarding breastfeeding than the control group did postpartum. The experimental group's rate of exclusive breastfeeding initiation (56.5%) trended higher than the control group (41.3%); however, this was not significant (p = 0.14). The interventions reported above focused mainly on providing education regarding breastfeeding as the optimal choice for infant feeding. Although they reported positive findings, initiation rates and duration of breastfeeding were still not up to the desired levels. A randomized controlled trial of Hispanic WIC participants examined initiation and duration rates of breastfeeding. Standard services were offered to the control group (n = 52) and the experimental group (n = 52) received individual counseling from a lactation consultant. Forty-five percent of the mothers in the experimental group initiated breastfeeding compared to 29% in the control group. However, exclusive breastfeeding rates fell dramatically in both groups at the three month data collection (Petrova, Ayers, Stechna, & Gerling, 2009). Education may be only one factor among several that can influence breastfeeding rates.

Peer support interventions using methods ranging from a chart audit study to randomized controlled trials have been found to be effective at increasing initiation rates of breastfeeding as well as extending the duration (Martens, 2002; Scafer, Vogel, Viegas,

& Hausafus, 1998; Shaw & Kaczorowski, 1999; Zimmerman, 1999). Shaw and Kaczorowski (1999) conducted a postpartum survey with a convenience sample to determine if mothers in a peer counseling group (n = 156) initiated and continued breastfeeding at a higher rate than those in a non-peer counselor group (n = 135). Fifty-three percent of the women in the peer counselor group initiated breastfeeding compared to 33% in the control group ($p < 0.01$). Duration of breastfeeding at six weeks was also higher in the experimental group. Peer counseling programs were also shown to be effective among inner city low income women, who tend to have the lowest breastfeeding initiation rates as part of a qualitative study (Meier, Olson, Benton, Eghtedary, & Song, 2007). A randomized study of low income Latinas (n = 165) found that those who participated in the peer counseling sessions provided by the researchers (a University Hospital) were six times more likely to initiate breastfeeding compared to a control group ($p = .002$) (Chapman, Damio, & Perez-Escamilla, 2004). Rapid assessment procedures (qualitative measurement) such as street interviews and focus groups were used to assess Latinas' sources of support for breastfeeding. Those who named a peer counselor as a source of support for breastfeeding were more likely to have breastfed their infant for six months than those who named others as their main source of support. Peer counseling programs have even demonstrated success in increasing initiation rates by targeting fathers. A Texas WIC program developed a peer counselor father program in two clinics. Between May and September of 2002, the initiation rate of the men's partners increased by an average of 9.5% and male attendance at other parenting classes offered by the WIC program also increased (Stremler & Lovera, 2004). Peer support may offer mothers education as well as support prior to and after delivery of their infant. However, the

experience mothers have in the hospital may also have a great impact on the decision to breastfeed.

The Baby Friendly Hospital Initiative's (BFHI) vision is "an American culture that values the enduring benefits of breastfeeding and human milk for mothers, babies, and society" (BFHI USA, 2009, p.1). The initiative includes 10 steps to successful breastfeeding that hospitals can adopt to increase breastfeeding rates. All of the steps are designed to increase awareness of breastfeeding on the part of the hospital as well as discourage barriers to breastfeeding. The BFHI is effective at increasing breastfeeding initiation, duration, and exclusivity rates (DiGirolamo, Grummer-Strawn, & Fein, 2001; Kramer et al., 2001; Merewood, Mehta, Chamberlain, Phillip, & Bauchner, 2005; Phillip et al., 2003; Phillip et al., 2001). In a survey of 29 hospitals in 2001, the breastfeeding initiation rate at Baby Friendly Hospitals was 83.8% as compared to the national average of 69.5% (Merewoodet al., 2005). This effect has also been seen in the neonatal intensive care unit (NICU). NICU initiation rates showed a 39.8% ($p < .001$) increase between 1995-1999 at a Baby Friendly Hospital in Boston (Merewood, Phillip, Chawla, & Cimo, 2003).

While a variety of face-to-face intervention approaches have been shown to be effective in promoting breastfeeding, including both individual and group approaches, offering these types of interventions in rural areas may be a challenge where resources are limited. Use of the internet to deliver programs to rural areas where access to personal computers as well as computers available at the public libraries in these parishes may allow for patients to access the information when it is more suited to their personal needs regarding convenience. Web-based education also allows patients to reassess

information that they may feel they did not understand the first time or just would like to review again.

The internet offers a new way to interact with and educate people about breastfeeding and possibly increase initiation rates. The Pew Research Center (2009) found that 74% of American adults use the internet and 57% of US households have a broadband connection. Their research also indicates that 61% of adults look for health information online. There are many benefits cited by Pate (2009) of e-based health interventions. These include 24/7 availability of the information, time and travel savings for caregiver and patient, maintenance of privacy and anonymity, more comfort in discussing sensitive topics, and more time to prepare an accurate response. Pate (2009) also lists disadvantages including: lack of face to face contact and access issues. The Information Use Management & Policy Institute (2008) reports that 99.7% of US libraries have free internet access. This would allow for many people who do not have home internet connections to have free access at their local library branch.

Healthcare organizations like physicians' clinics, public health clinics, and hospitals can implement internet-based health programs that provide clients with life event management. This approach could lead to better client outcomes and increase the quality of life of clients. Internet based programs can provide education, support, and skills training. These approaches could in turn increase self-efficacy for decreasing stress related to healthcare issues (MacStravic, 2001). Web-based health promotion has been described as having many advantages including convenience, flexibility, open communication, privacy, computerized data collection, and wide audience appeal (Cheng, Thompson, Smith, Pugh, & Stanley, 2003; Marshall, Leslie, Bauman, Marcus, &

Owen, 2003). Pandey, Hart, and Tiwary (2003) conducted a telephone survey of women in New Jersey using random digit dialing to assess their use of the internet for health information. The researchers found that women increasingly rely on the internet for supplemental health information. This was true in their survey especially of women who had an income of greater than $50,000 per year, had at least some college education, and were under 60 years of age (Pandey et al., 2003).

There are several examples of successful health behavior interventions utilizing the internet. These are covered within the next section, Web-based Health Interventions.

Web-Based Interventions

Web-based interventions have been used to address obesity attitudes (Haque & White, 2005), diabetes (Kim & Jeong, 2007), depression (van Bastelaar, Pouwer, Cuijpers, Tweick, & Snoek, 2008), addiction (Severson, Gordon, Danaher, & Akers, 2008), periodontal health (Ojima, Hanioka, Kuboniwa, Nagata, & Shizukuishi, 2003), pediatric care (Christakis, Zimmerman, Ebel, & Ebel, 2006; Fletcher, Vimpani, Russell, & Keating, 2008), traumatic brain injury (Rotondi, Sinkule, & Spring, 2005), physical activity promotion (Sciamanna, Lewis, Tate, Napolitano, Fotheringham, & Marcus, 2002), organ donation (Vinokur, Merion, Couper, Jones, & Dong, 2006), increasing dairy intake (Poddar, Hosig, Anderson, Nickols-Richardson, & Duncan, 2010), and prevention of medical errors (Oerman, Hamilton, & Shook, 2003). In a 2010 randomized study by Poddar et al., a web-based nutrition education program was used to evaluate the effectiveness of this medium in improving the self-efficacy and self-regulation ability of college students related to dairy consumption. The intervention involved web-based delivery of one topic of content per week over the course of five weeks. Of the 294

participants enrolled in the study, 92% completed the study criteria. Participants in the intervention group reported larger increases in self-efficacy when selecting dairy products, but not for actual increases in dairy consumption (Poddar et al., 2010). A web-based intervention for the treatment of obesity which included 481 overweight participants was conducted to evaluate whether or not an internet delivered program could be successful. The participants were placed randomly into one of three groups (internet, in-person counseling, and hybrid). The participants in the in-person group lost on average more weight (7% of body weight), with those in the other two conditions losing on average 5% body weight. This demonstrates that a web-based program can be successful in weight management interventions (Harvey-Berino et al., 2010). Kim and Jeong (2007) investigated the efficacy of a web-based diabetes program that also included the use of text messages. Fifty-one diabetic patients were randomly assigned into one of two groups (25 intervention, 26 control). The participants in the intervention group reported their blood glucose measurements to a nurse via the internet for six months. The nurse then sent each participant individualized recommendations based on the information each participant reported. At the end of the six months the intervention group had a significant decrease in hemoglobin A1C levels compared to pretest data (8.09% pretest to 7.04% at six months). The same was not found with the control group (7.59% pretest to 7.70% at six months).

A web-based quasi-experimental design intervention for parents of infants (n = 1388) was developed in Finland to provide support for parents in the form of information and support. The study was based on Bandura's self-efficacy theory and provides information on parenting, breastfeeding, and infant care. Researchers collected data

regarding demographics, parental self-concept, depressive symptoms, parent state of mind, parental perception of the infant, and environmental attributes (e.g., hospital experiences). Dependent variables for the study included parenting satisfaction and self-efficacy. The website was developed by an editorial team and consisted of six sections with information for both parents. The control hospital and the intervention hospital participant scores were compared for both mothers (n = 863) and fathers (n = 525) who completed the study measures. Father's in the intervention hospital viewed access to social support more favorably than the control group at baseline. It was noted that the intervention hospital had a higher percentage of mothers exclusively breastfeeding at the time of discharge (51% vs. 27.4% $p < .001$). The second stage of this study is ongoing and will remeasure variables at one year post-partum (Salonen, Kaunonen, Astedt-Kuri, Jarvenpaa, & Tarkka, 2008). These examples of internet-based interventions have exhibited the benefit of their use in a wide range of populations as evidenced by the variety of studies cited above.

This broad range of successful implementation of web-based interventions in health promotion leads to the question of whether or not this approach can be applied to breastfeeding effectively. A review of the literature reveals only a handful of research studies on the application of a web-based intervention for breastfeeding. One study sought to determine the effect of use of a website on infant feeding practices on knowledge and attitudes of child care workers toward infant feeding best practice guidelines. The researchers developed a website related to infant feeding practices that specifically promoted breastfeeding. The experimental (n = 23) and control (n = 15) groups participated by filling out a pretest online. They were instructed to access their

assigned website freely for three months and then complete a posttest at completion of the study. The experimental website included original content developed by the researchers regarding infant feeding (including breast milk), whereas the control group viewed an established health website. Compared to control, the intervention group showed more positive changes in attitude and behavior between pre- and posttests ($p < .05$). A trend towards increased knowledge was observed, but it was not statistically significant. The authors concluded that the website was an effective way to increase knowledge of infant feeding best practices among child care workers (Clark, Anderson, Adams, Baker, & Barrett, 2009).

A second study evaluated the number of mothers who had access to e-technology and compared breastfeeding outcomes between those with and without access to e-technology. This prospective observational study included 550 French women. Baseline data was collected by pediatricians or midwives at discharge following birth and follow-up telephone surveys were completed at four and 26 weeks post-discharge. Of the participants, 435 had access to some form of e-technology. These mothers breastfed for an average of 19 weeks, compared to 16 weeks for those without access, but this difference was not statistically significant (Laborde, Gelbert-Baudino, Schelstraete, Francois, & Labarere, 2007).

Another study utilizing the internet for breastfeeding education had the objective of determining parents' perceptions of two breastfeeding education programs which were identical in content except for use of graphics. Twenty participants evaluated both programs. Paired *t* tests and repeated measures ANOVA were employed to test for rating differences between the two programs. The program with graphics was preferred by the

participants. The authors concluded that health care web design should include graphics when creating education programs online (Cheng et al., 2003). This study did not measure knowledge, attitudes, or effectiveness of the breastfeeding program.

A third study which utilized computers with self-interviewing (audio –CASI) as part of an intervention to compare group prenatal treatment to individual prenatal care reported that the prenatal group had a breastfeeding rate of 66.5% as compared to 54.6% in the individual care group ($p < .001$). However computers were used only as a function of interviewing patients and not one of the main variables of the study (Ickovics et al., 2007).

This literature review uncovered only one web-based intervention study which sought to increase breastfeeding initiation. Huang et al. (2007) wanted to determine if a web-based breastfeeding education intervention could be effective in increasing knowledge, skill, and initiation rate. They collected demographic data, pre- and posttest of breastfeeding knowledge and attitude, and breastfeeding rates using a quasi-experimental design, with an intervention group and a historical control group of similar mothers. The web-based program, delivered during the prenatal period, included information discussing several breastfeeding topics and incorporated animations, graphics, audio, video, and interactive messaging. Both the experimental and control groups consisted of 60 participants. The experimental group's breastfeeding rate at discharge was 48.3% as compared to the control group's rate of 38.3% ($p < .05$). The experimental group also had greater posttest breastfeeding knowledge. The authors concluded that the web-based program enhanced breastfeeding knowledge and attitude as well as positively impacted the rate of initiation (Huang et al., 2007). The limitations of

this study include the small sample size, which was limited to one hospital. The participants were also predominantly one race. This makes it impossible to generalize these results to a larger more ethnically diverse population. A review of the literature by Pate (2009) found that "e-based interventions had a moderate effect of breastfeeding (odds ratio = 2.2 [1.9-2.7], d = 0.5); whereas provider-based interventions had very little to no effect (odds ration = 1.1 [1.0-1.2], d = 0.3) (P. 647)." This reinforces the need to further explore information technologies and their use in breastfeeding promotion.

Use of Cell Phones for Health Interventions

The United States in 2007 had an approximate cell phone penetration rate of 84% with a projected 100% penetration by 2013 (RCR Wireless, 2007). The United States government has implemented a texting service called Text4baby. The intent of the program is to provide health information to pregnant women to decrease infant mortality (Healthy Babies Coalition, 2012). This move by the government to provide health information through text messages indicates the importance of providing health information through a variety of channels.

Similar services are available from various health promotion organizations. One example is the FamPlan Hotline in the Philippines. The service responds to text, voice, or email messages sent to the hotline regarding questions about safe sexual activity and HIV/AIDS. In a two year time period the service received approximately 65,000 questions (94% as texts). The organization running the hotline views it as an inexpensive effective way to provide health information to those seeking help. There are similar services in South Africa and England, which use text messaging to send daily reminders

to encourage patients to take their medications for illnesses such as tuberculosis and oral contraceptives (Population Reports, 2007).

Text messaging was utilized as part of a smoking cessation intervention based on self-regulation and trans theoretical theories. The target population of college aged smokers yielded a convenience sample at a university (n = 31) aged 18 to 24 years. Participants were sent between one to three text messages each day. Texts were personalized based on feedback from the participants. Saliva samples were obtained to assess levels of cotinine. Forty-two percent of the sample quit smoking based on the chemical validation; however, the result was not statistically significant. Those participants who continued smoking but reduced their use of cigarettes smoked an average of 5.4 fewer cigarettes per day ($p < .05$) (Riley, Obermayer, & Jean-Mary, 2008). Texting has also been used in the university setting to support students' transition to college life. A student messenger program (qualitative study) was implemented at the beginning of the 2004-2005 year at the University of Brighton. Three types of text messages were sent to the 285 students who participated. The messages were of an administrative, general, or individualized content type. Participants were interviewed and notes were transcribed. The authors found that text messaging was the major form of electronic communication on campus and that text messages can be a beneficial method to communicate administrative information to students to help them transition into their new responsibilities as college students (Harley, Winn, Pemberton, & Wilcox, 2007).

In health-related interventions text messaging has also been used to determine the efficacy of using this technology with varies types of patients. Sweet Talk is a text messaging support system developed for use with diabetic children (n = 37). The goal of

the study was to determine if text messaging would be effective in determining the rate of hypoglycemic events in the group of participants. Participants were randomized into one of two groups: text messaging or computer-based interview (emails). Participants were asked to keep a diary recording every hypoglycemic episode. The text messaging group (95%) had a higher response rate than the computer email group (89%); however, the difference was not statistically significant. The higher rate of use/reporting by the text message group may indicate the higher appeal of the method of communicating hypoglycemic events (Tasker, Gibson, Franklin, Gregor, & Greene, 2007).

Sherwood et al. (2006) examined the use of email and the phone for weight loss interventions. This three-arm randomized trial consisted of the facility's usual care (n = 600), mailed information (n = 600), and phone intervention (n = 601). All the groups utilized the same 10 lessons regarding successful weight loss strategies. The interaction with staff was the variable that differed between the groups. The study lasted two years and weight and BMI were assessed periodically (6, 12, 18, and 24 months). Weight change was higher in the phone group (-2.35 kg) at 18 and 24 months compared to the mail group (-2.27 kg) and the usual care group (-1.91 kg). However, these differences were not statistically significant (Sherwood et al., 2006).

Mbuagbaw et al. (2011) described their design for a randomized controlled trial utilizing weekly mobile phone texting and standard care versus standard care alone for an anti-retroviral regimen. The researchers view texting as a viable option for communication due to the low cost and non-invasive nature of this method. Participants (n = 198) were randomized into either the standard care or the texting group. The text messages were designed to be motivating and to remind participants to take action (take

their anti-retroviral medication). Data will be collected at three and six months. The researchers will be collecting data on the effect of adding text messages to the usual care for these patients.

In a sample of 81 postnatal women, a 12 week randomized controlled trial utilizing text messages was conducted to evaluate the efficacy of delivering a theory based physical activity program using mobile phone text messaging. The participants in the experimental group (n = 45) received between three to five personalized messages each week. The experimental group had increased physical activity frequency ($p = 0.038$) and frequency of walking ($p = 0.02$) (Fjeldsoe, Miller, & Marshall, 2010). The text messages in the study performed the function of cue to action. These examples demonstrate how technology, especially text messaging, is becoming increasingly more common in health care, and it is important to research the viability and efficacy of such technology. These studies show how text messaging has been used in a variety of health related topics. The greatest relevance is that they show that text messaging is user friendly and popular with the general public. The studies show that text messages can be used as a cue, which is the goal of their use in this study.

Elaboration Likelihood Model

The Elaboration Likelihood Model (ELM) is a framework of attitude change through persuasive communications (Petty & Cacioppo, 1986b). This framework purports that there are two routes of persuasion. The first is the central route, which is used by those who are interested in and willing to perform deeper elaboration (thinking) on the given topic. It is defined as “persuasion that which likely resulted from a person’s careful and thoughtful consideration of the true merits of the information presented in

support of an advocacy" (Petty & Cacioppo, 1986b). The central route can influence large and long lasting change. The peripheral route is defined as "that which more likely occurred as a result of some simple cue in the persuasion context that induced change without necessitating scrutiny of the true merits of the information presented" (Petty & Cacioppo, 1986b, p. 125). The peripheral route is thought to induce small short term change without deep elaboration. The ELM has seven postulates: (a) Seeking Correctness: people want to have the correct attitude. People typically assess the correctness of their attitude by comparing their attitude and opinions to those of others around them. Expert opinions, fact, and statistics are often used by those seeking to hold the correct attitude or stance on a given topic. (b) Variations in Elaboration: situational factors may influence individuals' abilities to elaborate on the topic even if they have the perceived correct attitude. Each situation regarding a given topic varies from individual to individual with regards to how much time they will spend thinking about the topic. People's interests vary or the amount of time available for them to elaborate varies. People do not spend equal amounts of time studying each thought, idea, or topic with which they are presented each day. (c) Arguments, Cues, and Elaboration: variables affect the attitude change by either being persuasive, being peripheral cues, or by affecting the degree of elaboration. Peripheral cues can be used to drive people to spend more time elaborating on a topic, thus changing the route from peripheral to central route processing. Color, images, or other attractive cues are examples of variables that may attract a person to spending more time thinking about an idea. (d) Objective Elaboration: variables can affect the willingness or ability to process information by either enhancing or minimizing argument analysis. Finding variables that are argument enhancing based

on your target group is an important part of increasing likelihood of elaboration, for example, a female becoming pregnant and having to make a decision about the method of infant feeding she will implement at the end of her pregnancy. (e) Elaborations versus Cues: variables which are biased can have either a favorable or unfavorable effect on elaboration. This can be minimized by presenting both the positive and negative sides of an argument, by repetition of an argument, and by presenting facts that increase the personal relevance of the issue for the elaborator. (f) Biased Elaboration: when a persons' motivation or ability to elaborate decreases, peripheral cues become more important. For example, if someone doesn't have the time to really spend thinking about an idea, he or she will be more likely persuaded by attractive peripheral cues such as positive images or catch phrases. (g) Consequences of Elaboration: attitude change will mostly result after processing relevant arguments from the central route; attitudes formed due to the central route will be stronger and more resistant to counter persuasion (Petty & Cacioppo, 1986b).

The ELM has been studied in various areas of health education including baby bottle tooth decay (Kanellis, Logan, & Jakobsen, 1997), prenatal care (Alcalay, Ghee, & Scrimshaw, 1993), nutritional care (Kerssens & van Yperen, 1996), physical activity (Rosen, 2000), and obesity attitudes (Haque & White, 2005). The ELM has been incorporated into health behavior research in a number of ways. One intervention study with adolescent girls on prevention of eating disorders exposed the participants in the two experimental groups to activities to increase central route processing following viewing of an eating disorders prevention video. Central route processing was promoted in the experimental groups, which were further broken into activity groups by utilizing a group

discussion (Group 1) or completion of written exercises about the content of the video (Group 2) or both (Group 3) versus none of these activities (control). Intervention groups which included activities that promoted elaboration of content experienced greater improvement in body image and knowledge of eating disorders than controls. Intervention participants scoring higher on the Personal Involvement Inventory, an instrument used to measure personal relevance, showed greater improvement in outcomes, but scores on the Need for Cognition Scale were not related to outcomes. The Need for Cognition Scale is an 18-item scale that measures a participant's likelihood to elaborate via the central route (Withers & Wertheim, 2004).

Kirby, Ureda, Rose, and Hussey (1989) studied the effects of peripheral processing and subject relevance in promoting mammography screening in a group of women. They recruited 89 women to view a mammography public service announcement (PSA). Involvement index items were used to determine personal relevance of the topic to each subject. Four treatment groups were used. Two groups received a strong argument and two received a weak argument for participating in mammography screening. The authors postulated that, according to the ELM, a strong argument for mammography would be a more affective peripheral cue compared to a weak argument as evidenced by the postulates of the ELM. One group from each of these arguments also received a color video with music, and the other groups received a black and white video with rap music. The videos applied the elaboration versus cues postulate of ELM, by providing visual stimulation through positive images, color, music, and the use of simple persuasive arguments. Each group was also exposed to either favorable or unfavorable peripheral cues. An example of a favorable peripheral cue, theorized to

increase elaboration, was use of gospel music in the PSA. An example of an unfavorable cue was the use of black and white film, thought to decrease involvement and elaboration in the message. Each participant was asked about her intention to seek mammography information after watching the PSA. Women with higher subject relevance, demonstrating central processing according to ELM, were more likely to say that they were going to seek more mammography information. Peripheral cues, not argument strength, was shown to have more of a positive effect on low relevance subjects which confirms the ELM's postulate that peripheral cues increase elaboration (thinking about the topic) in subjects for whom the topic has low relevance (Kirby, Ureda, Rose, & Hussey, 1998).

These studies, as examples of ELM-based intervention research, suggest that approaches that encourage elaboration and central processing can be an important part of health education, whether the topic is initially relevant to the participants or not. Further, they suggest that peripheral cues are important if the education topic is not of high relevance to the target audience.

Need for Cognition

The Need for Cognition (NFC) Scale is an 18-item instrument that is used to quantitatively assess the "tendency to engage in and enjoy effortful thinking" (Cacioppo, Petty, & Kao, 1984, p. 3). The original instrument (1982) contained 34 questions, but was shortened and validated two years later. The questionnaire has been used in a variety of contexts including those related to academic performance (Sadowski & Gulgoz, 1996; Sadowski & Gulgoz, 1992; Tolentino, Curry, & Leak, 1990), to expert testimony and juror decision making (Bornstein, 2004), to life satisfaction (Coutinho & Woolery, 2004),

and in advertising (Hallahan, 2008). The NFC scale asks participants to rate the degree to which they agree with the statements in reference to the amount of satisfaction they obtain from the thinking process. Half of the items are reverse scored. The possible score range is 18-90. The instrument utilizes a five point response scale with the following values:

1 = extremely uncharacteristic

2 = somewhat uncharacteristic

3= uncertain

4 = somewhat characteristic

5 = extremely characteristic

People with higher scores are more likely to enjoy thinking and are better at synthesizing information (Cacioppo, Petty, & Kao, 1984). Sadowski and Cogburn (1997) have also noted that people who score high on the NFC scale tend to be more conscientious and open to new experiences compared to those with low NFC scores. In their study of 85 undergraduate students, the NFC and the NEO-Five Factor Inventory, which measures five domains of adult perrsonality, were administered. The NFC scores were positively correlated with the NEO-Five Factor Inventory Scores in the area of openness to new experience, $r(83) = .50$, $p < .001$, and conscientiousness, $r(83) = .40$, $p < .001$. The authors concluded that individuals with higher need for cognition scores are motivated mentally and tend to be more curious (Sadowski & Cogburn, 1997).

The NFC Scale has been tested for validity and reliability (Cacioppo & Petty, 1982; Cacioppo, Petty & Kao, 1984; Forsterlee & Ho, 1999; Sadowski,1993). The scores are not influenced by gender, cognitive style, or by the individual's attempt at trying to

make him or herself look good. Cacioppo and Petty (1982) found that the scale was very reliable, and the Cronbach's alpha coefficent was +.90.

Previous use of this instrument has shown that individuals with high NFC scores are more likely to enjoy thinking and, therefore, are more likely to seek information about topics that are personally relevant to them. Using this scale in the current research project will give insight into whether participants with high need for cognition scores have more frequent use of the educational website as well as higher intention to breastfeed scores. Sadowski and Cogburn (1997) found that individuals with high NFC were more likely to be open to new experiences through increased curiosity as well as have high tolerance for new ideas.

Written Education

The traditional approach of offering written health information about the topic of breastfeeding relies solely on central route processing. This is hypothesized to be a less effective approach, according to data on the general population with regard to use of central and peripheral processing because, although people have tendencies to use one route more than the other, elaboration occurs on a continuum of the two routes (Petty & Cacioppo, 1986b). Further, data on use of print information as a sole basis for breastfeeding education suggests that printed education when used alone provides no significant benefit (Guise, Westhoff, Chan, Helfand, & Lieu, 2003). For example, Loh, Kelleher, Long, & Loftus (1997) conducted a simple intervention utilizing a printed education sheet that illustrated some of the positive aspects of breastfeeding. The intervention group, which received the education sheet, consisted of 98 pregnant woman and the control included 95. Upon discharge post-delivery, 43.9% of the intervention

participants and 31.5% of the control group had initiated breastfeeding (p = 0.07) (Loh et al., 1997). An Italian study by Curro, Lanni, Scipione, Grimaldi, and Mastroiacovo (1997) resulted in similar outcomes. Their intervention included two groups; one group received counseling and written materials (n = 103) and the other group received only counseling (n = 97). There were no statistically significant differences found between the two groups in regard to initiation or exclusivity of breastfeeding (Curro et al., 1997). Hauck and Dimmock (1994) examined the effectiveness of written materials on breastfeeding duration. They randomized 150 participants into two groups of 75 each. After discharge the experimental group received written educational materials, and no intervention was provided to the control group. Data on breastfeeding duration was collected over a one year period. The researchers found no significant difference between groups for breastfeeding duration (Hauck & Dimmock, 1994).

This literature review shows evidence that there is a lack of information regarding the use and efficacy of internet-based interventions for pregnant women regarding breastfeeding. A review of the literature by Pate (2009) found that "e-based interventions had a moderate effect of breastfeeding (odds ratio =2.2 [1.9-2.7], d = 0.5); whereas provider-based interventions had very little to no effect (odds ration = 1.1 [1.0-1.2], d = 0.3)" (p. 647). This reinforces the need to further explore information technologies and their use in breastfeeding promotion, as there were only three studies. The same three studies reviewed in the previous section of this literature review on web-based interventions for breastfeeding promotion.

The ELM is an appropriate model for use with this population as well as the method of delivery for the educational intervention. Pregnant women are at a special

stage in life when information regarding infant feeding has increased relevance. This is evidenced by the short duration of time that they have to research and decide on a feeding method for their infant (37-40 weeks). Increased personal relevance is included in the postulates (postulate 4) of the ELM as an important variable to increasing central route processing and, therefore, long term behavior change (Petty & Cacioppo, 1986b). The internet is also an optimal method for utilizing the ELM because of the versatility of the medium of communication. In the age of technology and readily available information more people are seeking health information from the internet. Web-based education is uniquely able to provide information in a way that can engage peripheral and central route processors, which is something that is typically lacking in written materials. The format of web-based education can be simple and eye-catching, allowing the participant to gather bits of information which would be effective for peripheral route thinkers while more detailed information can also be offered for those who tend to use the central route.

CHAPTER III

METHODOLOGY

Research Design

A randomized controlled experimental design, using a convenience sample, was used to compare the effectiveness of two web-based breastfeeding educational interventions (one with and one without text message reminders) versus traditional written breastfeeding education mailed to participants (control). This study received approval through the Institutional Review Board at The University of Southern Mississippi (Appendix A). Table 2 provides an overview of the study design. The study took place between October 2011 and December 2012.

Table 2

Breastfeeding Study Design Overview

	Group	Measure / Activity	Pre-Intervention	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Post-Intervention
Randomization of Eligible Participants	Web-Based with Text Messages (TEXT)	Demographic and Need for Cognition Questionnaire	X							
		Email with password to access web-based education		X						
		Text Message Reminders			X	X	X	X	X	
		Intention to Breastfeed Questionnaire	X							X
		Iowa Infant Feeding Attitude Scale	X							X

Table 3 (continued).

	Group	Measure Activity	Pre-Intervention	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Post-Intervention
Randomization of Eligible Participants	Web-Based without Text Messages (WEB)	Demographic and Need for Cognition Questionnaire	X							
		Email with password to access web-based education	X							
		Intention to Breastfeed Questionnaire	X							X
		Iowa Infant Feeding Attitude Scale	X							X
	Written Education (CONTROL)	Demographic and Need for Cognition Questionnaire	X							
		Mailed breastfeeding education	X							
		Intention to Breastfeed Questionnaire	X							X
		Iowa Infant Feeding Attitude Scale	X							X

Intervention Development and Incorporation of Theory

Breastfeeding Education Curriculum

The curriculum content used for all intervention groups was based on two sources, the Arkansas WIC program's breastfeeding curriculum (Arkansas Department of Health, 2004) and *Breastfeeding: Your Guide to a Healthy, Happy Baby 4th edition* (2005) by Amy Spangler, MN, RN, IBCLC, which was one of the sources for the Arkansas curriculum. Curriculum content for all treatment groups was standardized to include the lessons outlined in Table 3.

Table 3

Lesson Descriptions

Lesson	Description
Breastfeeding Benefits	Teaches the benefits of breastfeeding for mother and infant.
Thinking about Breastfeeding	Explores views of breastfeeding.
Beginning Breastfeeding	Teaches techniques of breastfeeding.
Breastfeeding: The Early Weeks	Discusses the early weeks of breastfeeding and what the moms can expect during that time.
Breastfeeding and Work or School	Discusses how to continue breastfeeding once going to back to work/school.
Breastfeeding Challenges	Discusses the most common problems encountered by breastfeeding moms.

Incorporation of Elaboration Likelihood Model into Web-Based Interventions

The home page of the website consists of a welcome message with instructions for logging into the website. The researcher developed the website used for the two web-based interventions with the assistance of a web developer (iiicreative from Houma, Louisiana) at a cost of $2,990. The website was constructed to build on the ELM's contention that use of both central and peripheral routes of persuasion are more likely to result in the desired thinking/behavior. The lessons for the website included written content from the breastfeeding curriculum which would trigger central route processing. It also incorporated features intended to access the peripheral processing route, such as interactive modules, bright colors and attractive images, and simple messages. According to ELM, this should result in increased information-seeking by participants. Wilson (2007) recommends using the ELM when developing media messages about health and nutrition. Her recommendations include designing messages for your audience, using a source that speaks to your audience (credentialed health professionals), drawing a firm conclusion, presenting both sides of an argument, using fear appeals when appropriate, and providing statistics (Wilson, 2007). The website was designed to meet all seven postulates of the ELM as described in Table 4. A copy of each page of the website is provided in Appendix B. An expert in the field of lactation (licensed lactation consultant) evaluated the website for accuracy of breastfeeding information. Five women similar to the projected target audience for the intervention reviewed the website and gave qualitative feedback on the user-friendliness and clarity of the website. The pilot test subjects evaluated the site's construction and clarity using questions from Roberts, 2010 paper on health information website evaluation (Appendix C). No modifications

were suggested or made based on their feedback. The website is located at www.babybff.net.

Table 4

ELM Postulates as a Basis for Intervention

ELM Postulate	**Intervention consideration or feature**	**Study feature reflecting postulate**
1.) Seeking Correctness: People want to have the correct attitude. People typically assess the correctness of their attitude by comparing their attitude and opinions to those of others around them.	The information provided through the website was factual and based on current research that supports breastfeeding as the optimal choice for infant feeding. Statistics showing national breastfeeding rates were also reported on the website to show that the majority of mothers in the United States do initiate breastfeeding.	Each webpage reflected postulate one.
2.) Variations in Elaboration: Situational factors may influence people's ability to elaborate on the topic even if they have the perceived correct attitude.	The issue position (breastfeeding initiation) will be associated with affective cues. Color choices and images will be selected to assist in persuading increased elaboration of messages. The images and colors used will be chosen to evoke a participant's interest and also association with infants and infant feeding.	Each webpage will reflect postulate two. The colors used are baby blue, pastel pink, and white. A feminine font is used to provide a soft feel to the text. Images of babies are used throughout the website.

Table 4 (continued).

ELM Postulate	Intervention consideration or feature	Study feature reflecting postulate
3.) Arguments, Cues, and Elaboration: "Variables can affect the amount and direction of attitude change by: (A) serving as persuasive arguments, (B) serving as peripheral cues, and/or (C) affecting the extent or direction of issue and argument elaboration (Petty & Cacioppo, 1986b)."	Arguments will be given to persuade participants in the web-based groups that they should initiate breastfeeding. Persuasive arguments will be presented in the form of benefits to the mother, child, and society as a whole. These arguments are also provided in narrative format in the written materials provided to the control group.	A lesson presenting the benefits of breastfeeding for the mother and infant was presented as arguments for breastfeeding. A lesson presenting common myths associated with breastfeeding was presented to provide simple explanations regarding myths and the actual truth behind those myths. Peripheral cues were utilized throughout the website in the form of images depicting mother and infant relationship during feeding.
4.) Objective Elaboration: Enhance or reduce argument scrutiny with objectively presented arguments, repetition, personal relevance, personal responsibility, and need for cognition.	Both the positive and negative aspects of breastfeeding were presented. Methods for overcoming the negative aspects of breastfeeding were provided. The web-based texting group received the text messaging reminders which served as a cue for repetition of message. The fact that all participants were pregnant should have increased personal relevance of the messages presented. Personal responsibility was reinforced through use of language that reminded participants that the infant's health is their responsibility.	Each page of the website reflected postulate number four.

Table 4 (continued).

ELM Postulate	Intervention consideration or feature	Study feature reflecting postulate
5.) Elaboration versus Cues: "As motivation and/or ability to process arguments is decreased, peripheral cues become relatively more important determinants of persuasion (Petty & Cacioppo, 1986b)."	Peripheral cues such as positive images, quick simple persuasive statements, and use of credible sources were implemented to persuade participants to increase their intention to breastfeed. The website also provided the ability for motivated participants to self-pace when elaborating on the information presented to process the issue-relevant arguments.	Quick messages during interactive lessons, positive breastfeeding images, use of credible sources, as well as the ability of participants to self-pace through the lessons were provided.
6.) Biased Elaboration: When issues are presented in a biased way they can have either a positive or negative effect on elaboration.	Prior Knowledge (messaging processing bias) was assessed through questions about previous education on the topic of breastfeeding as well as the pre-intervention questionnaire to assess participants' intention to breastfeed.	
7.) Consequences of Elaboration: Central route processing of arguments increases attitude change and prediction of behavior.	Increased accessibility to information was presented in a well-organized manner and included subject-relevant cognitive activity (interactive activities) was used to enhance the message and increase central route processing. Peripheral cues were used to increase personal relevance of the issue and therefore increase participants' likelihood to participate in central route processing.	

Study Participants

The study population included pregnant females in Louisiana and Mississippi. As of 2011, 51.1% of Louisiana's and 51.4% of Mississippi's populations were female. The racial breakdown for Louisiana includes: 63.8% Caucasian, 32.4% African American, 1.6% Asian American, and 4.4% Hispanic. Mississippi's population was similar with 60% Caucasian, 37.3% African American, 0.9% Asian American, and 2.9% Hispanic (US Census Bureau, 2012). In 2010, there were 62,555 births in the state of Louisiana (Louisiana Department of Health and Hospitals, 2010). For the same year Mississippi produced 39,825 live births (US Census Bureau, 2012).

The target area for recruitment was initially defined as three parishes in south central Louisiana with low breastfeeding rates. Later, because participant enrollment was not meeting projections, the geographic area was expanded to include an additional four parishes in south Louisiana, and subsequently to include all Louisiana parishes and Mississippi counties.

Recruitment

Pregnant women were recruited by mailing flyers and a recruitment cover letter to obstetrics and gynecology offices and health department clinics in major cities and towns in each parish/county in the designated area. A packet of 50 flyers and a letter requesting assistance with distribution was mailed to each office/clinic (Appendix D). The names and addresses for these offices were obtained using internet directories including the Yellow Pages. The cover letter requested that flyers with information about study enrollment be given to pregnant patients when they were at their prenatal visits (Appendix E). The flyer contained a contact number for calling or texting if patients were

interested in participating. An incentive to participate was offered (a chance to win one of five gift cards).

Screening of potential study participants

The inclusion criteria for the study included the following: pregnant women aged 18 and older, between 1-27 weeks gestation, living in Louisiana or Mississippi, with access to the internet and ability to receive text messages, who were fluent in English. Excluded were men, women under 18, non-pregnant women, pregnant women greater than 27 weeks gestation, those living outside Louisiana or Mississippi, persons with no access to the internet, persons with no ability to receive text messages, and persons who are not fluent in English. The decision to exclude women greater than 27 weeks gestation was made based on two studies of intention to breastfeed, which suggested that the decision to breastfeed typically occurs either prior to conception or early on in the pregnancy (Earle, 2002; Humphreys et al., 1998).

Screening of interested women was conducted as each made contact through texting or calling the researcher. Interested women were contacted by phone by the researcher, who administered the Breastfeeding Study Screening Tool (Appendix F) to establish eligibility. When a potential participant provided an answer that halted her inclusion in the study, the interview was concluded and the woman was asked for her mailing address in order to provide her with written educational materials. All women who initiated screening for participation who were not eligible to participate were mailed the same breastfeeding educational material as the control group and a letter thanking them for their interest (Appendix G).

Study Enrollment and Assignment to Intervention Group

All women who completed the screening process successfully were directed to the online consent form and enrollment questionnaire (First Survey Questionnaire), available through Survey Monkey. The email each participant received requesting her completion of the first questionnaire is included as Appendix H. Participants consented to participate and then completed the enrollment questionnaire, described below under Study Measures. Each enrolled participant was then randomized into one of the three intervention groups using Haphazard Assignment. "This method is not formally random but has no obvious bias" (Shadish, Cook, & Campbell, 2002, p. 302). Due to the continuous nature of enrollment, the randomization placed each enrolled participant into a group based on her order of completion of the informed consent. Eligible participants were assigned to a group using the following randomization scheme, where each group of three assigned successively follows a different order of assignment:

1,2,3

1,3,2

2,3,1

2,1,3

3,1,2

3,2,1

repeat

Intervention Procedures

Intervention participants were assigned to one of three groups: (a) web-based education with text message reminders, (b) web-based education with no text messages, and (c) written education (CONTROL). Each group was exposed to the intervention for a period of six weeks. The two web-based groups (TEXT and WEB) had access to the breastfeeding education website for that period of time. Participants in the TEXT group also received two text messages per week over the six-week period. The CONTROL group received a one-time mailing of written education material, which consisted of the breastfeeding book described earlier, via the US Postal Service. They also received a letter informing them that they would receive the second questionnaire after six weeks (Appendix I). Neither the WEB nor the CONTROL group was contacted again over the duration of the intervention.

The TEXT and WEB groups were assigned a login and password via email to access the breastfeeding education website, www.babybff.net (Appendix B). These participants were instructed by email to view each of the six content areas over the course of the six weeks following their enrollment in the study. They were free to access the website at any time and to access the lessons in any order of their choosing. The website was able to track the number of lessons each participant completed. Since only the web-based groups were tracked, this information provided descriptive data only. Website access was only provided to TEXT and WEB groups, ensuring that the CONTROL group was not directly influenced by the website contents and formatting.

The text messages were simple one sentence reminders, described in Table 5. The first briefly described the weekly lesson, whereas the second simply reminded the

participant to visit the website and complete the lesson of the week. Two text messages per week were chosen based on time available to the researcher and informed by the ELM literature. In many of the studies reviewed in the preceding literature review, text messages were sent daily, but those studies mainly concerned increasing participants' use of medications. The text messages in this study were meant only to encourage participants to complete lessons on the website. Postulate number four of the ELM also warns against the use of too much repetition of the message. This postulate states that at first repetition increases the liking of the message but can eventually increase dislike of the message by increasing tedium for the participant. The authors of the ELM also indicate that a simple cue can affect attitude change. It acts as a reinforcing agent (Petty & Cacioppo, 1986b).

Table 5

Text Messages

Week	Messages
Week 1	1.) Remember to visit www.babybff.net to learn more about the benefits of breastfeeding 2.) Don't forget to complete lesson 1 at www.babybff.net
Week 2	1.) Remember to visit www.babybff.net to learn more about different opinions about breastfeeding 2.) Don't forget to complete lesson 2 at www.babybff.net
Week 3	1.) Remember to visit www.babybff.net to learn more about the techniques of successful breastfeeding 2.) Don't forget to complete lesson 3 at www.babybff.net
Week 4	1.) Remember to visit www.babybff.net to learn more about what you need to know for the first few weeks of breastfeeding 2.) Don't forget to complete lesson 4 at www.babybff.net

Table 5 (continued).

Week	Messages
Week 5	1.) Remember to visit www.babybff.net to learn more about breastfeeding and going to work or school 2.) Don't forget to complete lesson 5 at www.babybff.net
Week 6	1.) Remember to visit www.babybff.net to learn more about solutions to the most common problems encountered by breastfeeding mothers 2.) Don't forget to complete lesson 6 at www.babybff.net

Study Measures and Data Collection Procedures

Study Measures

Study measures are summarized in Table 6 and described below. Data collection instruments were reviewed and pretested online for readability by five women who were similar demographically to the targeted study participants.

The Breastfeeding Study Screening Tool (Appendix F) was used to gather brief demographic information (age and stage of pregnancy) as well as to determine eligibility for participation in the study. It consisted of 15 items. This tool also included participant contact information.

Demographics were collected via the Breastfeeding Study Demographic Tool (Appendix J). This questionnaire consisted of 10 questions regarding race, number of pregnancies, number of live births, marital status, education, household income, WIC participation, and previous exposure to breastfeeding education. This tool was administered to the study participants via the internet, using the online survey tool Survey

Monkey. All participants were sent an email asking them to complete the online questionnaire once they had been randomized to a study group.

The main outcome measure was intention to breastfeed. This was determined using The Infant Intentions Scale ([IFI] Nommsen-Rivers & Dewey, 2009). The IFI consists of five questions regarding a woman's plans for feeding her infant, with a possible score range of 0-16 (Appendix K). Intention to breastfeed has been shown to be an effective measure of actual initiation and duration of breastfeeding in several studies (Forster, McLachlan, & Lumley, 2006). For example, in a longitudinal cohort study that included 10,548 women, 96.6% of the 4,764 who indicated intention to breastfeed did initiate breastfeeding (Donath & Amir, 2003). Cronbach's alpha of 0.90 was calculated in a pilot survey as well as in construct validity samples of Nommsen-Rivers and Dewey, 2009. While collecting data on the actual behavior of breastfeeding initiation might be preferable, the rolling enrollment feature of this intervention, along with the cost, would have made it challenging to follow up each participant through birth of her infant.

Cacioppo, Petty, and Kao's (1984) 18 Item Need for Cognition Scale (Appendix L). This 18-item scale measures an individual's tendency to engage in and enjoy thinking. The participants were asked to rate each statement as to whether or not it was characteristic of themselves or what they believe about themselves. The scale used to measure the need for cognition ranges from 1 = extremely uncharacteristic to 5 = extremely characteristic. Statements two, four, five, seven, eight, nine, twelve, sixteen, and seventeen are reverse scored. The possible score range is 18-90. Cronbach's alpha for the scale is .86. There is some evidence that Need for Cognition is related to increased central route processing/likelihood to elaborate and, therefore, may influence

decision-making associated with adopting desirable health behaviors. Participants with high need for cognition will be more likely to use the website more often.

Level of participation for the web-based groups was measured through completion of lessons in the website. This was measured as a continuous variable, which was operationally defined as viewing of all information screens provided in each lesson. The website tracked and recorded this information.

The Iowa Infant Feeding Scale (IIFAS) (Appendix M) – developed by De La Mora, Russell, Dungy, Losch, and Dusdieker (1999), is a 17-item questionnaire designed to measure attitude toward infant feeding. The authors had previously found through their research that attitude was an important predictor of infant feeding method. For each of the 17 items the participant was asked to rate her level of agreement with the statement using a five-point scale (1 = strong disagreement, 2 = disagreement, 3 = neutral, 4 = agreement, 5 = strong agreement). Nine of the items are marked for reverse scoring for analysis purposes. The possible score range is 17-85. A high score reflects a mother's preference for breastfeeding. Cronbach's alpha for the 17 items was .86, reflecting its high level of reliability (De La Mora et al., 1999). The IIFAS tool has also been adopted for use in other populations. Wallis et al. (2008) translated the IIFAS into Romanian and found it to be user-friendly, reliable ($\alpha = .63$), and valid in the study population. In 2007, Dungy, McInnes, Tappin, Wallis, and Oprescu (2008) used the IIFAS to identify infant feeding attitudes in a population of socioeconomically disadvantaged women. The authors found that mothers who initiated breastfeeding in the hospital had higher IIFAS scores than those who initiated formula feeding ($p = .005$). An Irish study using the

IIFAS found that breastfeeding mothers had higher scores than formula feeding mothers ($p<.001$) (Sittlington, Stewart-Knox, Wright, Bradbury, & Scott, 2007).

Table 6

Study Variables

Variables	Measurement Units	Variable Type	Data Source
Age	Years	Continuous	Breastfeeding Screening Tool
Race	Caucasian African American Hispanic Asian American American Indian Two or More Don't know Refuse to Answer	Categorical	Demographic Tool
Number of pregnancies	1 2 3 4 5 or more	Continuous	Demographic Tool
Marital Status	1.Married 2.Single and not living with the baby's father 3.Single and living with the baby's father	Categorical	Demographic Tool
Educational Level	1. Some high school 2. High school graduate 3. Some college 4. College graduate 5. Some graduate or professional school 6. Graduate level or Professional Degree 7. Don't know	Categorical	Demographic Tool

Table 6 (continued).

Variables	Measurement Units	Variable Type	Data Source
Income (U.S. Dollars per Year)	1. Less than $5,000 2. $5,000 - $9,999 3. $10,000 - $14,999 4. $15,000 - $19,999 5. $20,000 - $24,999 6. $25,000 - $29,999 7. $30,000 - $34,999 8. $35,000 - $39,999 9. $40,000 - $44,999 10. $45,000 - $49,999 11. $50,000 - $54,999 12. $55,000 or more	Categorical	Demographic Tool
Previous Exposure to breastfeeding education	Yes or No	Categorical	Demographic Tool
Previous Breastfeeding Experience	Yes or No	Categorical	Demographic Tool
Intention to Breastfeed	Very much agree Somewhat agree Unsure Somewhat disagree Very much disagree	Categorical	IFI Scale – Pre and Post Intervention (5-Items)
Exposure to web-based breastfeeding education interventions	Lessons completed (defined as all page views within a lesson accessed)	Continuous	Website Tracking

Table 6 (continued).

Variables	Measurement Units	Variable Type	Data Source
Need for Cognition	1 = extremely uncharacteristic 2 = somewhat uncharacteristic 3 = uncertain 4 = somewhat characteristic 5 = extremely characteristic.	Categorical	18-Item Need for Cognition Scale developed by Cacioppo, Petty, & Kao (1984)
Iowa Infant Feeding Attitude Scale (IIFAS)	1 = strong disagreement 2= disagreement 3 = neutral 4= agreement 5= strong agreement	Categorical	17-Item IIFAS developed by De La Mora, Russell, Dungy, Losch, & Dusdieker (1999)

Data Collection Procedures

Participants completed the enrollment questionnaire via Survey Monkey upon enrollment. This questionnaire included all study variables listed in Table 6. After six weeks of exposure to the assigned intervention condition, each participant received an email (Appendix N) asking them to complete the final questionnaire which included the IFI and IIFAS scales.

After completion of final data collection from all enrolled participants (December 2012), five names were randomly selected from those participants who completed all study questionnaires. The winners were informed via mail that they had won one of the five chain store gift cards. The gift cards were mailed to each participant via USPS certified mail (Appendix O).

Data Analysis

The sample size for this intervention study was calculated using GPower, a general power analysis software program, using an alpha of 0.05, a medium effect size, and power of 0.8. A total of 180 enrolled participants allowed for a minimum of 60 per intervention group, and for a 20% attrition rate.

PASW (formerly SPSS) Version 21.0 (Chicago, IL) was used for statistical analysis of data. Descriptive statistics were calculated for all measures. Analyses performed to address each objective and hypotheses are described below.

1. Determine if a web-based intervention and text messaging based on postulates of the Elaboration Likelihood Model is effective at increasing intention to breastfeed compared to a traditional educational approach.

This objective was addressed using regression analysis. Post-intervention intention to breastfeed was the dependent variable. Pre-intervention infant feeding attitude and intention to breastfeed, previous breastfeeding education, and income were used as covariates.

2. Participants who are older, white, married, have higher educational level, and high income level will have increased intention to breastfeed and will have higher scores on the Iowa Infant Feeding Attitude Scale.

This objective was addressed by entering these demographic variables into the multiple regression analyses on the baseline enrollment data to determine if any of them were predictors of either intention to breastfeed or infant feeding attitude at enrollment.

3. Determine if Need for Cognition is related to change in intention to breastfeed.

This objective was addressed using a multiple regression analysis in which Need

for Cognition was entered into a regression model to determine if it was a significant predictor of post-intervention intention to breastfeed, while controlling for pre-intervention intention to breastfeed. Based on that analysis, significant predictors of post-intervention intention were evaluated further.

Hypotheses

1. Change in intention to breastfeed will be higher in the web-based intervention groups than the traditional education group.

This hypothesis was tested by first performing a multiple regression analysis to determine the predictor variables for post-intervention intention to breastfeed. The predictor variables that were statistically significant (or approaching significance), including pre-intervention intention to breastfeed, were then entered into the MANCOVA test to control for their influence on the dependent variable (intention to breastfeed), and effects of group assignment were tested.

2. Change in Intention to breastfeed will be higher in the web-based intervention with text messages group versus the web-based group without text messages.

This hypothesis was tested using the procedure for Hypothesis 1.

3. Intention to breastfeed and infant feeding attitude at pre-intervention enrollment are greater among those who are married, white, have breastfeeding experience, are older, or are more educated.

This hypothesis was tested by entering these demographic variables into two multiple regression analyses with intention to breastfeed and infant feeding attitude as the dependent variables.

4. Web-based lesson completion will be higher in the web-based plus text message condition.

This hypothesis was tested by conducting an independent samples *t*-test to determine if the mean number of lessons completed by each group was different.

CHAPTER IV

PREDICTORS OF INTENTION TO BREASTFEED AMONG PREGNANT WOMEN IN TWO SOUTHERN STATES

Abstract

Breastfeeding rates for the southern United States are much lower than the rest of the country, and these states also typically rank as among the unhealthiest in the nation. This study sought to determine predictors of intention to breastfeed in a convenience sample of pregnant women in Louisiana and Mississippi at the time of their enrollment in a breastfeeding intervention study. One-hundred and seventy-seven women completed a 51-item online questionnaire that included demographic questions, Need for Cognition Scale (NFC), the Iowa Infant Feeding Attitude Scale (IIFAS), and the Infant Feeding Intentions Assessment (IFI). The sample was predominantly Caucasian (88.7%), married (71.2%), with a mean age of 27.3$\pm$4.9. Forty-four percent were primaparous, and 40.1% had previous experience breastfeeding. A multiple regression analysis to determine predictors of intention to breastfeed resulted in a model that explained 46.1% of variation in intention to breastfeed and included attitude toward breastfeeding (B = 0.633) and previous breastfeeding experience (B = 0.159) as significant predictors. Further, 22% of the variation in infant feeding attitudes was explained by three factors: maternal age, weeks of gestation, and Need for Cognition. These findings suggest that more research should be done to identify breastfeeding intervention approaches that influence positive breastfeeding attitudes while taking into consideration these characteristics of the women being targeted.

Background

Breast milk is the optimal source of nutrition for infants. The benefits for mother and infant are well documented in the literature. The American Academy of Pediatrics (AAP) policy statement from 2012 states that breast milk decreases infant mortality rates in the United States by 21% (as cited in Eidelman & Schanler, 2012).

Breastfeeding statistics for the southern portion of the United States of America (U.S.) show that mothers from this region are less likely to breastfeed their infants than mothers from other geographic regions within the country. The Centers for Disease Control (CDC) report the national average for the percent of babies in the U.S. that were ever breastfed was 76.9% in 2009. Southern states such as Alabama (57.2%), Louisiana (53.5%), and Mississippi (47.2%) are all well below the national average (US Department of Health and Human Services, 2010). The Healthy People 2020 goal for breastfeeding is to achieve at least 81.9% breastfeeding initiation in the early postpartum period (US Department of Health and Human Services, 2010). The low breastfeeding rates in southern states like Louisiana and Mississippi are one example of these states' consistent place at the bottom of health ranking surveys like "America's Health Rankings 2011," in which Louisiana ranked 49th and Mississippi 50th overall (United Health Foundation, 2012). The data on infant feeding attitudes by geographic region raises the question of why women in the southern portion of the U.S. are less likely to initiate breastfeeding. The literature documents several factors that influence the initiation of breastfeeding. Initiation increases with a mother's age, income, marriage, and educational level. Higher rates of breastfeeding initiation also exist among Caucasian and some groups of un-acculturated Hispanic mothers than in their African American counterparts

(McLaughlin et al., 2004). These factors are also representative of the demographic description of Louisiana women who are more likely to breastfeed (Chin et al., 2008). Other factors that have been shown to predict breastfeeding initiation or intention include having smaller families, or previous breastfeeding experience (Mitra et al., 2004), social support from the infant's father, the maternal grandmother, other family members, or lactation consultants also increased the likelihood of breastfeeding in samples of women of Caucasian, African American, Hispanic and Native American ethnicities (Grassley & Eschiti, 2008; Humpreys et al., 1998; Wagner et al., 2006). Attitude toward breastfeeding may also influence the choice of feeding method. In a national sample, community attitudes toward breastfeeding were found to be more positive in the western and north central portions of the United States, where rates of breastfeeding were also higher (Hannan et al., 2005).

This study assessed infant feeding attitude and intention to breastfeed in a convenience sample of pregnant women from Louisiana and Mississippi at their baseline enrollment into a breastfeeding education intervention. The purpose of this study was to determine predictors of intention to breastfeed.

Methods

This study was approved by the Institutional Review Board at The University of Southern Mississippi. Informational recruitment flyers were distributed via U.S. mail to obstetrics and gynecology (OB/GYN) practice offices and health department clinics, with a cover letter which requested that the flyers be distributed to patients at their prenatal appointments. Recruitment occurred using a staged approach. Initially, two parishes in south central Louisiana with low breastfeeding rates were targeted. Subsequently

recruitment flyers were mailed to some 500 OB/GYN practice and health department clinic offices identified through the Internet Yellow Pages throughout Louisiana and Mississippi in order to achieve the number of participants required for the planned intervention in a timely manner. Once the sample size required for the planned intervention was achieved, study enrollment ended.

The flyers contained instructions for interested participants to text or call the contact phone number provided by the researcher, or to fill out an online screening form via a Survey Monkey link, if they were interested in participating in the intervention study. Participation in a chain store gift card drawing was offered as a participation incentive. Each recruitment respondent provided contact information (cell phone number, and email and mailing addresses) data to determine study eligibility. Inclusion criteria were pregnant, aged 18 and older, fluent in English, between 1-27 weeks gestation, living in Louisiana or Mississippi, access to the internet and ability to receive text messages. Following screening, the informed consent document was sent to eligible respondents with the enrollment data collection tool via the email address they provided.

Of 218 women who were screened, 181 met eligibility criteria. The most common exclusion criterion was gestation >27 weeks. Of the 181 eligible, 177 women completed the enrollment questionnaire, which they accessed through an email link to Survey Monkey sent to each participant's email address. The 51-item instrument included 10 sociodemographic questions: race, number of pregnancies, number of live births, marital status, education, household income, WIC participation, and previous exposure to breastfeeding education. Infant feeding attitude was assessed using the Iowa Infant Feeding Scale (IIFAS) developed by De La Mora et al. (1999). The IIFAS is a 17-item

questionnaire which asks the participant to rate level of agreement with each statement using a five-point Likert scale. Possible scores range from 17-85, with a high score reflecting a preference for breastfeeding. This tool has been used in a variety of populations and has been found to be a reliable measure of attitude (Cronbach alpha = 0.86) (De La Mora et al., 1999; Dungy et al., 2008; Sittlington et al., 2007; Wallis et al., 2008).

Cacioppo, Petty, and Kao's (1984) Need for Cognition (NFC) Scale was also included in the survey instrument. Need for Cognition, a component of the Elaboration Likelihood Model (ELM), was hypothesized as a potential predictor of breastfeeding intention, since those with a higher need for cognition are thought to prefer in-depth thinking, which has been linked to adoption of healthy behaviors and longterm behavior change (Petty & Cacioppo, 1986b). Study participants rated each statement on the 18-item NFC instrument on a five-point scale, from 1 for statements that were extremely uncharacteristic of themselves to 5 (extremely characteristic of themselves). NFC score range was 18-90, with a high score indicating a preference for in-depth thinking, referred to in the ELM as central route processing. Cronbach's alpha for the scale is .86 (Cacioppo et al., 1984).

To determine the participant's intention to breastfeed, the Infant Intentions (IFI) Scale was used. The IFI consists of five questions regarding a woman's plans for feeding her infant. A Cronbach's alpha of 0.90 was calculated in a pilot survey as well as in construct validity samples (Nommsen-Rivers & Dewey, 2009). Intention to breastfeed has been shown to be a valid measure of actual initiation and duration of breastfeeding (Donath & Amir, 2003; Forster et al., 2006). In a study by Nommsen-Rivers and Dewey

(2009), breastfeeding exclusively at one month increased as IFI score increased, as reflected in these percentages of breastfeeding women for each IFI score category: 0 - 3.5 (0%), 4 - 7.5 (33%), 8 - 11.5 (40%), 12 - 15.5 (50%), and 16 (86%). Scale scores on the IFI scale were related to breastfeeding exclusively at one month when categorical IFI were used, with the highest breastfeeding rate associated with a maximum score of 16 (Nommsen-Rivers & Dewey, 2009).

Data were analyzed using PASW (formerly SPSS) Version 21.0 (Chicago, Illinois). Descriptive statistics were computed including means and frequencies. Multiple regression analyses were used to determine predictors of intention to breastfeed.

Results

The study was conducted from October 2011 through October 2012. The sample consisted of 177 pregnant women, the majority (96%) from Louisiana. Participants had a mean age of 27.3+4.9 years and averaged 15.4+6.9 weeks gestation. They were primarily Cacasian (88.7%), married (71.1%), and educated (39.1% completed college or higher). The majority (53.1%) had incomes $\geq$\$55,000. For 44.1%, it was their first pregnancy; 20.9% were receiving WIC benefits and 40.1% had previous breastfeeding experience. Mean attitude toward breastfeeding scores and need for cognition scores were both above the midpoint in the score range (58.0$\pm$8.7 out of a possible 85 points and 61.3$\pm$10.7 out of a possible 90, respectively). Mean score on the IFI was 10.6$\pm$4.8. Table 7 provides complete demographic data as well as instrument scores.

Table 7

Demographic Characteristics of Study Participants

Characteristic	Mean and Standard Deviation
Age in years	27.3 ± 4.9
Gestation in weeks	15.4 ±6.9
IIFAS Scale (attitude)	58.0 ±8.7
IFI Scale (intention)	10.6 ±4.8
NFC Scale	61.3 ±10.7
	Frequency and Number (%)
Race	
White	157 (88.7)
African American	15 (8.5)
Alaskan Native/American Indian	4 (2.2)
More than one race	1 (0.6)
Ethnicity	
Hispanic	2 (1)
Non-Hispanic	175 (99)
Education	
Completed some HS	3 (1.7)
Graduated from HS	23 (13.0)

Table 7 (continued).

Characteristic	Frequency and Number (%)
Completed some college	56 (31.6)
Graduate from college	58 (32.8)
Completed some Grad school	11 (6.2)
Completed Grad degree	26 (14.7)
Marital Status	
Married	126 (71.2
Single living with the father	38 (21.5)
Single not living with the father	13 (7.3)
Currently Receiving WIC	
Yes	37 (20.9)
No	140 (79.1)
Previous Breastfeeding Experience	
Yes	71 (40.1)
No	106 (59.9)
Previous Breastfeeding Education	
Yes	112 (63.3)
No	63 (35.6)
Don’t Know	2 (1.1)

Table 7 (continued).

Characteristic	Frequency and Number (%)
Number of Pregnancies	
1	78 (44.1)
2	57 (32.2)
3	28 (15.8)
4 or more	14 (7.9)
Income (household)	
Less than $5,000	9 (5.1)
$5,000 - $14,999	13 (7.3)
$15,000 – $24,999	13 (7.3)
$25,000 - $34,999	14 (7.9)
$35,000 - $44,999	17 (9.6)
$45,000 - $54,999	17 (9.6)
$55,000 or more	94 (53.1)
IFI Score Category*	
0 – 3.5	20 (11.3)
4 – 7.5	16 (9.0)
8 – 11.5	61 (34.5)
12 – 15.5	45 (25.4)
16	35 (19.8)

Note. IIFAS score range: 17 – 85; NFC score range: 18 – 90; IFI score range: 0-16; * IFI score categories, reflects the sample's scores on the IFI scale in these same groupings. If the two highest scoring groups are summed (80 participants) to determine the number of participants that are most likely to breastfeed (45%) it reflects a similar percentage to the current reported breastfeeding rate for the study area (53.5% in Louisiana) and (47.2% in Mississippi) (Centers for Disease Control, 2012).

A series of multiple regression analyses was performed to determine the model for best predicting intention to breastfeed. Predictor variables (age, race, ethnicity, education, marital status, income, WIC recipient status, weeks of gestation, prior breastfeeding experience, previous breastfeeding education, NFC, and infant feeding attitude) were included in the first model, which predicted 44.9% of the variance in intention to breastfeed. Those variables that were significant ($p < 0.05$) or approached significance ($p = .155$) were then used in a final model. The final model (Table 8) predicted 46.1% of the variance in intention to breastfeed and two variables were significant: attitude toward breastfeeding and previous breastfeeding experience (adjusted R square = .461. $F_{4,\ 172} = 38.623$, $p < 0.001$).

Table 8

Significant Variables in Multiple Regression Analysis for Intention to Breastfeed

Variable	B	SE B	β
IIFAS	0.349	0.033	0.633*
Previous Breastfeeding Experience	1.560	0.641	0.159**
No Previous Breastfeeding education	0.933	0.612	0.093
Income	-0.115	0.074	-0.087

Note. *p < .001; **p = .016

To determine if any of the demographic variables or need for cognition predicted infant feeding attitude, a multiple regression analysis was performed with attitude (IIFAS) as the dependent variable. For the first analysis, the potential predictor variables (age, race, education, marital status, income, number of pregnancies, WIC recipient status, weeks of gestation, prior breastfeeding experience, previous breastfeeding education, and NFC) were entered into the model, which predicted 19.0% of the variation in infant feeding attitude. In the second regression analysis, a significant model emerged ($F_{4, 172} = 13.683$, $p < 0.001$. Adjusted R square = .224), which predicted 22.4% of the variation in infant feeding attitude. The variables that were found to be significant included number of weeks gestation, age, previous breastfeeding experience, and Need for Cognition.

Table 9

Significant Variables in Multiple Regression Analysis for Infant Feeding Attitude

Variable	B	SE B	β
Gestation (weeks)	-.202	.085	-.159*
Age (years)	.257	.127	.145**
Need for Cognition	.188	.055	.230***
Previous breastfeeding experience	6.28	1.25	.353***

Note: *p = .019; **p = .044; ***p < .001

Discussion

This study aimed to determine predictors of intention to breastfeed in two states with historically low breastfeeding initiation rates. On the IFI scale, about 45% of women scored in the two highest intention categories, indicating a high likelihood of breastfeeding (Table 7) (Nommsen-Rivers & Dewey, 2009). This rate is similar to the current reported breastfeeding rates for the study area, which are 53.5% for Louisiana and 47.2% for Mississippi (CDC, 2012).

Previous breastfeeding experience and attitude toward infant feeding were found to be the best predictors of intention to breastfeed, and number of weeks gestation, age, and need for cognition predicted attitude toward infant feeding. The finding about predictors of intention is consistent with other research indicating that attitude toward breastfeeding contributes to higher breastfeeding initiation rates (Bertino et al., 2012; Persad & Mensinger, 2008; Scott, Shaker, & Reid, 2004). In 2007, Dungy et al. (2008) used the IIFAS to identify infant feeding attitudes in a population of socioeconomically disadvantaged women. They found that mothers who initiated breastfeeding in the hospital had higher IIFAS scores than those who initiated formula feeding ($p = .005$). An Irish study using the IIFAS found that breastfeeding mothers had higher scores than formula feeding mothers ($p < .001$) (Sittlington et al., 2007). Scott et al. (2004) found that maternal infant feeding attitude was a better predictor of method of feeding chosen than demographic variables in a sample of 108 pregnant couples. They noted that the IIFAS instrument may help healthcare providers identify women who are more in need of breastfeeding education to help influence their attitudes and choice (Scott et al., 2004).

Merriam-Webster defines attitude as "a mental position with regard to a fact or state, a feeling or emotion toward a fact or state" (Merriam-Webster, 2012). It is important to think of an attitude as something that can be changed or molded. This study found that age, breastfeeding experience, weeks of gestation, and need for cognition predicted attitude toward infant feeding. As age increased, IIFAS score increased, indicating a more favorable attitude toward breastfeeding. This finding is consistent with other literature suggesting that women who are younger than age 20 are less likely to breastfeed (Ahluwalia et al., 2003; Mahoney & James, 2000; Ross Products Division, 2002; Ryan et al., 2002; Scott & Binns, 1999). Likewise, weeks of gestation was related to attitude, such that for every one week increase in weeks gestation, there was a .2 decrease in the IIFAS score. Two studies of intention to breastfeed suggest that the decision to breastfeed typically occurs either prior to conception or early on in the pregnancy (Earle, 2002; Humphreys et al., 1998).

Need for cognition also predicted attitude toward infant feeding, such that for each one point increase in NFC score, there was a .19 point increase in the IIFAS score. Choosing an infant feeding method is a decision that may require much thought to determine what is best for the infant, mother, and family. This might suggest that women with a higher need for cognition had already accessed information explaining benefits of breastfeeding.

The findings of this study may have limited generalizability due to a possible selection bias. The study included a convenience sample of women receiving prenatal care from OB/GYN practices. Women responding to recruitment information placed in clinics were enrolled if they met selection criteria, without regard to representativeness of

the geographic areas from which the sample was drawn. Further, enrollment was limited to two south central parishes in Louisiana, and opened to other parishes and counties in Louisiana and Mississippi later in order to reach the required sample size for the intervention study. Thus, more of the sample came from the originally targeted parishes, which differ demographically from the two states as a whole.

Further, study participants were mainly Caucasian and not low income. This study did seek to recruit pregnant women by mailing information and flyers to health department clinics in south central Louisiana, which might have yielded a more socioeconomically diverse sample, but feedback from clinics suggested a preference for their clients to participate in health department breastfeeding education programs. It is important to note that women in Louisiana become Medicaid-approved once they are diagnosed as pregnant, which allows them to seek prenatal care from OB/GYN offices just like privately insured patients. Therefore, lower income and minority women may have had access to the study but have chosen not to enroll. Further, they may not have sought enrollment because of lack of access to the internet and/or cell phone service, since these were requirements of enrollment. Findings from the study may be more generalizable to the coastal parishes of Louisiana which were originally targeted, as well as to coastal counties of Mississippi, since these counties have high proportions of Caucasians (US Census Bureau, 2011).

Conclusions and Implications

The findings of this study on a target population with breastfeeding rates that are among the lowest in the U.S. were generally in agreement with those of other studies, affirming that attitudes toward breastfeeding are important predictors of breastfeeding

intention and, in turn, initiation. These results suggest that programs to increase breastfeeding rates should target attitudes toward breastfeeding. Although this study did not attempt to measure the influence of breastfeeding attitudes of others on pregnant women, efforts to change attitudes may need to target those who provide social support to pregnant women, as well as targeting society more broadly, using efforts such as social marketing (Hannan et al., 2005).

Similarly, this study found that maternal age and weeks of gestation predicted breastfeeding attitudes. These findings suggest that programs that attempt to influence infant feeding decisions may need to be tailored by age of intended program recipient, and should consider timing of efforts during the gestation period.

The finding that need for cognition predicted infant feeding attitude may offer new insights for developing breastfeeding education or intervention programs. This finding suggests that those women with a lower need for cognition, who are less likely to engage in extensive thinking about a breastfeeding decision, may require different approaches to develop a favorable attitude toward breastfeeding than those who prefer to information-seeking. Wilson (2007) suggests that by developing and tailoring a persuasive message that targets an individual's motivation and ability to process (need for cognition), the sought after attitude and behavior can be attained.

In conclusion, further research into the most effective methods of changing attitudes toward breastfeeding, considering maternal age, stage of gestation, and need for cognition, is needed. Such research could test messages and their delivery methods to those who vary in these characteristics. Approaches utilizing social media and electronic communication, such as the Text4baby program, which provides health information to

pregnant women to decrease infant mortality (Healthy Babies Coalition, 2012), may be more appropriate than traditional approaches for those with a lower need for cognition and should be evaluated. It may also be important to study whether and how attitudes toward infant feeding are different in the South, given that the Healthy People 2020 breastfeeding initiation goal is being met in other states (Centers for Disease Control, 2012; US Department of Health and Human Services, 2010) and that attitudes are such a strong predictor of breastfeeding intention and initiation.

CHAPTER V

EFFECTIVENESS OF ELECTRONIC EDUCATION DELIVERY METHODS ON INTENTION TO BREASTFEED

Abstract

Breastfeeding rates for the southern portion of the United States are low compared to the rest of the country. This study sought to determine the effectiveness of electronic delivery of breastfeeding education compared to written education in regards to intention to breastfeed in a convenience sample of pregnant women in Louisiana and Mississippi. Of 177 women randomized into one of three groups (a) web-based with text messages; (b) web-based no text, or (c) written materials only group, 147 completed the six-week breastfeeding education intervention. MANCOVA was used to determine if differences existed among groups in post-intervention infant feeding intention, while controlling for other variables. No significant differences were found among groups; however, all three groups showed improvement in intention to breastfeed scores. The text message group completed more web-based lessons than the no-text group. More research is needed on effects of the use of reminder text messages, as well as exposure to educational content, on breastfeeding intention.

Background

Breastfeeding statistics for the southern portion of the United States (U.S.) show that women from this region of the country are less likely to breastfeed their infants than those from other geographic regions. Centers for Disease Control (CDC) reported the national average for the percent of babies in the U.S. that were ever breastfed was 76.9% in 2009. Southern states such as Alabama (57.2%), Louisiana (53.5%), and Mississippi

(47.2%) are all well below the national average (CDC, 2012). The Healthy People 2020 goal for breastfeeding is to achieve at least 81.9% breastfeeding initiation in the early postpartum period (US Department of Health and Human Services, 2010). The low breastfeeding rates in Louisiana and Mississippi are one example of these states' consistent place at the bottom of health ranking surveys like America's Health Rankings 2011. Louisiana ranks 49th and Mississippi ranks 50th on this list due to their high percentage of children who live in poverty, number of uninsured citizens, the high rate of obesity and the high rate of preventable hospital visits (United Health Foundation, 2012).

Breast milk is the optimal source of nutrition for infants. The benefits for mother and infant are well documented in the literature and further reinforced by the American Academy of Pediatrics (AAP) position paper from 2012, which states that breast milk decreases infant mortality rates in the United States by 21% (Eidelman & Shanler, 2012).

Health education interventions to increase breastfeeding initiation have been successful. Interventions range from in-person, one on one or group education and use of written education materials, to web-based and peer support approaches, both prenatal and postnatal (Bonuck et al., 2002; Dyson et al., 2009). While a variety of face-to-face intervention approaches have been shown to be effective in promoting breastfeeding, including both individual and group approaches, offering these types of interventions in rural areas may be a challenge where resources such as money and human capital are limited. The internet may offer a way to interact with and educate people in areas of scarce resources. A review of the literature reveals only a handful of research studies on the application of a web-based intervention for breastfeeding, and these studies all measured different aspects breastfeeding interventions (Cheng et al., 2003; Clark et al.,

2009; Ickovics et al., 2007; Laborde et al., 2007). A review of the literature uncovered one web-based intervention study which sought to increase breastfeeding initiation. Huang et al. (2007) wanted to determine if a web-based breastfeeding education intervention could be effective in increasing knowledge, skill, and initiation rate. The web-based program, delivered during the prenatal period, included information on several breastfeeding topics and incorporated animations, graphics, audio, video, and interactive messaging. In a comparison of an experimental group with a historical control group, the experimental group had greater posttest breastfeeding knowledge and a breastfeeding rate at discharge of 48.3%, compared to 38.3% for the historical control ($p < .05$). The limitations of this study included a small sample size limited to one hospital, limiting the generalizability of its findings. The purpose of the current study described here was to determine if intention to breastfeed could be increased in pregnant women in Louisiana and Mississippi through the use of a web-based educational support program for pregnant women, compared to use of a traditional written education program that was mailed to participants.

Methods

This study received approval through the Institutional Review Board at The University of Southern Mississippi. Informational recruitment flyers were distributed via US mail to obstetrics and gynecology (OB/GYN) practice offices and health department clinics, with a cover letter which requested that the flyers be distributed to patients at their prenatal appointments. Recruitment occurred using a staged approach. Initially, two parishes in south central Louisiana with low breastfeeding rates were targeted. Subsequently recruitment flyers were mailed to some 500 OB/GYN practice and health

department clinic offices identified through the Internet Yellow Pages throughout Louisiana and Mississippi in order to achieve the number of participants required for the planned intervention in a timely manner. Once the sample size required for the planned intervention was achieved, study enrollment ended.

The flyers contained instructions to contact the researcher if flyer recipients were interested in participating. The flyer also offered an incentive to participate, which was the opportunity for participants who met screening criteria and completed the study to be enrolled in a drawing for a chain store gift card. Respondents completed the screening process to determine study eligibility. For study inclusion, participants had to live in one of the two target states, be 27 weeks gestation or less, be English speaking, and have the use of a cell phone, text messaging, email, and the internet. The informed consent document was sent to eligible respondents with the data collection tool via email address, using the contact information they provided.

Of the 218 women who were screened, 181 met the enrollment criteria and were eligible to participate in the study. The majority of women who were not eligible were past 27 weeks gestation. Of the 181 eligible, 177 women completed the enrollment questionnaire. The questionnaire consisted of four instruments (51 items) that were combined and accessed through an email link to SurveyMonkey sent to each participant's email address. The instrument included sociodemographic questions: race, number of pregnancies, number of live births, marital status, education, household income, WIC participation, and previous exposure to breastfeeding education. Infant feeding attitude was assessed using the Iowa Infant Feeding Scale (IIFAS) developed by De La Mora et al., in 1999. This 17-item questionnaire uses a five-point Likert-type response. Possible

scores range from 17-85. A high score reflects a respondent's preference for breastfeeding. This instrument has been found to be a reliable predictor of infant feeding attitude, with a Cronbach alpha of 0.86 (De La Mora, Russell et al., 1999; Dungy et al., 2008; Sittlington et al., 2007; Wallis et al., 2008).

Cacioppo et al.'s (1984) Need for Cognition (NFC) Scale was also included in the survey instrument. This 18-item scale measures an individual's tendency to engage in and enjoy thinking. Need for Cognition is the basis for the Elaboration Likelihood Model (ELM), which postulates that there are two types of thinkers: central route processors and peripheral route processors. There is some evidence that central route processing (more in-depth thinking) is more likely to lead to adoption of healthy behaviors and longterm behavior change (Petty & Cacioppo, 1986b). The NFC scale asks respondents to rate the degree to which they agree with statements related to the amount of satisfaction they obtain from the thinking process. Those with higher scores are more likely to enjoy thinking and are better at synthesizing information (Petty & Cacioppo, 1984). It was hypothesized that women with higher need for cognition would have a greater change in intention to breastfeed and infant feeding attitude, compared to those with lower NFC scores. Breastfeeding intervention participants were asked to rate each statement as to whether it was characteristic of themselves or what they believed about themselves. The five-point item response ranged from 1(extremely uncharacteristic) to 5 (extremely characteristic). The possible score range was 18-90. Cronbach's alpha for the scale is .86 (Cacioppo et al., 1984).

To determine the participant's intention to breastfeed, the Infant Intentions (IFI) Scale was also administered. The IFI consists of five questions regarding a woman's

plans for feeding her infant. Possible scores range from 0 to 16. A Cronbach's alpha of 0.90 was calculated in a pilot survey as well as in construct validity samples (Nommsen-Rivers & Dewey, 2009). Intention to breastfeed has been shown to be strongly related to initiation and duration of breastfeeding (Donath & Amir, 2003; Forster et al., 2006).

Enrolled participants were assessed using the study questionnaires at enrollment and six weeks later. Using a rolling enrollment, each new participant was randomized to one of three intervention groups upon enrollment, using Haphazard Assignment due to the continuous nature of enrollment (Shadish et al., 2002). The three groups included (a) web-based education intervention with text message reminders (TEXT), (b) a web-based education intervention with no text reminders (WEB), and (c) a written education program (CONTROL). The two web-based groups had access to a breastfeeding education website developed by the researcher for a period of six weeks. Participants in the TEXT group also received two text messages per week. These were simple one sentence reminders to complete one of the six web-based lessons included in the website. The control group received written education materials, which consisted of a breastfeeding book (*Breastfeeding: Your Guide to a Healthy, Happy Baby, 4th edition* [2005]) by Amy Spangler, MN, RN, IBCLC), via the US Postal Service. Neither the WEB nor the CONTROL group received other communication from the researcher over the six-week period designated for the intervention. Curriculum content for all treatment groups was standardized to include the following six lessons: breastfeeding benefits, various views of breastfeeding, techniques of successful breastfeeding, what to expect during breastfeeding, going back to work and school, and the challenges of breastfeeding. The Spangler book sent to the control group contained a chapter on each intervention

topic. The web-based intervention content was developed using the Arkansas WIC program's breastfeeding curriculum (Arkansas Department of Health, 2004) and the *Breastfeeding:Your Guide to a Healthy, Happy Baby, 4th edition* book, which is a primary source for the Arkansas WIC curriculum.

The intervention website was developed by the researcher with assistance from a web developer (iiicreative from Houma, Louisiana). The website was constructed to build on the ELM's contention that use of both central and peripheral routes of persuasion are more likely to result in the desired thinking/behavior. The lessons for the website included written content from the breastfeeding curriculum which would trigger central route processing. It also incorporated features intended to access the peripheral processing route, such as interactive modules, bright colors and attractive images, and simple messages. According to ELM, this should result in increased information-seeking by participants. Wilson (2007) recommends using the ELM when developing media messages about health and nutrition. Her recommendations include designing messages for your audience, using a source that speaks to your audience (e.g., credentialed health professionals), drawing a firm conclusion, presenting both sides of an argument, using fear appeals when appropriate, and providing statistics (Wilson, 2007). The website was designed to meet all seven postulates of the ELM as described in Chapter III and summarized in Table 4. An expert in the field of lactation (licensed lactation consultant) evaluated the website for accuracy of breastfeeding information. Five women similar to the projected target audience for the intervention reviewed the website and gave qualitative feedback on the user-friendliness and clarity of the website. The pilot test subjects evaluated the site's construction and clarity using questions from Roberts'

(2010) paper on health information website evaluation. No modifications were suggested or made based on their feedback.

The home page of the website consisted of a welcome message with instructions for logging into the website. The web-based participants were given a login and password via email after randomization to web treatment groups. The participants were instructed by email to view each of the six content areas over the course of six weeks following their enrollment in the study. They were free to access the website at any time and to access the lessons in any order of their choosing. The website was able to track the number of lessons each participant completed. The website was provided only to the TEXT and WEB groups, ensuring that the CONTROL group was not directly influenced by the website contents and formatting.

All study participants completed the first study questionnaire upon enrollment and prior to random assignment to treatment. The post-intervention questionnaire was emailed to all participants after the six week exposure to the education approach for their assigned group. This posttest questionnaire consisted of the same IIFAS and IFI scales that they completed prior to beginning the study.

The required sample size for this intervention study was calculated using GPower, a general power analysis software program, using an alpha of .05, a medium effect size, and power of 0.8, which resulted in a minimum of 180 participants total, with a minimum of 60 per group. This number also reflects calculations for a 20% attrition rate. Data were analyzed using SPSS Version 21.0 (Chicago, Illinois) for Windows (Redmond, Washington). Descriptive statistics were computed. Multiple regression analyses were performed to compare intervention approaches on post-intervention intention to

breastfeed, using demographic and pre-intervention measures determined to predict intention to breastfeed as co-variates. Univariate analysis was also performed in order to determine the need for further Multivariate Analysis of Covariance (MANCOVA). *T*-tests were performed to compare within group differences pre- and post-intervention for infant feeding attitude and breastfeeding intention.

Results

The study was conducted from October 2011 through October 2012. The final sample consisted of 147 pregnant women, the majority (95%) from Louisiana. Thirty women did not complete the posttest questionnaire, which represents an attrition rate of 17%, within the 20% estimated prior to the study beginning. Table 10 provides data on sociodemographics and other study measures for study completers and non-completers. The majority of participants who completed the study were Caucasian (90%) and married (71%). Fifty-eight percent completed college, 56.5% had a household income of $55,000 or greater, and only 21% were currently participating in the WIC nutrition assistance program. It was the first pregnancy for 45%, 40% had previously breastfed, and 63.3% had received prior breastfeeding education.

Table 10

Participant Data

Characteristic	Completers Mean ± Standard Deviation (n = 147)	Non-Completers Mean ± Standard Deviation (n = 30)
Age in years	27.4 ±4.9	26.6 ±5.1
Gestation in weeks	15.7 ±6.8	13.93 ±7.3

Table 10 (continued).

Characteristic	Completers Mean ± Standard Deviation (n = 147)	Non-Completers Mean ± Standard Deviation (n = 30)
IIFAS Scale[a] (attitude)		
Pre-intervention	58.2 ±8.75	56.5 ±8.08
Post-intervention	65.8 ±10.55	NA
Change	7.55 ±6.1	NA
IFI Scale[b] (intention)	10.7 ±4.76	9.9 ±5.16
Pre-intervention		
Post-intervention	11.1 ±4.7	NA
Change	0.39 ±2.2	NA
Need for Cognition Scale[c]	61.3 ±10.7	60.3 ±10.4
	Frequency Number (percent)	Frequency Number (percent)
Race		
Caucasian	133 (90.5)	24 (80)
African American	11 (7.5)	4 (13)
Alaskan Native/American Indian	2 (1.4)	2 (6.6)
More than one race	1 (0.7)	0 (0)
Education		
Completed some high school	2 (1.4)	1 (3.3)
Graduated from high school	18 (12.2)	5 (16.7)
Completed some college	41 (27.9)	15 (50)
Graduate from college	54 (36.7)	4 (13.3)

Table 10 (continued).

Characteristic	Completers Mean ± Standard Deviation (N = 147)	Non-Completers Mean ± Standard Deviation (n = 30)
Completed some graduate school	7 (4.8)	4 (13.3)
Completed a graduate degree	25 (17)	1 (3.3)
Marital Status		
Married	105 (71.4)	21 (70)
Single living with the father	32 (21.8)	6 (20)
Single not living with the father	10 (6.8)	3 (10)
Currently Receiving WIC		
Yes	31 (21)	6 (20)
No	116 (78.9)	24 (80)
Previous Breastfeeding Experience		
Yes	59 (40.1)	12 (40)
No	88 (59.9)	18 (60)
Previous Breastfeeding Education		
Yes	93 (63.3)	19 (63.3)
No	53(36.1)	10 (33.3)

Table 10 (continued).

Characteristic	Completers Mean ± Standard Deviation (N = 147)	Non-Completers Mean ± Standard Deviation (n = 30)
Don't Know	1 (0.6)	1 (3.3)
Number of Pregnancies		
1	66 (44.9)	12 (40)
2	48 (32.7)	9 (30)
3	21(14.3)	7 (23.3)
4	8 (5.4)	1 (3.3)
5 or more	4 (2.7)	1 (3.3)
Income (household)		
Less than $5,000	8 (5.4)	1 (3.3)
$5,000 - $9,999	3 (2)	2 (6.7)
$10,000 - $14,999	5 (3.4)	3 (10)
$15,000 – $19,999	5 (3.4)	1 (3.3)
$20,000 - $24,999	3 (2)	4 (13.3)
$25,000 - $29,999	9 (6.1)	1 (3.3)
$30,000 - $34,999	3 (2)	1 (3.3)
$35,000 - $39,999	5 (3.4)	1 (3.3)
$40,000 - $44,999	8 (5.4)	3 (10)
$45,000 - $49,999	9 (6.1)	0 (0)

Table 10 (continued).

Characteristic	Completers Mean ± Standard Deviation (n= 147)	Non-Completers Mean ± Standard Deviation (n = 30)
$50,000 - $54,999	6 (4.1)	2 (6.7)
$55,000 or more	83 (56.5)	11 (36.7)
Group Randomization[d]		Attrition
		Number (percent)
TEXT	48 (32.7)	13(21)
WEB	49 (33.3)	11 (18)
CONTROL	50 (34.0)	10 (16.7)

Note. [a] IIFAS – possible score range = 17-85; [b]IFI – possible score range = 0-16; [c] NFC – possible score range = 18-90; [d] 181 participants originally randomized

Table 11 presents data on intervention study measures pre- and post-intervention. The TEXT group completed an average of 4.3 of the 6 lessons, compared to 2.4 for the WEB group. Within groups, infant feeding attitude increased for all groups, as did intention to breastfeed.

Table 11

Intervention Lessons Completed, Pre-Post Attitude toward Infant Feeding and Intention to Breastfeed, by Group

	TEXT	WEB	CONTROL
Lessons Completed [a *]	4.29 ±2.173	2.43 ±2.814	N/A

Table 11 (continued).

	TEXT	WEB	CONTROL
Pre-intervention Attitude (IIFAS) [b]	59.71 ±8.538	58.35 ±7.756	56.72 ±10.073
Post-intervention Attitude**	68.00 ±10.551	65.73 ±9.331	63.72 ±11.430
Pre-intervention Intention (IFI) [c]	11.52 ±4.311	10.33 ±4.679	10.28 ±5.215
Post-intervention Intention***	12.219 ±4.340	10.714 ±4.7697	10.380 ±4.916
IFI scale (intention), posttest – pretest	0.698 ±2.023	0.388 ±2.294	0.1 ±2.254
IIFAS (attitude), posttest – pretest	8.292 ±6.779	7.388 ±5.689	7.000 ±5.824
[d]Need for Cognition(NFC)	62.35 ±11	61.10 ±11.4	61.24 ±10.1

Note. *Group 1 significantly different from Group 2, independent *t*-test, $p < .001$. ** Post-intervention attitude significantly different from pre-intervention attitude for all groups, independent *t*-test, $p < .001$. *** Post-intervention intention significantly different from pre-intervention attitude for all groups, independent *t*-test, $p = .021$. [a]Lessons completed was operationally defined as viewing of all information provided in each lesson. The website tracked and recorded this information. [b]IFI – possible score range = 0-16. [c]IIFAS – possible score range = 17-85. [d]Need for Cognition – possible score range = 18-90.

As noted in the previous table, intention to breastfeed increased in all intervention groups. Table 12 presents the regression models which were evaluated preliminary to testing intervention effects on post-intervention intention to breastfeed (Adjusted R square = .403. $F_{3,\ 141} = 33.418$, $p < 0.000$). Model 2 included previous breastfeeding experience, pre-intervention attitude toward breastfeeding, and income as significant predictors. Residuals were checked to determine if outliers were present. Two cases were removed due to their being outliers, one due to a high leverage value and the other based on the Standardized DFits value.

Table 12

Summary of Regression Analysis for Variables Predicting Post-intervention intention

Variable	B	SE B	β
Regression Model 1			
Pre-intervention attitude	0.303	0.043	0.569*
Income	-0.219	0.123	-0.165**
American Indian	4.232	2.760	0.104
Gestation	0.050	0.052	0.072
Age	0.062	0.094	0.064
African American	-0.584	1.370	-0.033
More than one race	2.164	3.912	0.038
Need for cognition	0.033	0.033	0.076
Completed some high school	0.805	2.807	0.020
Completed high school	-1.113	1.141	-0.078
Completed some college	0.765	0.874	0.073
Completed some graduate school	0.459	1.574	0.021
Completed graduate degree	0.353	0.950	0.028
Single living with father	-0.376	0.935	-0.033
Single not living with father	0.215	1.579	0.012
Not receiving WIC	1.092	1.019	0.095

Table 12 (continued).

Variable	B	SE B	ß
Previous breastfeeding experience	1.763	0.909	0.184***
Did not receive previous BF education	0.821	0.756	0.084
Number of pregnancies	-0.329	0.409	-0.071
Regression Model 2			
Pre-intervention attitude	0.316	0.038	0.597*
Income	-0.095	0.086	-0.071
Previous breastfeeding experience	0.963	0.693	0.100

Note. *p < .05; ** p < .077; *** p < .055

MANCOVA testing was performed using post-intervention intention to breastfeed as the dependent variable and the following covariates: pre-intervention intention, pre-intervention attitude, previous breastfeeding experience, and income to control for any pre-existing variability between the groups, so that any differences in the post-intervention breastfeeding intention scores would be more likely due to the exposure to the interventions. Estimated Marginal Means were adjusted for the covariates (TEXT: 11.399 ±0.312, WEB: 10.986 ±0.305, CONTROL: 10.744±0.306). Descriptive statistics, estimates of effect sizes and homogeneity tests were also run. Levene's test for equality of variances showed no violation of homogeneity, F (2,142) = .166, p = .847. There was

not a significant difference among intervention groups, F (2,142) = 1.133, p = .325. Since no differences existed there was no need to further analyze contrasts.

Discussion

This study found significant increases in intention to breastfeed and in attitude toward infant feeding within each of the three intervention groups when comparing pre- to post-intervention data, but no differences in intention to breastfeed among groups. Only a handful of research studies on the application of a web-based intervention for breastfeeding were found in the literature. Most are not directly comparable to this study, because they did not compare web-based breastfeeding education with non-web-based approaches. However, in contrast to the findings of this study, a review of the breastfeeding initiation literature by Pate (2009) found that "e-based interventions had a moderate effect on breastfeeding (odds ratio =2.2 [1.9-2.7], d = 0.5); whereas provider-based interventions had very little to no effect (odds ratio = 1.1 [1.0-1.2], d = 0.3)" (p. 647).

Although the results of the MANCOVA revealed no significant differences among intervention groups, participants in TEXT group completed a significantly higher number of lessons than the WEB group. This finding offers limited evidence that text messaging may be an effective tool to increase client utilization of health education. The United States government has implemented a texting service called Text4baby to provide health information to pregnant women, focused on decreasing infant mortality (Healthy Babies Coalition, 2012). This move by the government to provide health information through text messages suggests the importance of providing health information through a variety of channels. Cell phones and text messages have been used successfully in several

health care research settings for conditions including HIV/AIDS, smoking cessation, physical activity, diabetes, and colorectal cancer screenings (Fjeldsoe et al., 2010; Kreuter et al., 2012; Mbuagbaw et al., 2011; Population Reports, 2007; Riley et al., 2008; Sherwood et al., 2006; Tasker et al., 2007).

Limitations

The findings of this study may have limited generalizability because participants were a convenience sample, recruited only from OB/GYN offices. Therefore, the majority of participants were likely early seekers of prenatal care, who had prenatal health care coverage. Likewise, the majority of participants were Caucasian, had household incomes at or above $55,000, and were well educated; therefore, findings of this study may apply only to populations with similar demographic characteristics.

Implications

It is noteworthy that attitude toward infant feeding and intention to breastfeed increased in all intervention groups over the relatively brief and limited duration and intensity offered by a six-week intervention where exposure was controlled by the participant. These findings suggest that relatively low-cost breastfeeding education approaches, such as breastfeeding promotion websites and text messaging (perhaps automated), could be used to target certain demographic groups in states with persistent low rates of breastfeeding.

Further research needs to be done on the optimum number of text message reminders that should be used as adjunct to breastfeeding education interventions. Research could also focus on when is the optimal time to begin education and/or text messages to optimize their effectiveness in increasing intention to breastfeed.

CHAPTER VI

ADDITIONAL ANALYSES, SUMMARY, AND CONCLUSIONS

Further Analyses and Findings

Research objective 2 stated that participants who are older, Caucasian, married, have higher educational level, and high income level will have increased intention to breastfeed and will have higher scores on the Iowa Infant Feeding Attitude Scale. Hypothesis 4 similarly stated that intention to breastfeed and infant feeding attitude at pre-intervention enrollment are greater among those who are married, Caucasian, have breastfeeding experience, are older, or are more educated. Multiple regression analysis was performed on the pre-intervention data to determine the model for best predicting pre-intervention intention to breastfeed. All demographic variables, including marital status, race, age, education, and income, were included in the first model. None of these demographic variables were significant predictors of intention to breastfeed. Similarly, these variables were included in a regression model using infant feeding attitude as the dependent variable. Among these variables, only age was a significant predictor of infant feeding attitude. In a second regression model, which included only those variables that were significant in the first, age remained a significant predictor of infant feeding attitude, with a .26 increase in IIFAS score for every one year increase in age.

Strengths and Limitations

Breastfeeding is recommended as the preferred infant feeding method by numerous groups concerned with child health, including the American Academy of Pediatrics, the World Health Organization, and the Academy of Nutrition and Dietetics, but breastfeeding rates in some parts of the United States, and particularly in the southern

U.S., are much below the U.S. as a whole and the rates targeted in Healthy People 2020. This research focused on increasing breastfeeding intention, which is highly correlated with breastfeeding initiation, in a population with very low rates of breastfeeding. Using a randomized control trial design that was adequately powered, this study evaluated and compared the effectiveness of multiple, low intensity intervention approaches on intention to breastfeed.

A limitation of this study is that its participants were a convenience sample, recruited through the narrow channel of physicians' offices. This suggests that the majority of participants were early seekers of prenatal care, and women not receiving prenatal care would not have been included in the sample unless someone brought them a flyer. Therefore, this means of recruitment might also have resulted in a sample that was higher income and more educated than the average resident of the targeted Louisiana and Mississippi areas. However, women in Louisiana become Medicaid-approved once they are diagnosed as pregnant, allowing them to seek prenatal care from obstetrics offices just like privately insured patients, possibly providing study access to a more diverse population.

Participants received prenatal care by different physicians and healthcare providers, which could have affected the amounts and types of infant feeding advice they received. The sample had more Caucasian, college-educated, and middle-class women compared to the actual population of pregnant women in the states of Louisiana and Mississippi. The sample was 88.7% Caucasian, in contrast to somewhat lower percentages of Caucasians in the parishes that were initially targeted (81.1% and 72.1% for Lafourche and Terrebonne, respectively). This may have occurred because other

ethnic groups might not be seeking early prenatal care, or they might not have had access to the internet/cell service which was a requirement of the study. Another possible selection bias is that women who already had a positive attitude toward breastfeeding might have been more likely to participate in a research study regarding infant feeding. These sample characteristics may limit generalizability of the findings, but it is important to note that the low breastfeeding initiation rates in Louisiana and Mississippi are not confined to the minority, low income population.

Summary, Conclusions, Implications, and Applications

This study aimed to determine if intention to breastfeed could be increased for pregnant women in Louisiana and Mississippi through the use of a web-based breastfeeding educational support program versus a traditional written education program mailed to participants. The results indicate that the web-based education provided in this intervention did not significantly improve intention to breastfeed compared to the written education. However, all three intervention groups did experience a pre- to post- increase in their intention to breastfeed, as well as increase in attitudes favorable toward breastfeeding. These findings suggest that the relatively low intensity, low cost breastfeeding intervention approaches used in this study (web-based with text reminders, web-based, and written) should be considered for use in populations with low breastfeeding rates.

The group which received text message reminders to complete their educational lessons showed the highest rate of completion of lessons. This suggests that text messaging may be an effective tool to increase client utilization of breastfeeding education. These findings might also have implications for other types of health

education, supporting use of texting as an effective way to motivate individuals to access health information that is relevant to their condition or situation. Evaluation data for a new United States government texting program for pregnant women, Text4baby, will be useful in the future for understanding impacts and effectiveness of texting with this population.

This study reinforces that several different low-intensity educational methods can be effective in changing attitude and intention regarding breastfeeding, and it adds to this body of evidence by specifying that text message reminders can be utilized as a way to encourage pregnant mothers to read and access various education available to them. This information may be useful to health professionals engaged in prenatal and breastfeeding education.

Merriam-Webster defines attitude as "a mental position with regard to a fact or state, a feeling or emotion toward a fact or state" (Merriam-Webster, 2012). It is important to think of an attitude as something that can be changed or molded. All intervention approaches used in this study resulted in a change in attitude toward breastfeeding, which was related to intention to breastfeed. Breastfeeding education programs may need to place a greater emphasis on ways to change attitudes about breastfeeding. Further, since breastfeeding attitudes as measured by the IIFAS influenced intention to breastfeed, and intention is correlated with initiation, use of the IIFAS and IFI tools as simple impact evaluation measures may be appropriate for breastfeeding education programs.

The second multiple regression analysis model was used to determine if any of the other variables collected were predictors of attitude toward breastfeeding. The

resulting significant model included age, breastfeeding experience, gestation, and need for cognition. Need for cognition is used to assess a person's enjoyment of thinking. Deciding on infant feeding method is a process that should require much thought to determine what is best for the infant, mother, and family. Since NFC is a predictor of attitude toward breastfeeding it is important to develop ways to approach all levels of thinkers, engaging individuals based on the style that is best for them and the level of thought they are comfortable with pursuing.

Practical use for this research lies in changing attitudes of southern women and southern society toward breastfeeding. There is evidence to suggest that the use of social marketing that targets particular audiences may be one of the most effective ways to have a broad impact (Perez-Escamilla, 2012). By developing and tailoring a persuasive message that targets an individual's ability to process (need for cognition), the sought after attitude and behavior can be attained (Wilson, 2007). Tailoring television commercials and/or other media advertisements based on broad understanding of the Elaboration Likelihood Model and need for cognition among different groups may be an effective way to influence the attitudes of all those involved in the decision of what to feed the infant. State health departments seeking to increase breastfeeding rates could use social marketing based on the Elaboration Likelihood Model to try to increase positive attitude across broader societal groups.

Research for the Future

Further research needs to be done on the optimum number of text message reminders that should be used as adjunct to breastfeeding and other health education interventions to encourage exposure to education. Research could also focus on the

optimal time (e.g., age of individual, or relative to a specific event like the birth of a child) to begin education and/or health-related text messages to optimize their effectiveness.

Research on the role of social media and the internet for providing education and information to individuals who have a lower need for cognition should be pursued. Information delivery utilizing those methods tends to be quicker, shorter, and more interactive, which may appeal to individuals who score lower on the NFC scale, displaying more characteristics of peripheral route processors.

Further research is also needed to understand why breastfeeding attitudes and rates are different in the South. Since the Healthy People 2020 goal of at least 81.9% breastfeeding initiation in the early postpartum period (US Department of Health and Human Services, 2010) has already been met in some states in the U.S., this goal may be reasonable and attainable for all states. Approaches used in this study were successful in increasing intention to breastfeed among women in this region of low breastfeeding rates. Therefore, applying the theoretical model and the low-intensity intervention approaches used in this study on a broader scale may be a means to influence breastfeeding attitudes and behaviors in this region in order to attain the Healthy People 2020 goal.

APPENDIX A

HUMAN SUBJECTS REVIEW APPROVAL

THE UNIVERSITY OF
SOUTHERN MISSISSIPPI

INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.6820 | Fax: 601.266.4377 | www.usm.edu/irb

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

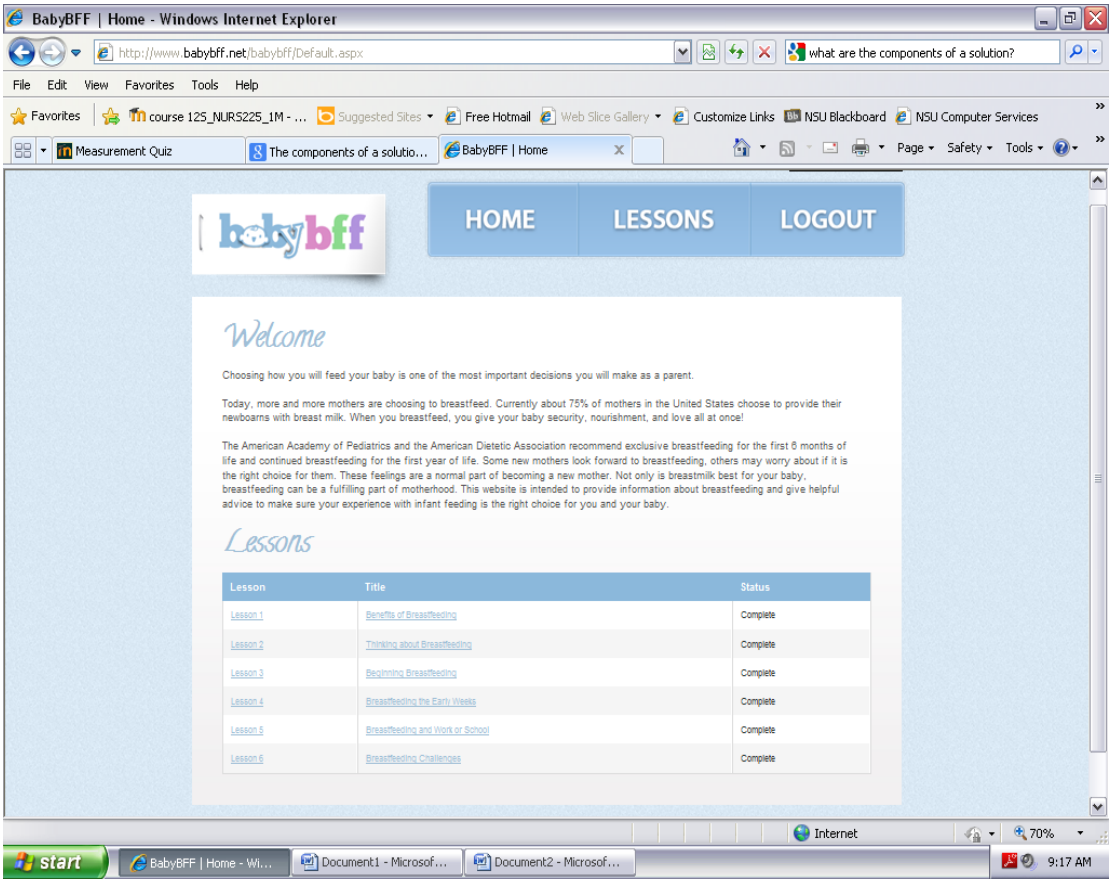
- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

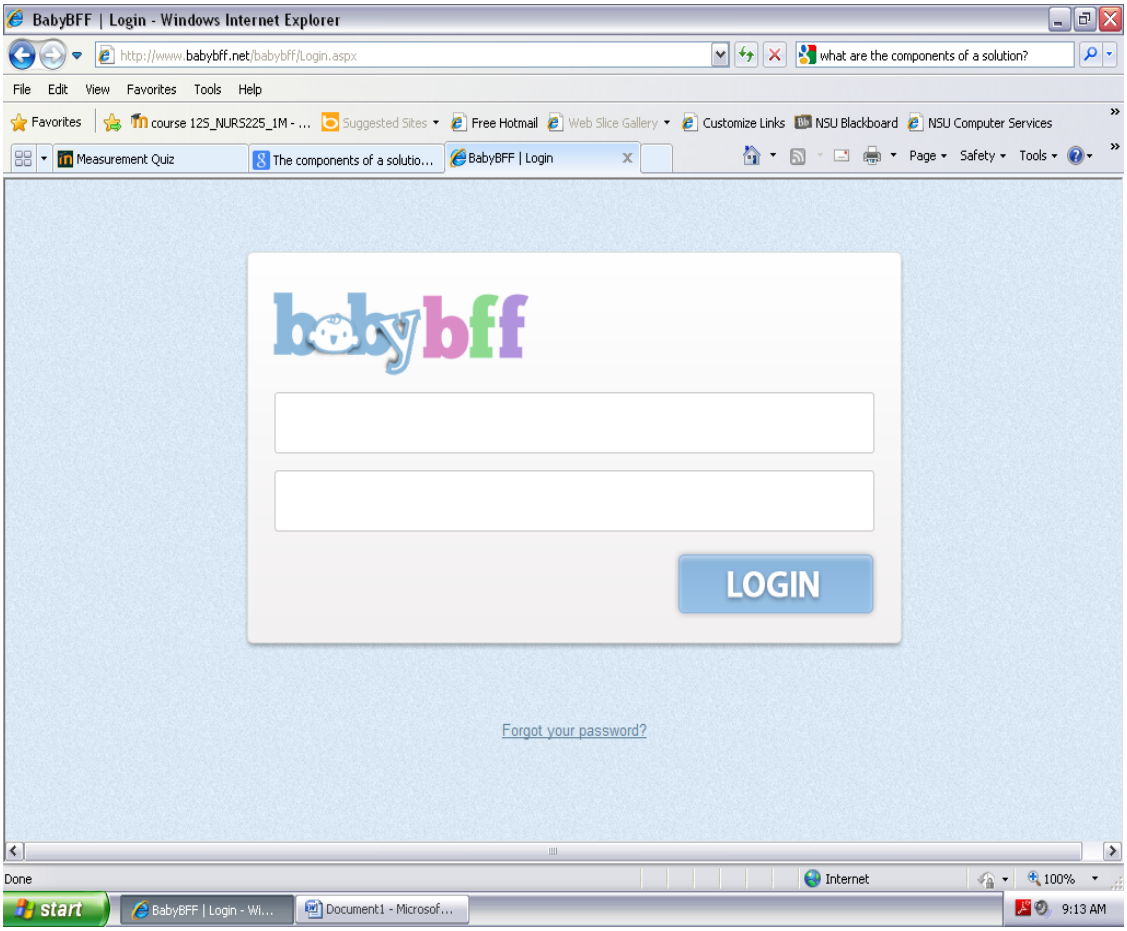
PROTOCOL NUMBER: **C11080905**
PROJECT TITLE: **Effectiveness of Internet and Instant Messaging in Promoting Intention to Breastfeed**
PROJECT TYPE: **Change to a Previously Approved Project**
RESEARCHER/S: **Brigett Scott**
COLLEGE/DIVISION: **College of Health**
DEPARTMENT: **Food & Nutrition Systems**
FUNDING AGENCY: **N/A**
IRB COMMITTEE ACTION: **Exempt Approval**
PERIOD OF PROJECT APPROVAL: **04/12/2012 to 04/11/2013**

Lawrence A. Hosman, Ph.D.
Institutional Review Board Chair

APPENDIX B

BABYBFF WEBSITE

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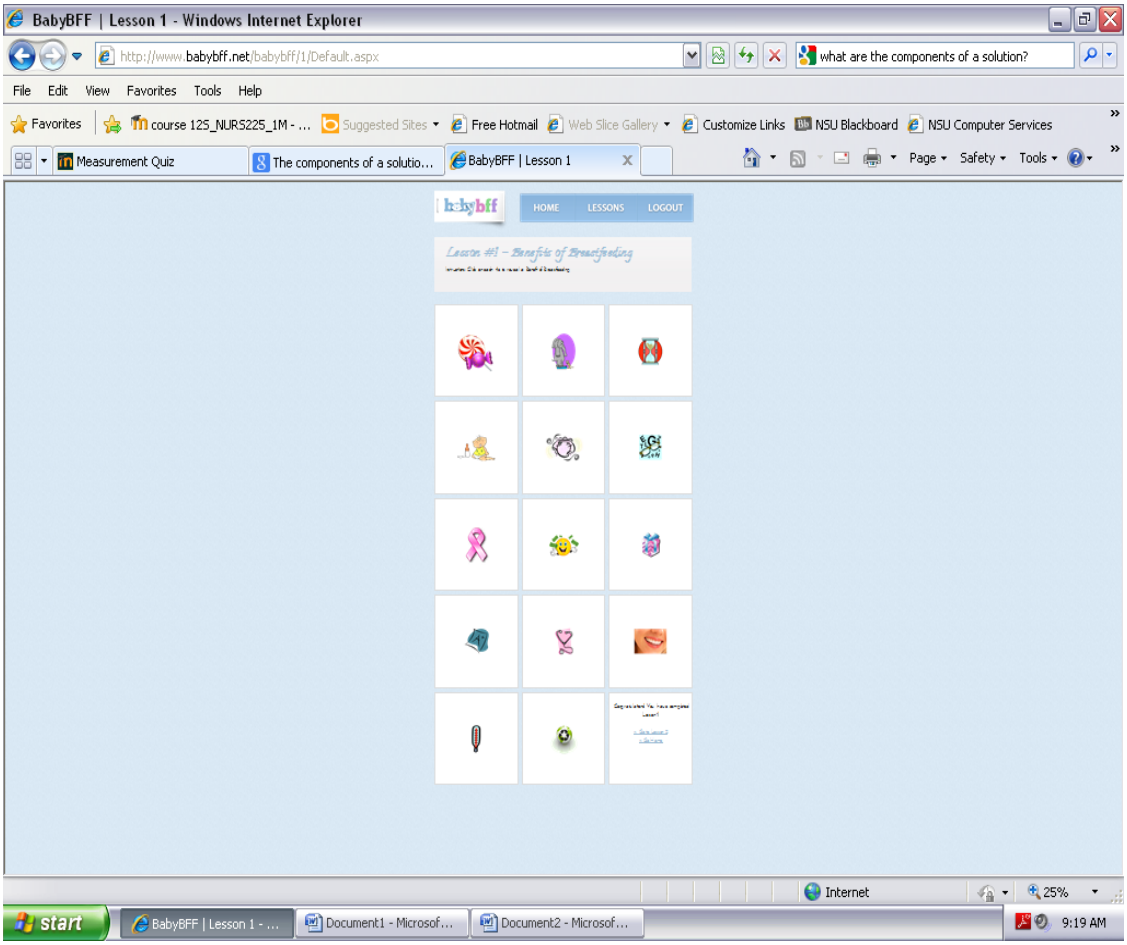
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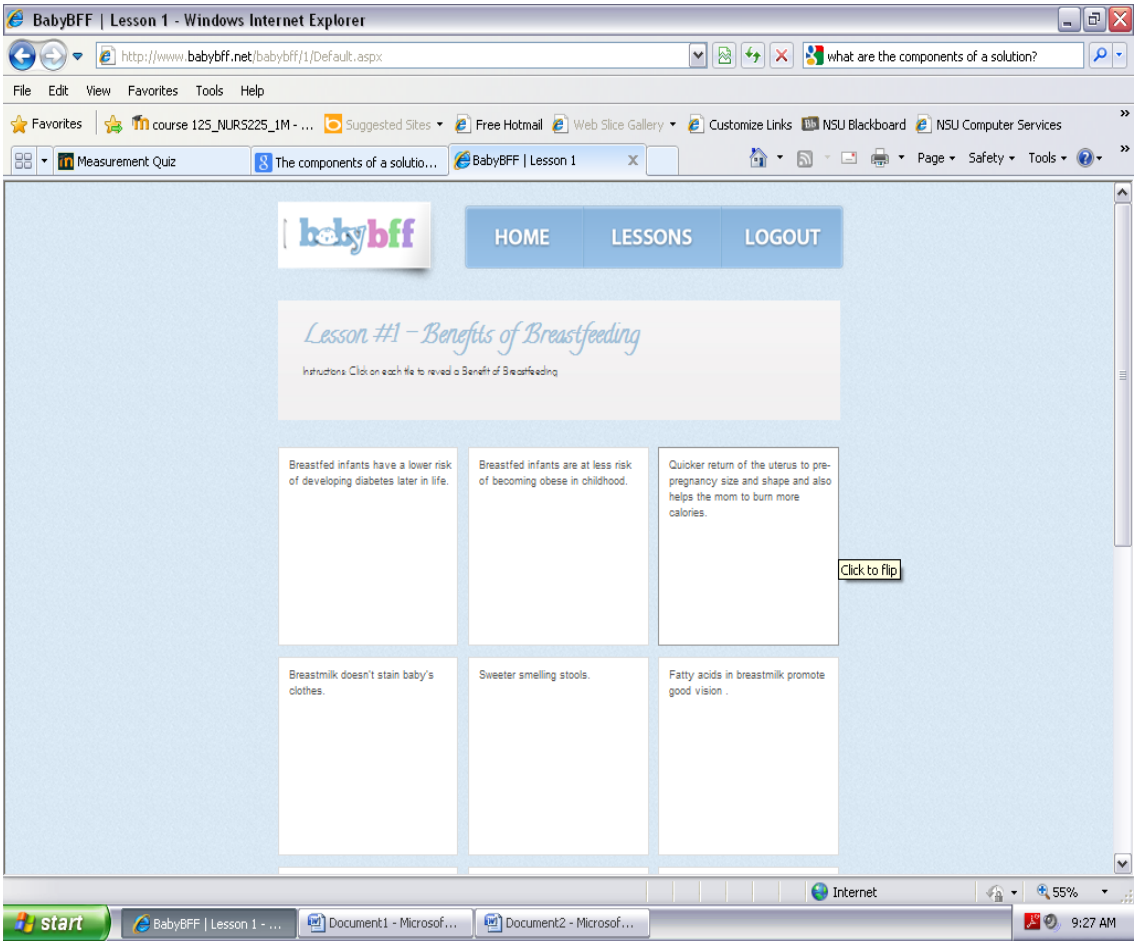
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Lesson #1 – Benefits of Breastfeeding
Instructions Click on each tile to reveal a Benefit of Breastfeeding
Breastfed infants have a lower risk of developing diabetes later in life.
Breastfed infants are at less risk of becoming obese in childhood.
Quicker return of the uterus to pre-pregnancy size and shape and also helps the mom to burn more calories.
Click to flip
Breastmilk doesn't stain baby's clothes.
Sweeter smelling stools.
Fatty acids in breastmilk promote good vision .
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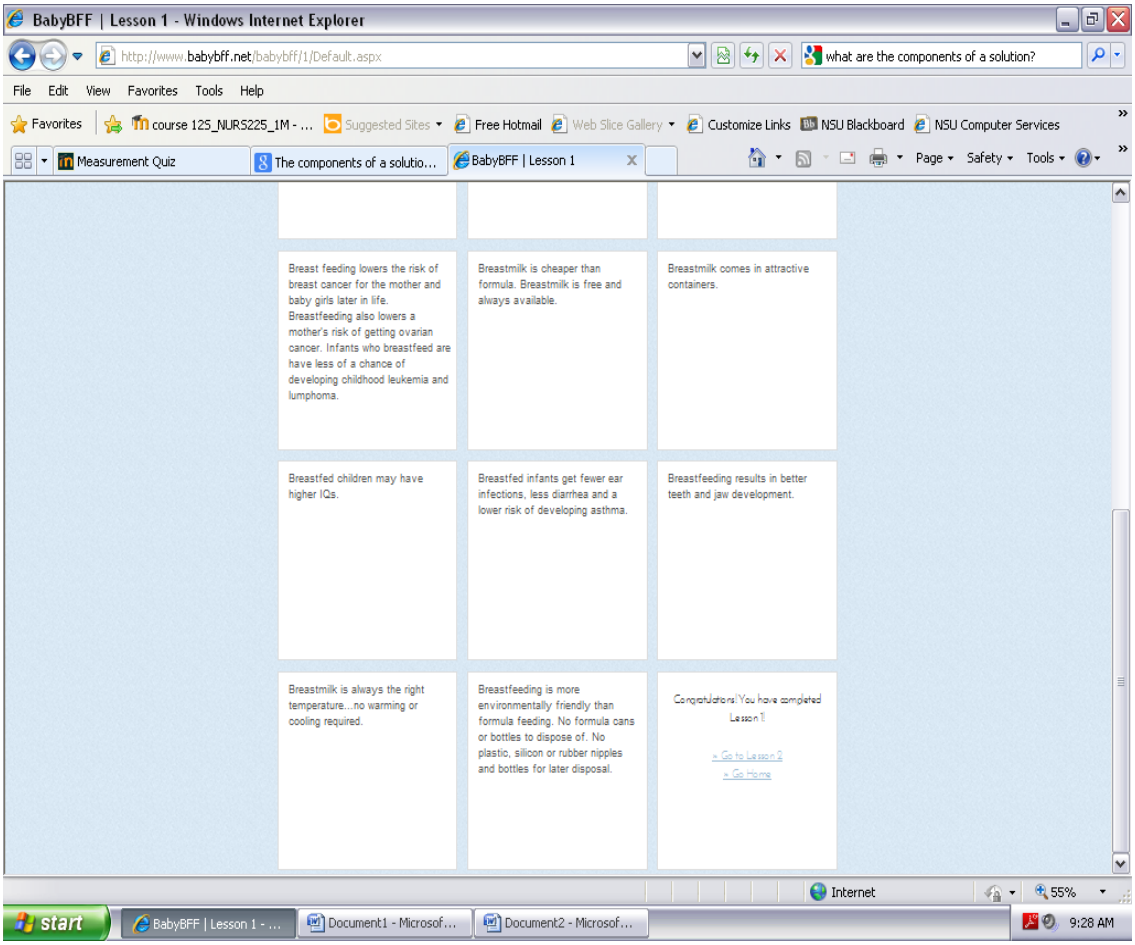
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Breast feeding lowers the risk of breast cancer for the mother and baby girls later in life. Breastfeeding also lowers a mother's risk of getting ovarian cancer. Infants who breastfeed are have less of a chance of developing childhood leukemia and lumphoma.
Breastmilk is cheaper than formula. Breastmilk is free and always available.
Breastmilk comes in attractive containers.
Breastfed children may have higher IQs.
Breastfed infants get fewer ear infections, less diarrhea and a lower risk of developing asthma.
Breastfeeding results in better teeth and jaw development.
Breastmilk is always the right temperature...no warming or cooling required.
Breastfeeding is more environmentally friendly than formula feeding. No formula cans or bottles to dispose of. No plastic, silicon or rubber nipples and bottles for later disposal.
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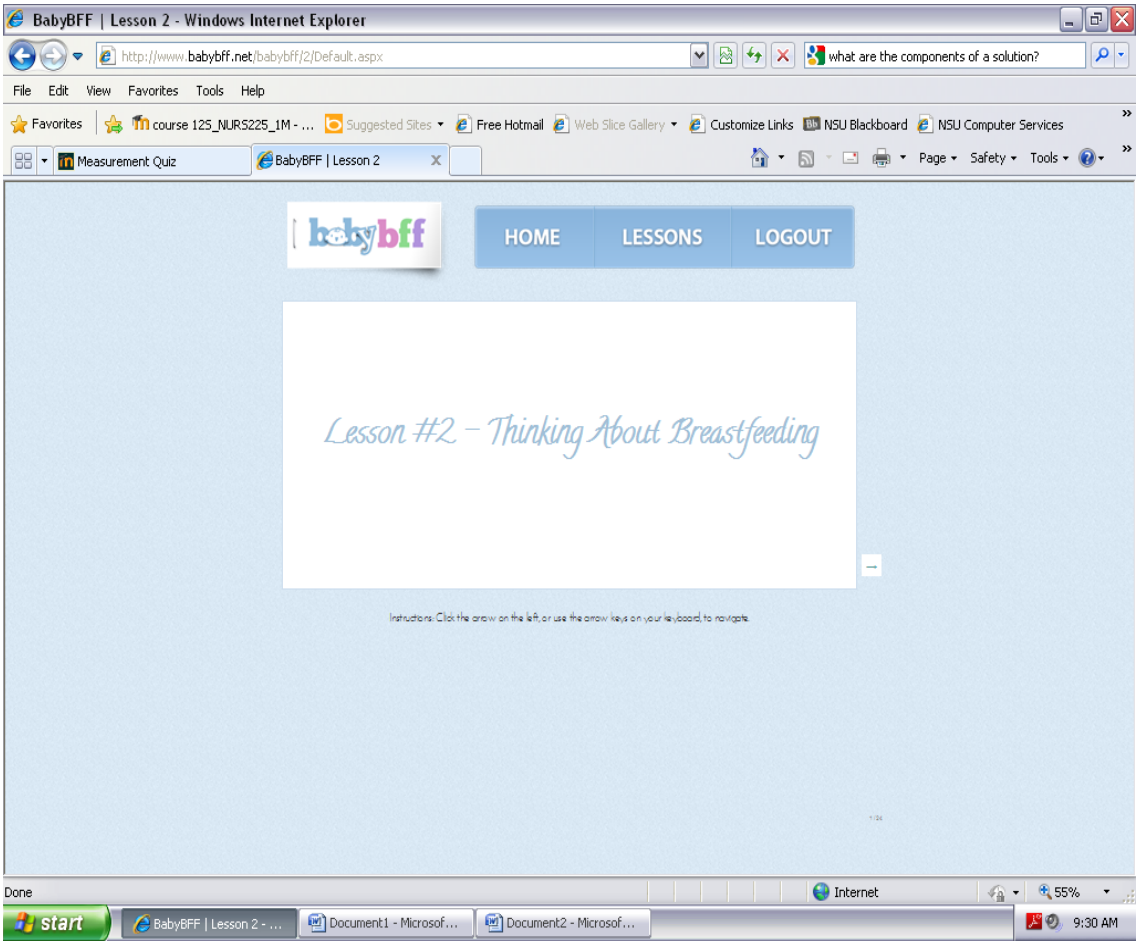
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Lesson #2 – Thinking About Breastfeeding
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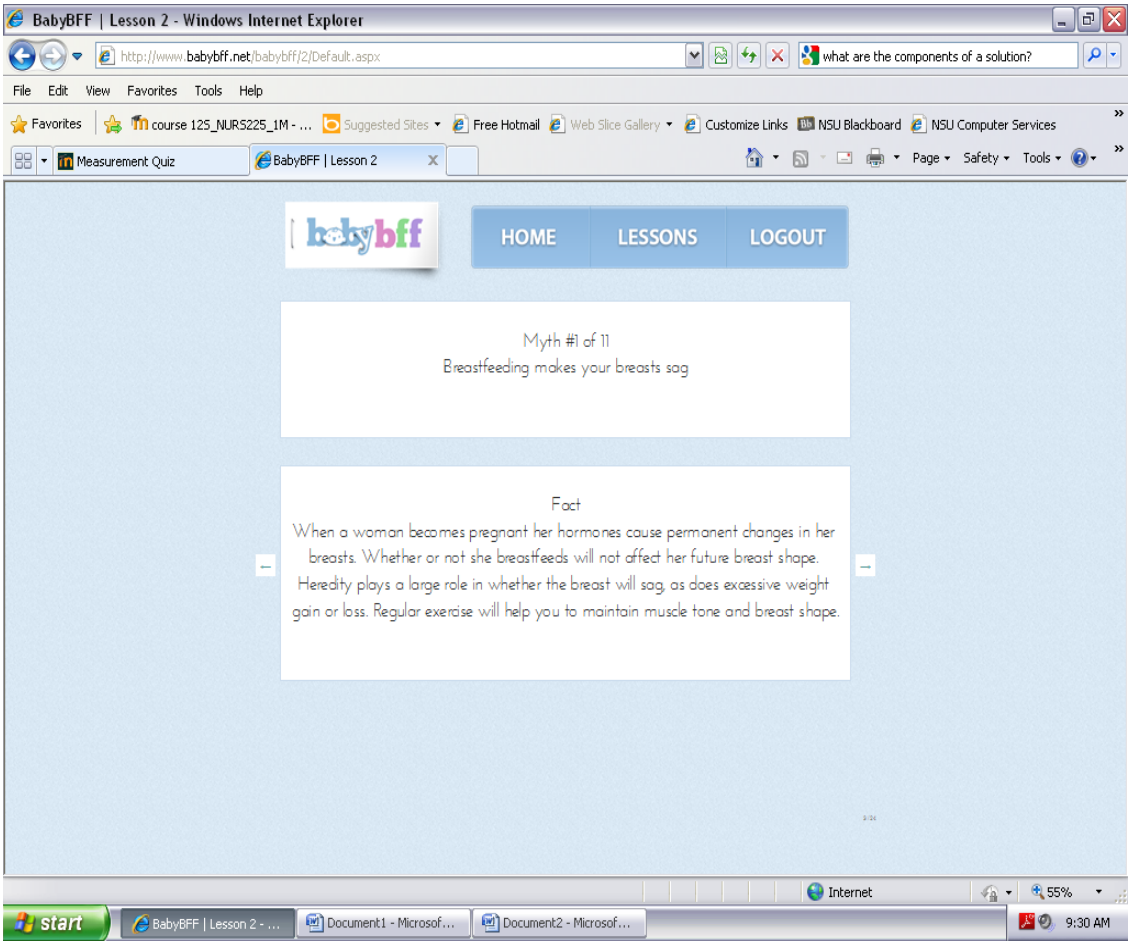
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Myth #1 of 11
Breastfeeding makes your breasts sag
Fact
When a woman becomes pregnant her hormones cause permanent changes in her breasts. Whether or not she breastfeeds will not affect her future breast shape. Heredity plays a large role in whether the breast will sag, as does excessive weight gain or loss. Regular exercise will help you to maintain muscle tone and breast shape.
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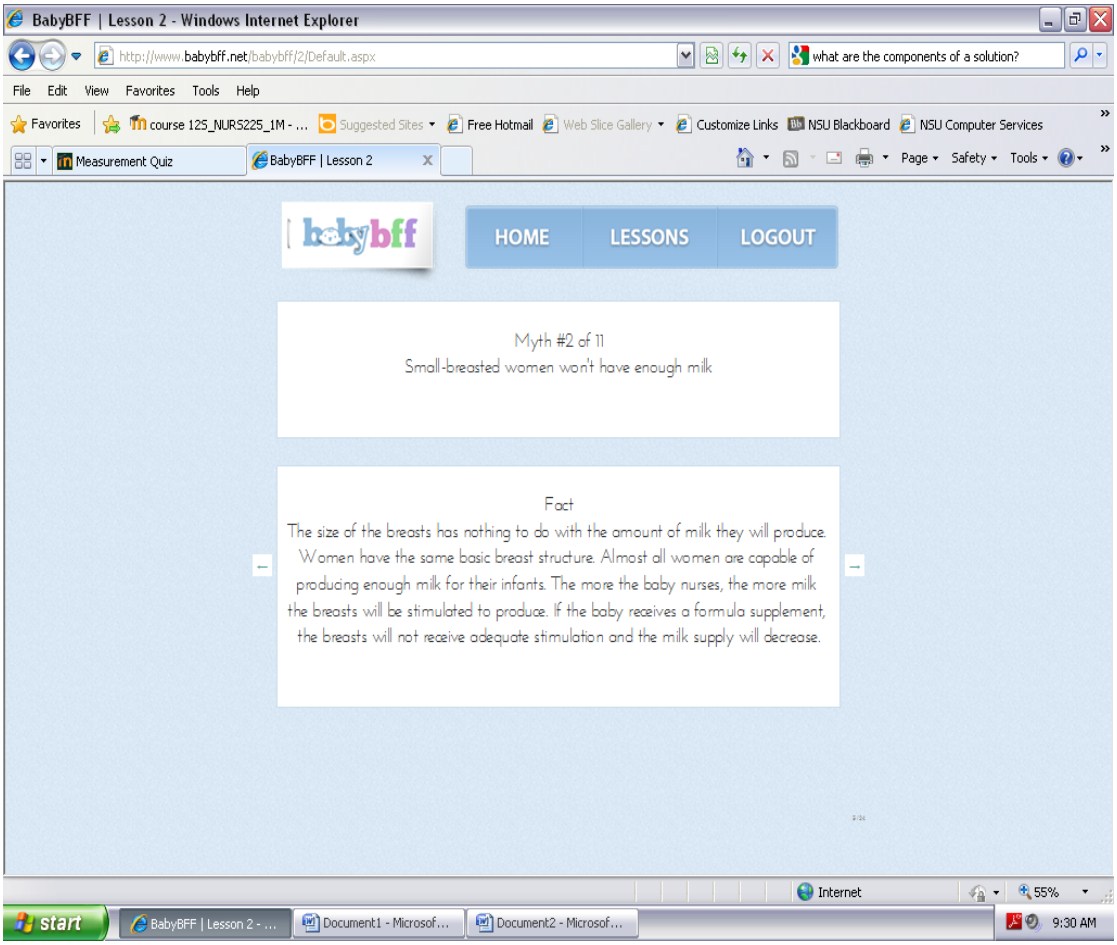
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Myth #2 of 11
Small-breasted women won't have enough milk
Fact
The size of the breasts has nothing to do with the amount of milk they will produce. Women have the same basic breast structure. Almost all women are capable of producing enough milk for their infants. The more the baby nurses, the more milk the breasts will be stimulated to produce. If the baby receives a formula supplement, the breasts will not receive adequate stimulation and the milk supply will decrease.
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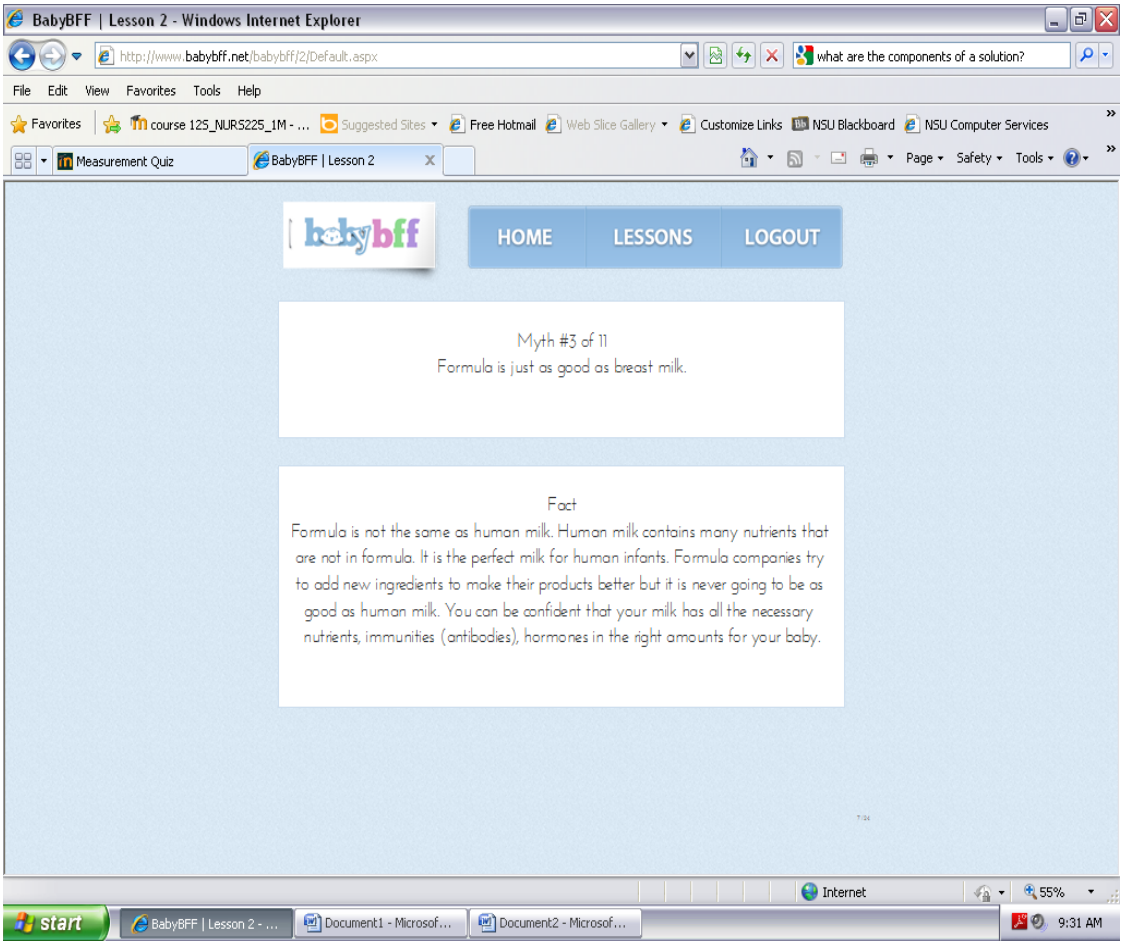
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Myth #3 of 11
Formula is just as good as breast milk.
Fact
Formula is not the same as human milk. Human milk contains many nutrients that are not in formula. It is the perfect milk for human infants. Formula companies try to add new ingredients to make their products better but it is never going to be as good as human milk. You can be confident that your milk has all the necessary nutrients, immunities (antibodies), hormones in the right amounts for your baby.
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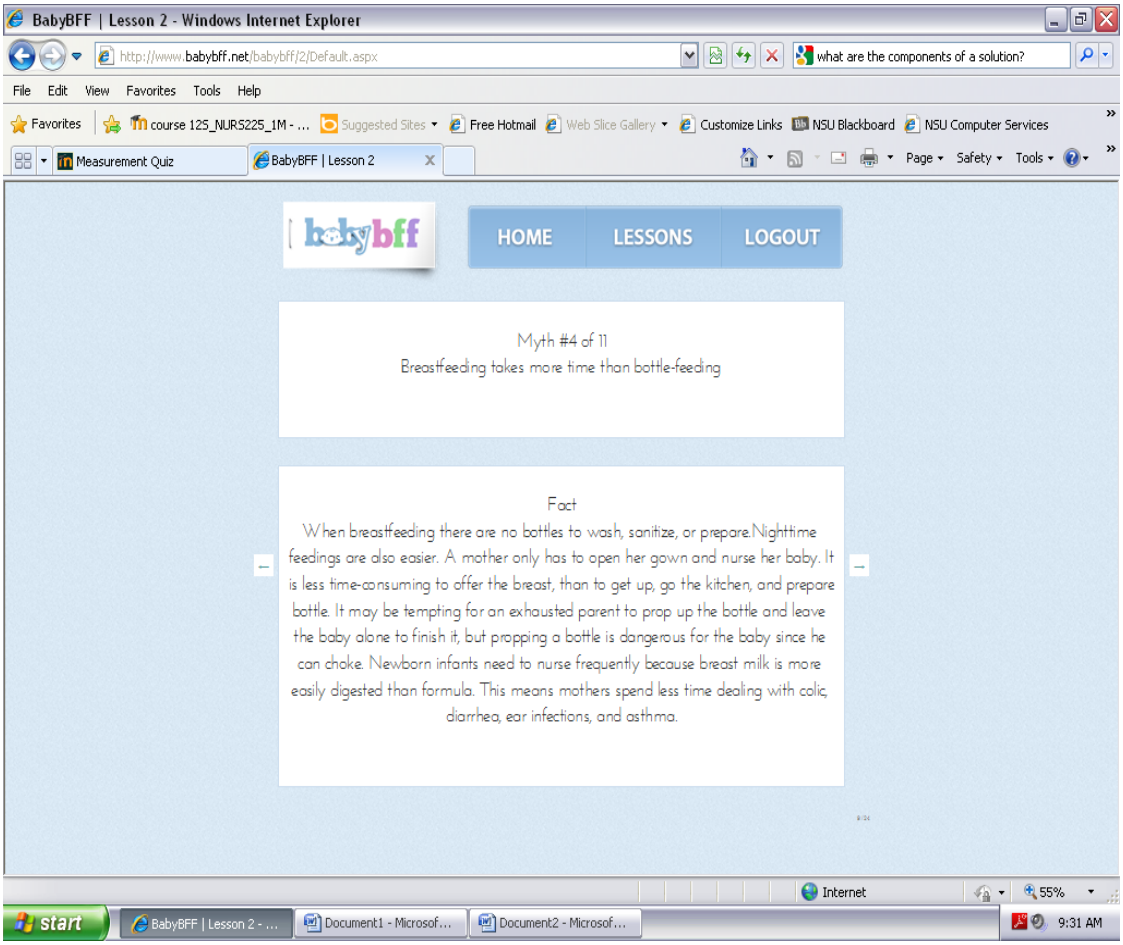
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Myth #4 of 11
Breastfeeding takes more time than bottle-feeding
Fact
When breastfeeding there are no bottles to wash, sanitize, or prepare.Nighttime feedings are also easier. A mother only has to open her gown and nurse her baby. It is less time-consuming to offer the breast, than to get up, go the kitchen, and prepare bottle. It may be tempting for an exhausted parent to prop up the bottle and leave the baby alone to finish it, but propping a bottle is dangerous for the baby since he can choke. Newborn infants need to nurse frequently because breast milk is more easily digested than formula. This means mothers spend less time dealing with colic, diarrhea, ear infections, and asthma.
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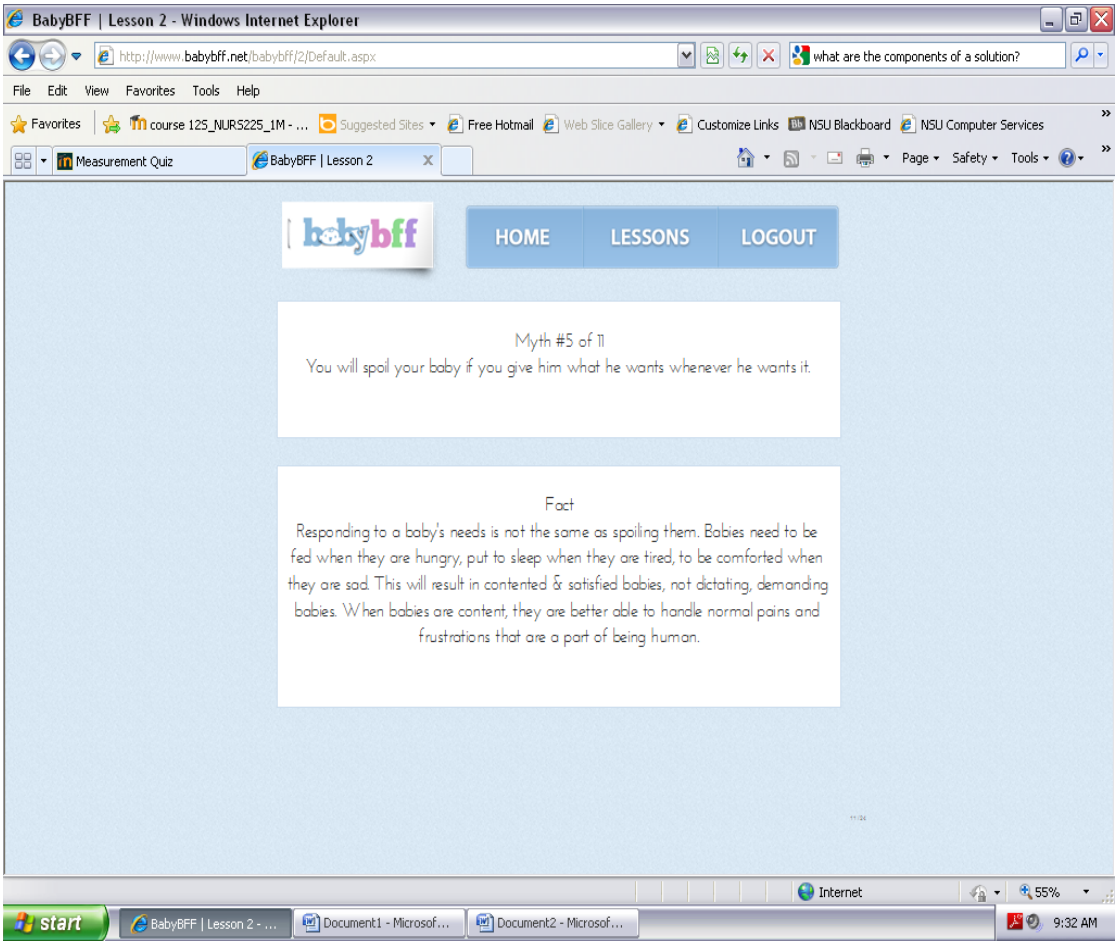
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Myth #5 of 11
You will spoil your baby if you give him what he wants whenever he wants it.
Fact
Responding to a baby's needs is not the same as spoiling them. Babies need to be fed when they are hungry, put to sleep when they are tired, to be comforted when they are sad. This will result in contented & satisfied babies, not dictating, demanding babies. When babies are content, they are better able to handle normal pains and frustrations that are a part of being human.
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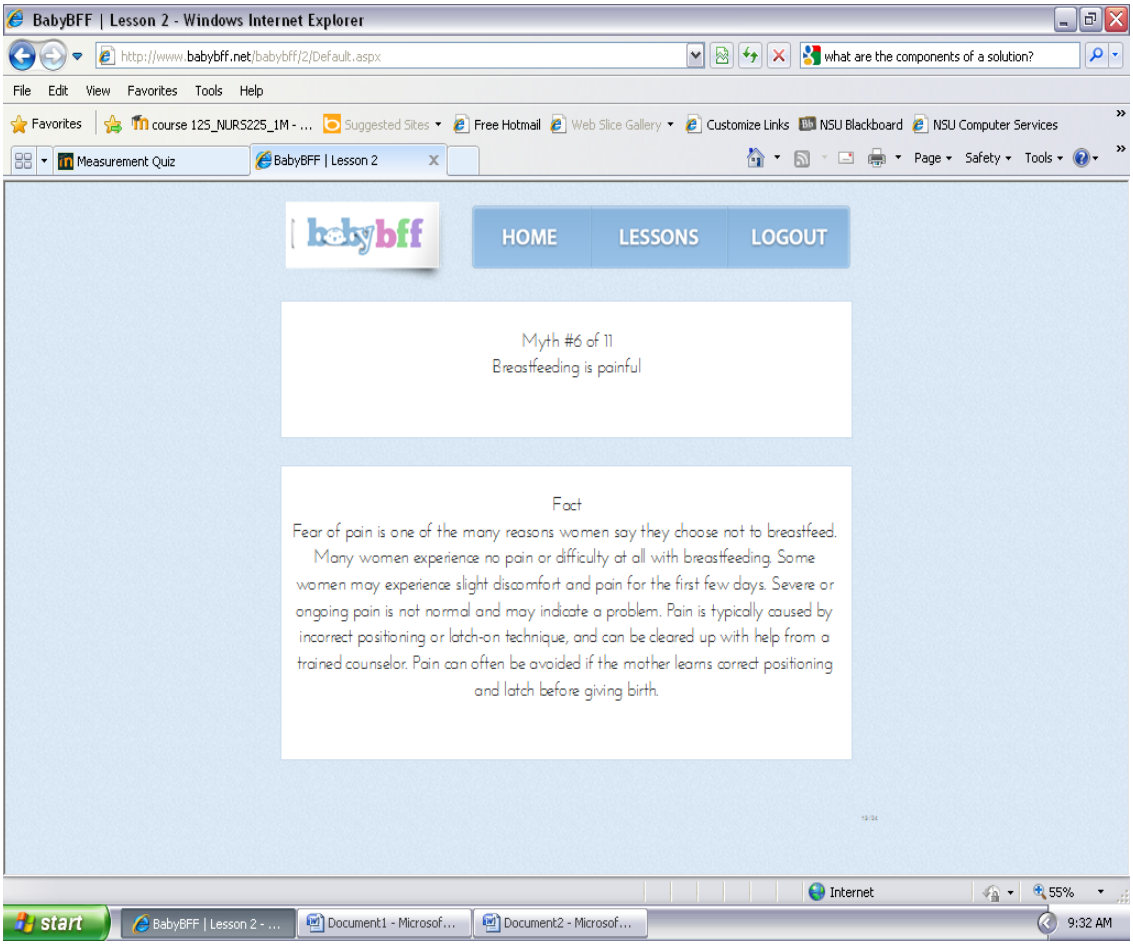
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Myth #6 of 11
Breastfeeding is painful
Fact
Fear of pain is one of the many reasons women say they choose not to breastfeed. Many women experience no pain or difficulty at all with breastfeeding. Some women may experience slight discomfort and pain for the first few days. Severe or ongoing pain is not normal and may indicate a problem. Pain is typically caused by incorrect positioning or latch-on technique, and can be cleared up with help from a trained counselor. Pain can often be avoided if the mother learns correct positioning and latch before giving birth.
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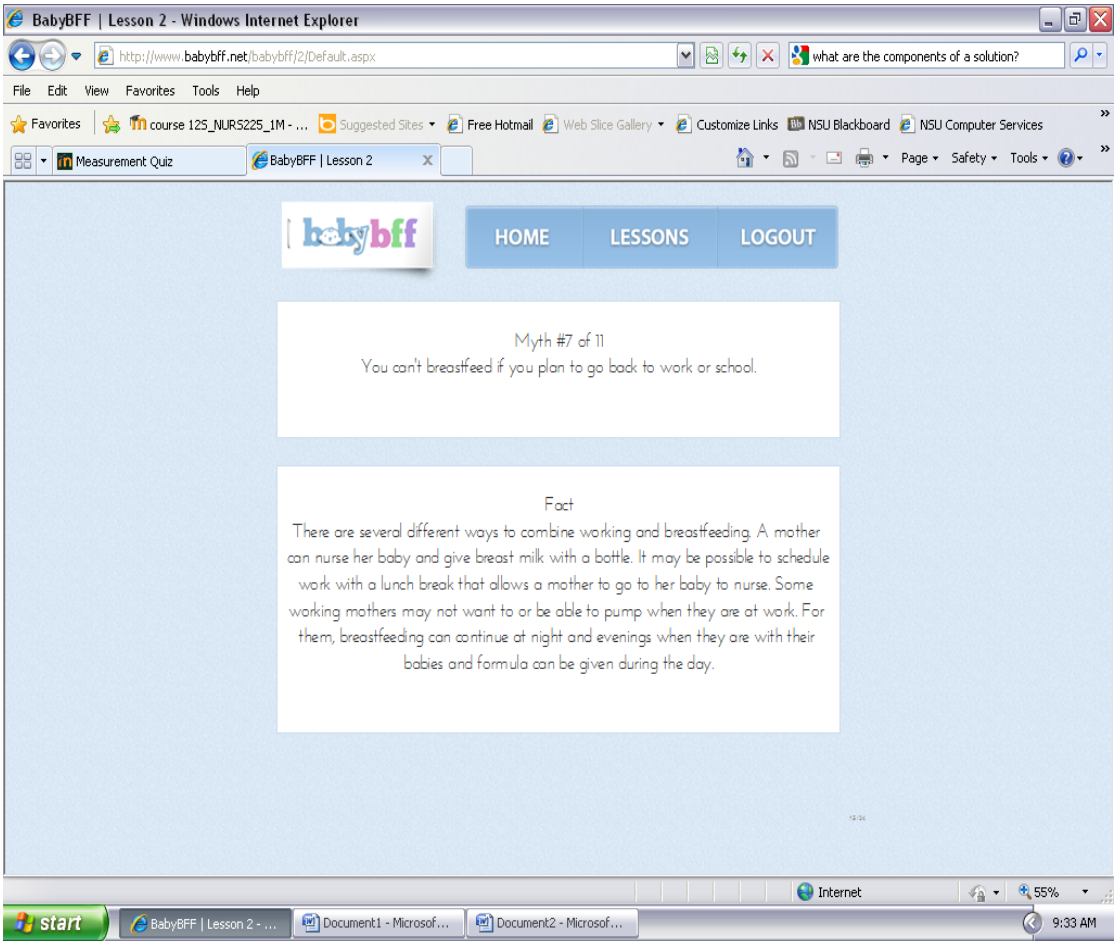
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Myth #7 of 11
You can't breastfeed if you plan to go back to work or school.
Fact
There are several different ways to combine working and breastfeeding. A mother can nurse her baby and give breast milk with a bottle. It may be possible to schedule work with a lunch break that allows a mother to go to her baby to nurse. Some working mothers may not want to or be able to pump when they are at work. For them, breastfeeding can continue at night and evenings when they are with their babies and formula can be given during the day.
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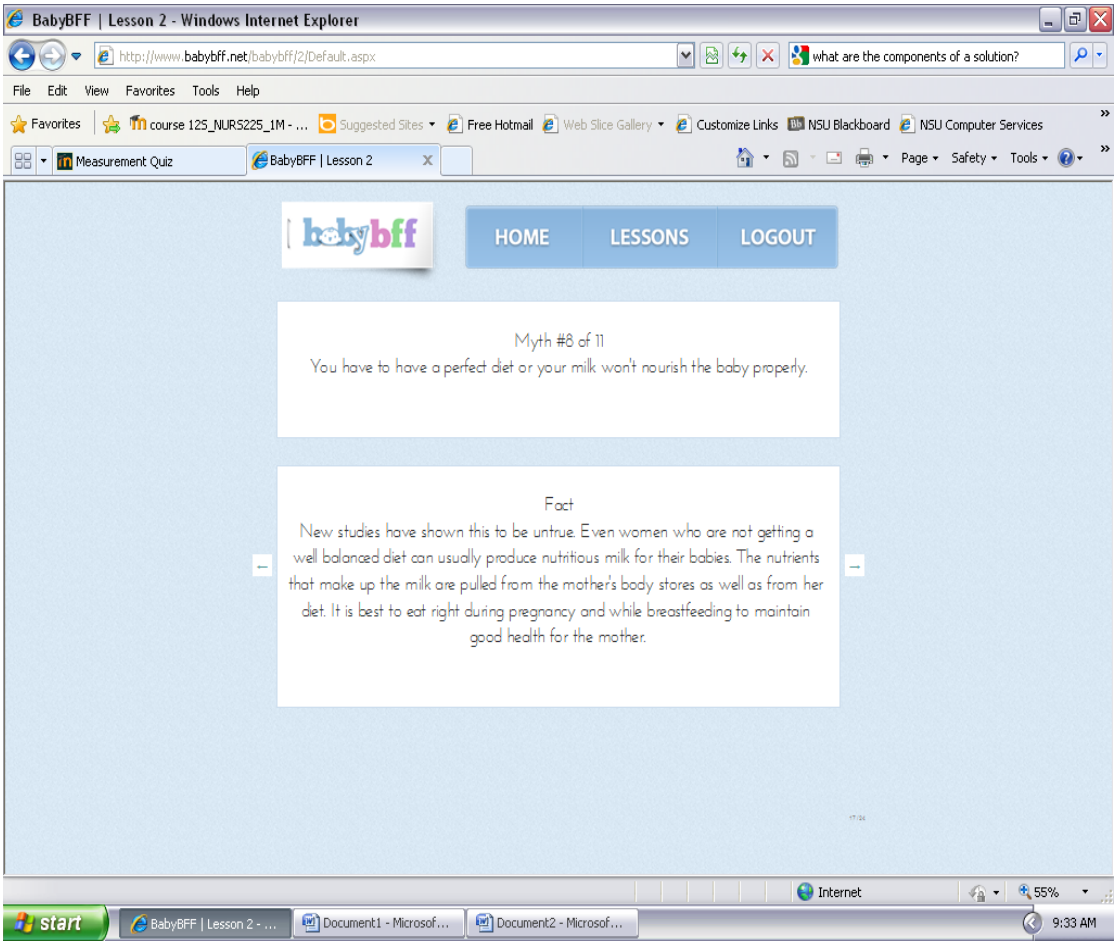
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Myth #8 of 11
You have to have a perfect diet or your milk won't nourish the baby properly.
Fact
New studies have shown this to be untrue. Even women who are not getting a well balanced diet can usually produce nutritious milk for their babies. The nutrients that make up the milk are pulled from the mother's body stores as well as from her diet. It is best to eat right during pregnancy and while breastfeeding to maintain good health for the mother.
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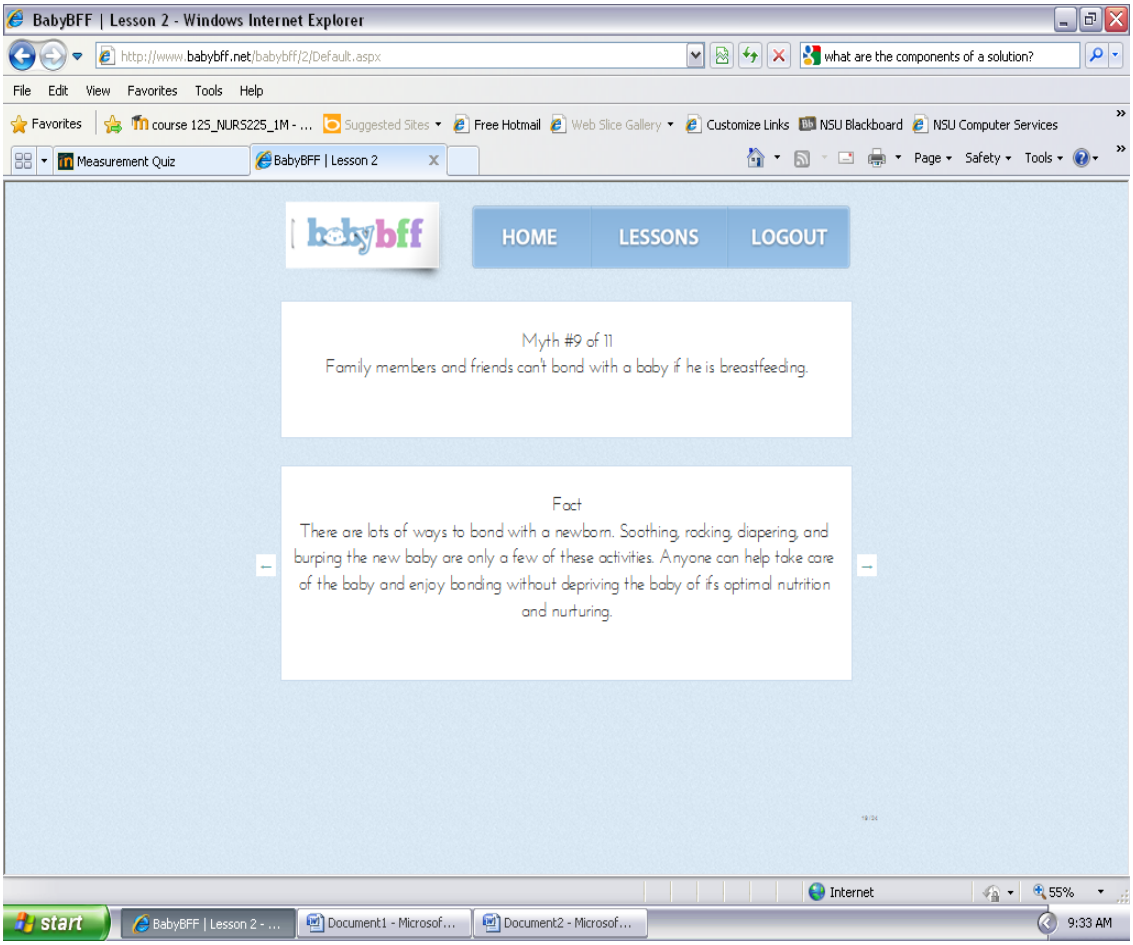
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Myth #9 of 11
Family members and friends can't bond with a baby if he is breastfeeding.
Fact
There are lots of ways to bond with a newborn. Soothing, rocking, diapering, and burping the new baby are only a few of these activities. Anyone can help take care of the baby and enjoy bonding without depriving the baby of it's optimal nutrition and nurturing.
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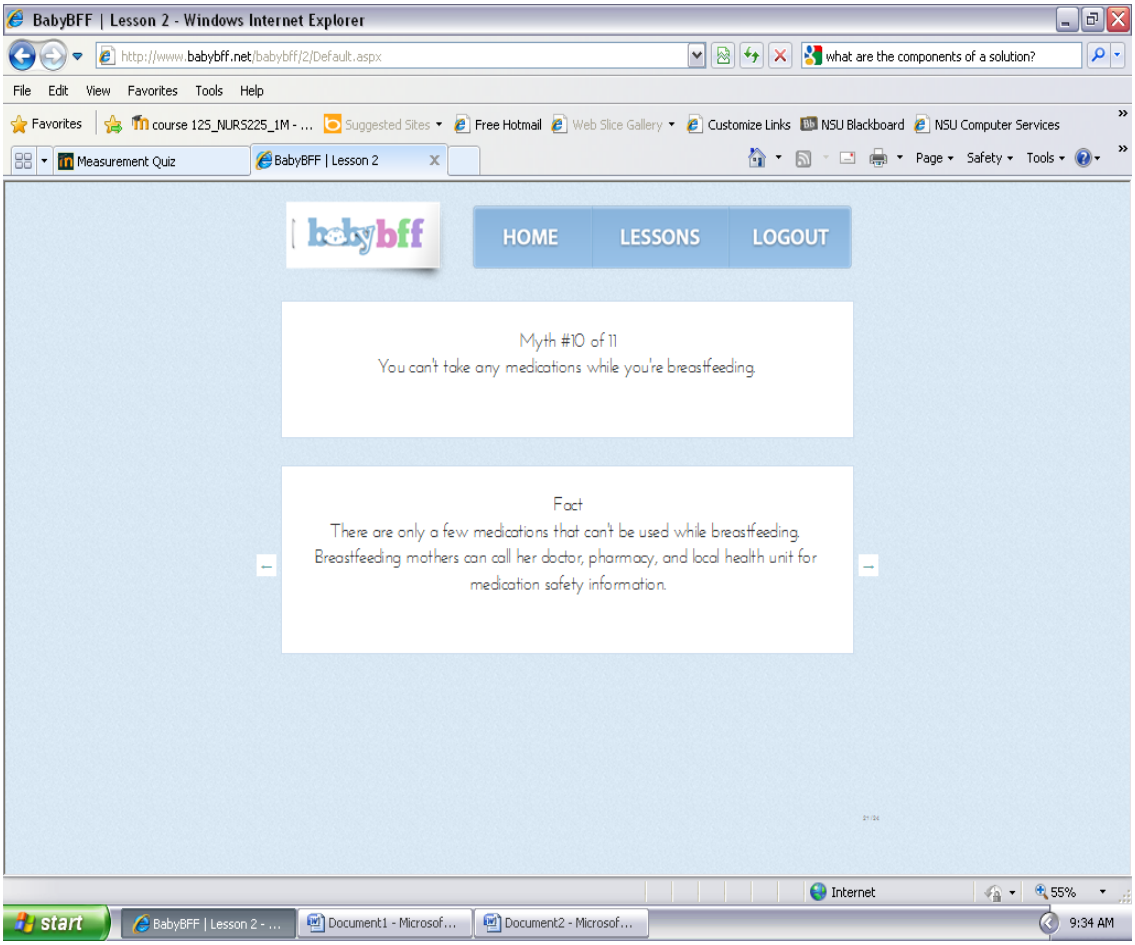
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Myth #10 of 11
You can't take any medications while you're breastfeeding.
Fact
There are only a few medications that can't be used while breastfeeding. Breastfeeding mothers can call her doctor, pharmacy, and local health unit for medication safety information.
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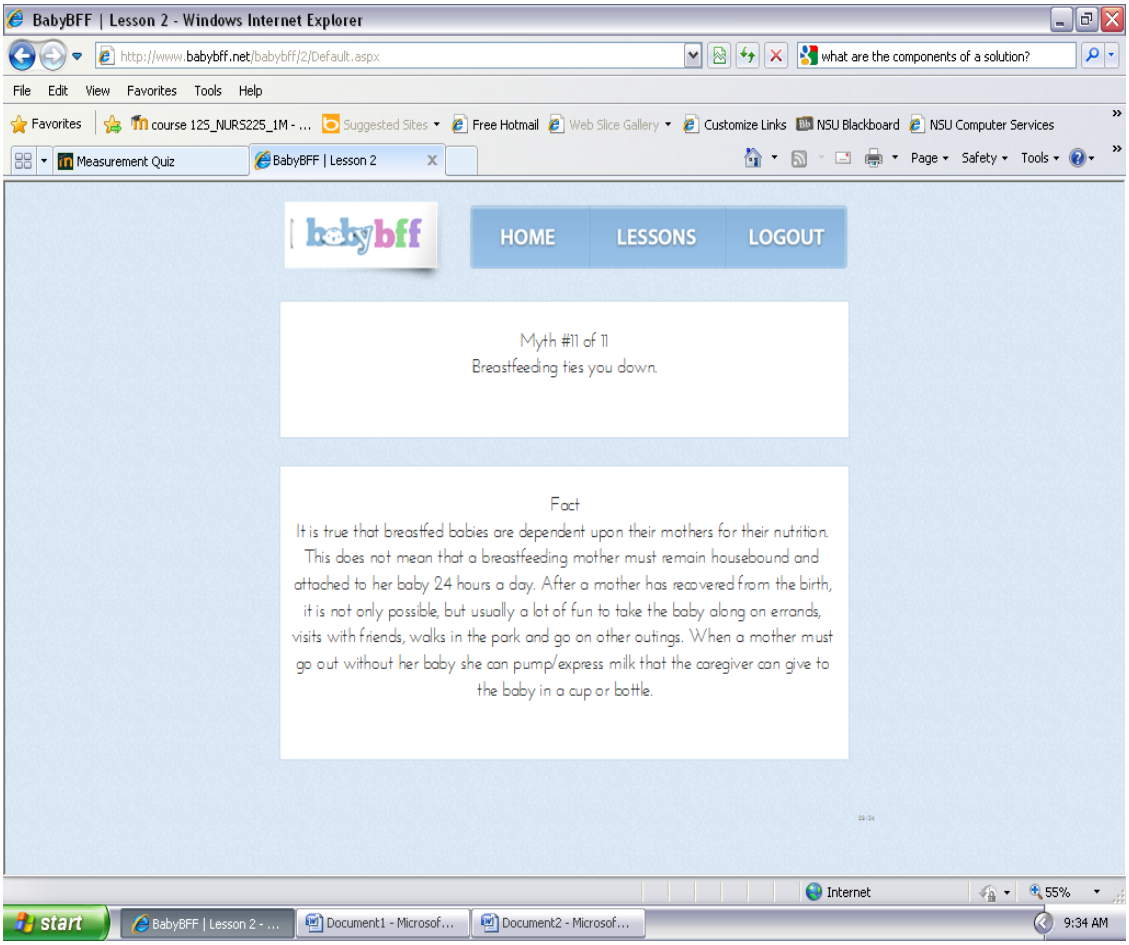
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Myth #11 of 11
Breastfeeding ties you down.
Fact
It is true that breastfed babies are dependent upon their mothers for their nutrition. This does not mean that a breastfeeding mother must remain housebound and attached to her baby 24 hours a day. After a mother has recovered from the birth, it is not only possible, but usually a lot of fun to take the baby along on errands, visits with friends, walks in the park and go on other outings. When a mother must go out without her baby she can pump/express milk that the caregiver can give to the baby in a cup or bottle.
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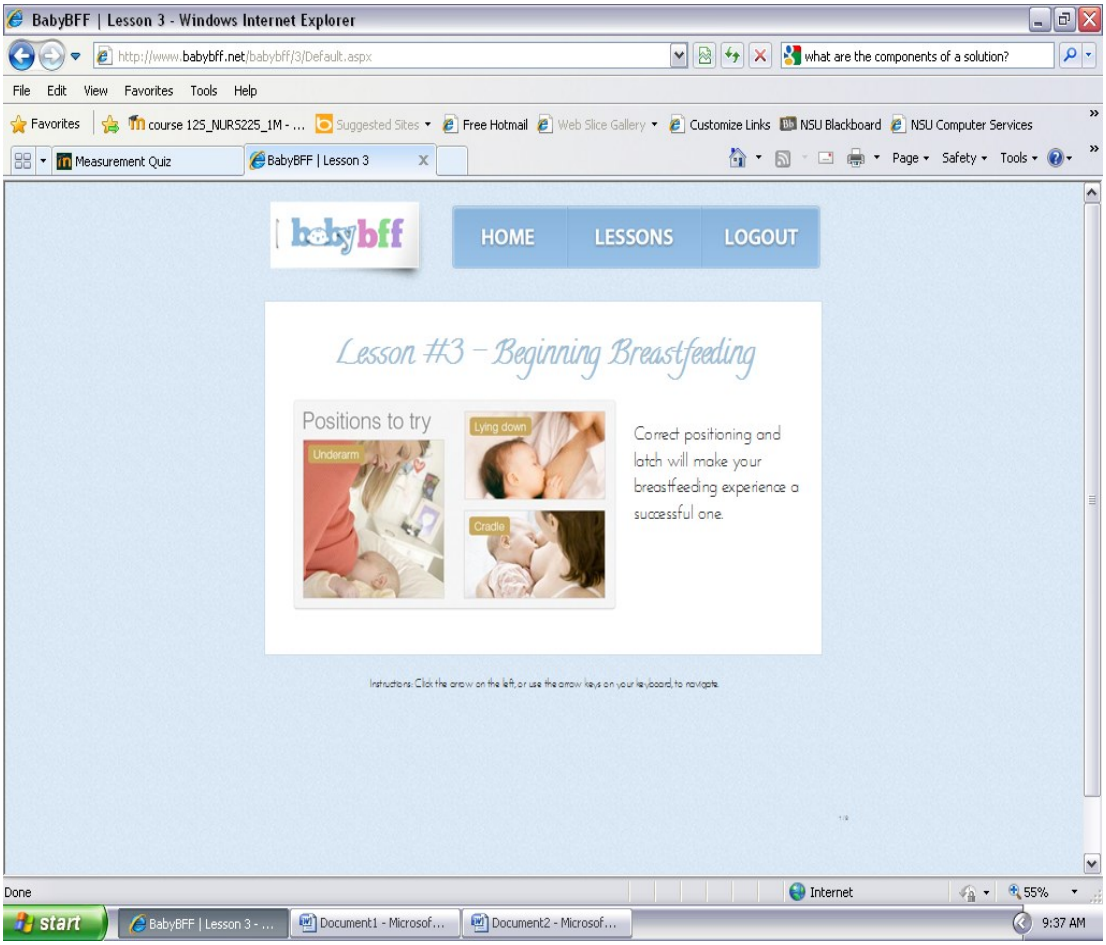
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Lesson #3 – Beginning Breastfeeding
Positions to try
Underarm
Lying down
Cradle
Correct positioning and latch will make your breastfeeding experience a successful one.
Instructions: Click the arrow on the left, or use the arrow keys on your keyboard, to navigate.
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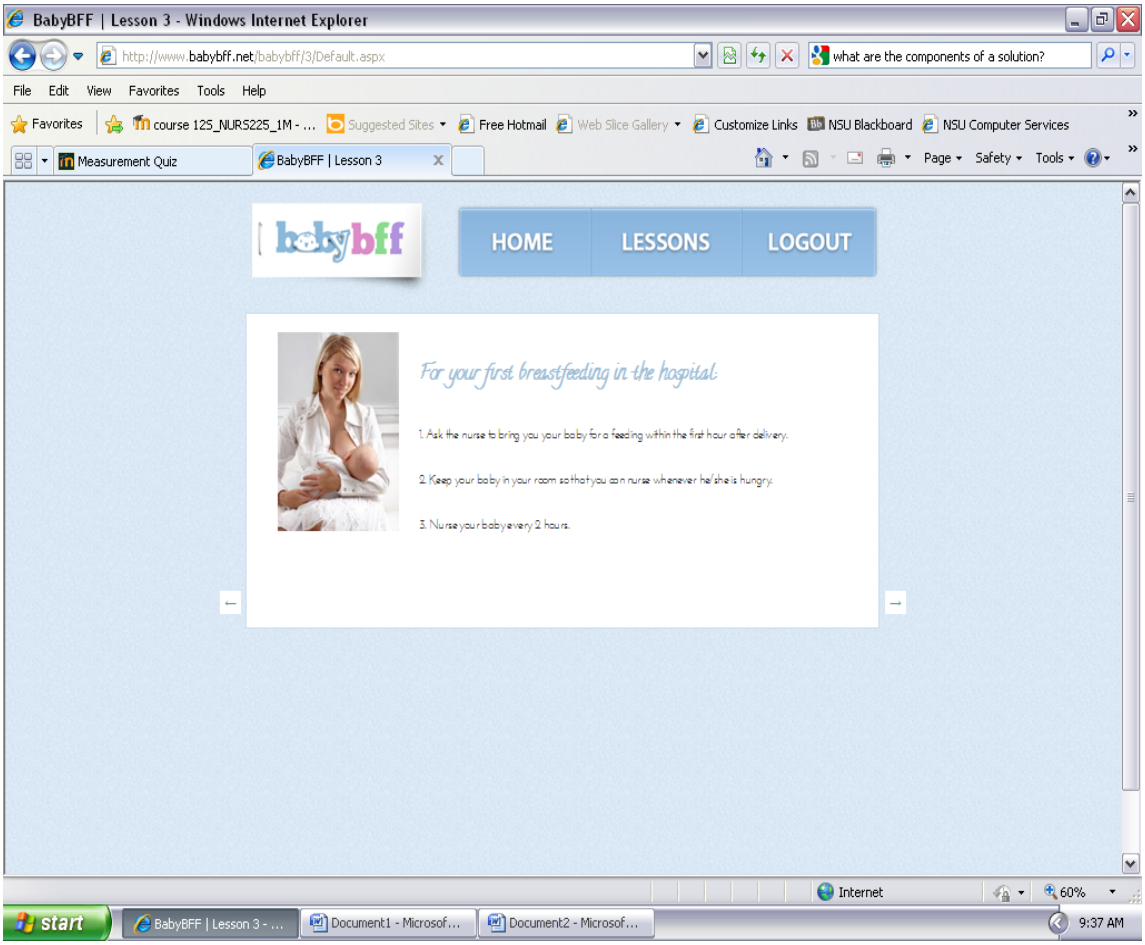
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For your first breastfeeding in the hospital:
1. Ask the nurse to bring you your baby for a feeding within the first hour after delivery.
2. Keep your baby in your room so that you can nurse whenever he/she is hungry.
3. Nurse your baby every 2 hours.
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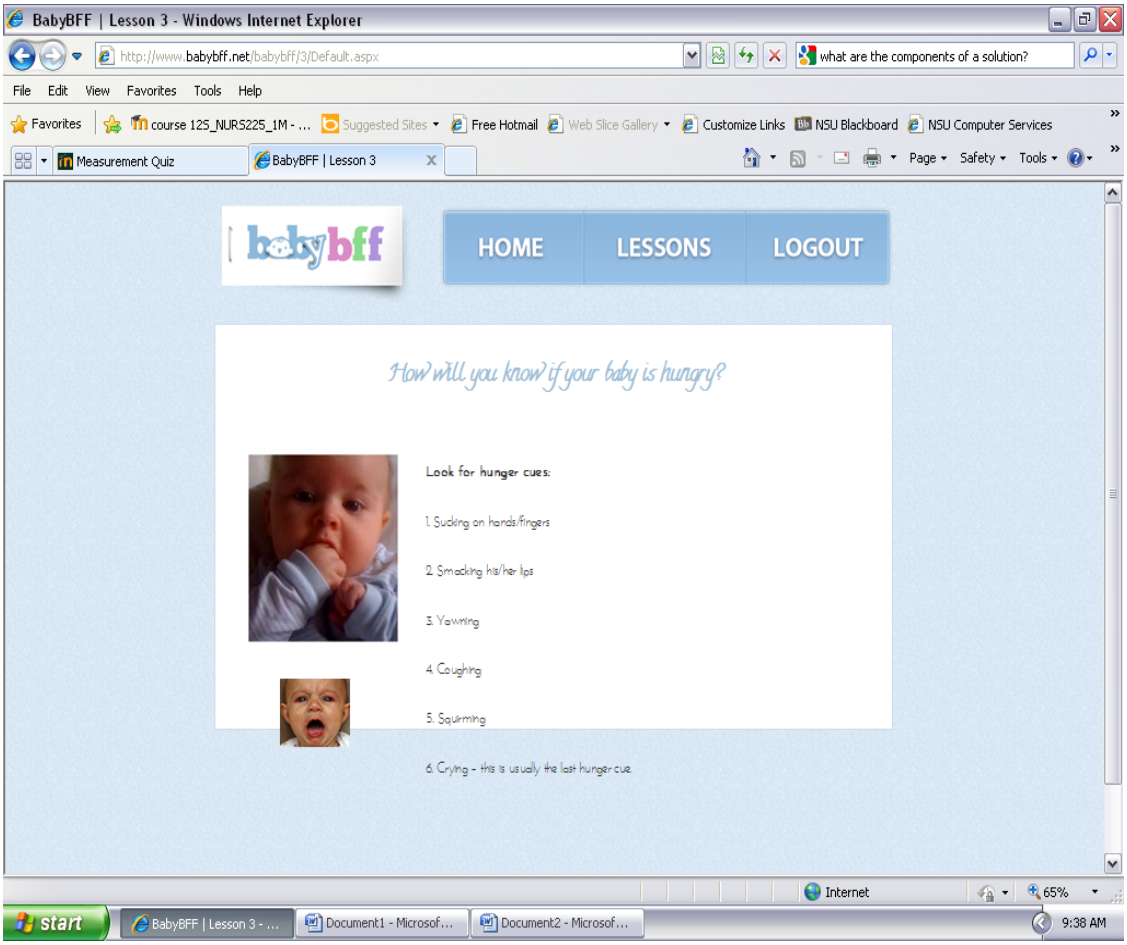
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How will you know if your baby is hungry?
Look for hunger cues:
1. Sucking on hands/fingers
2. Smacking his/her lips
3. Yawning
4. Coughing
5. Squirming
6. Crying - this is usually the last hunger cue.
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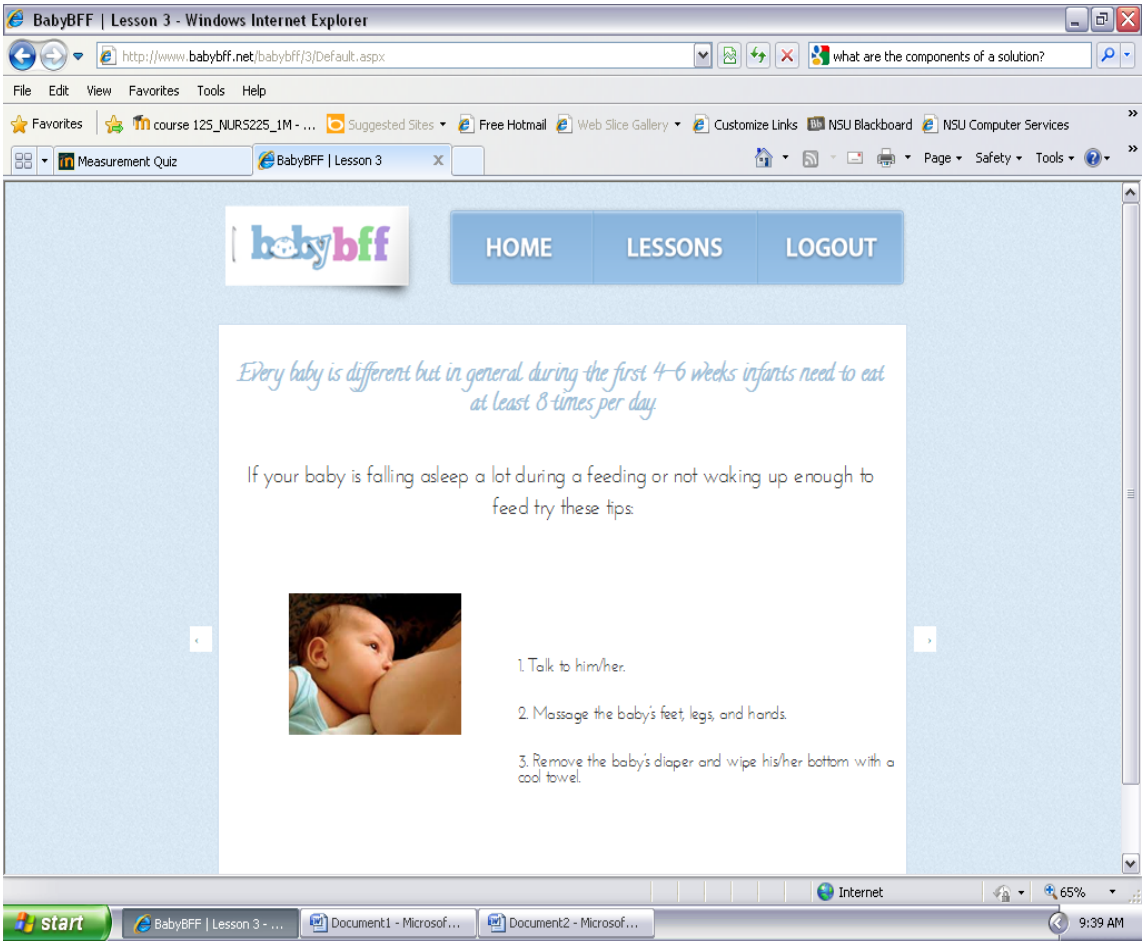
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Every baby is different but in general during the first 4-6 weeks infants need to eat at least 8 times per day
If your baby is falling asleep a lot during a feeding or not waking up enough to feed try these tips:
1. Talk to him/her.
2. Massage the baby's feet, legs, and hands.
3. Remove the baby's diaper and wipe his/her bottom with a cool towel.
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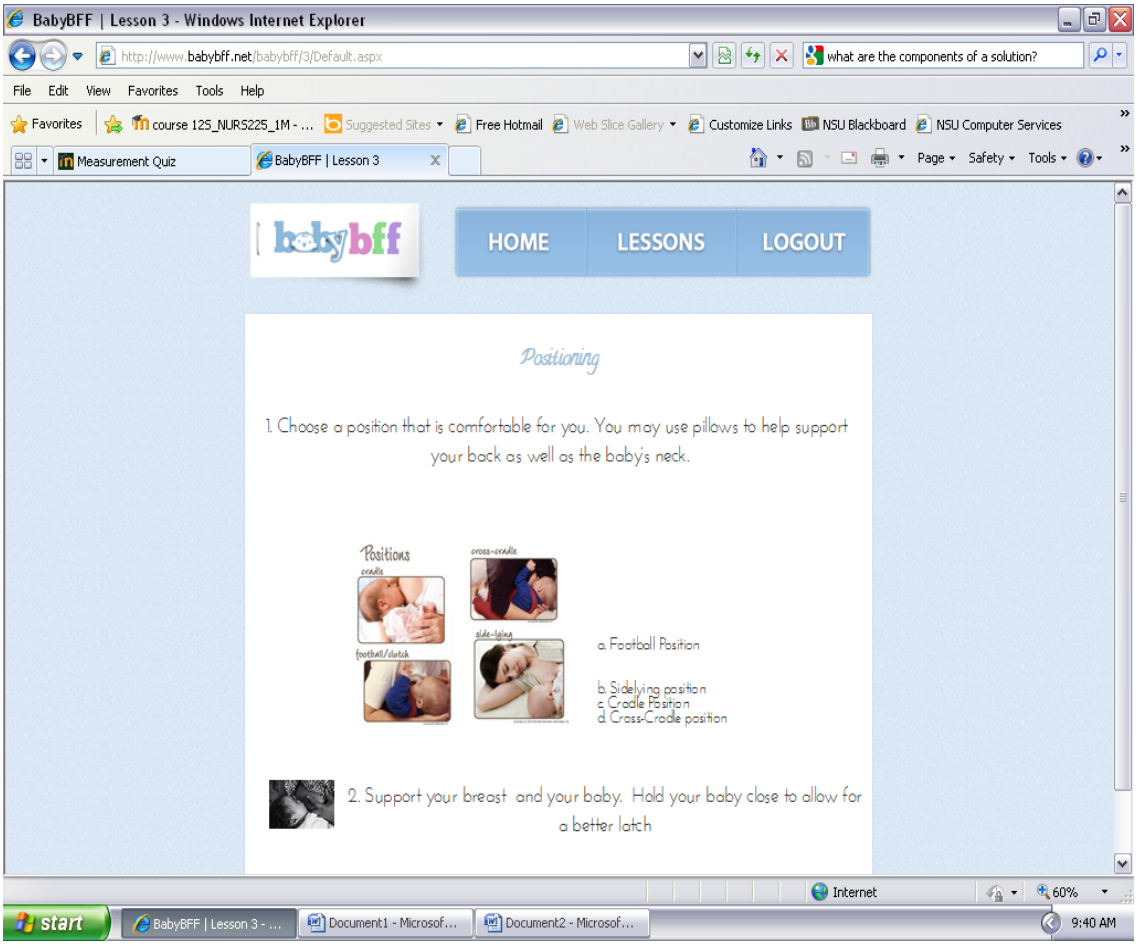
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Positioning
1. Choose a position that is comfortable for you. You may use pillows to help support your back as well as the baby's neck.
Positions
cradle
cross-cradle
football/clutch
side-lying
a. Football Position
b. Sidelying position
c. Cradle Position
d. Cross-Cradle position
2. Support your breast and your baby. Hold your baby close to allow for a better latch
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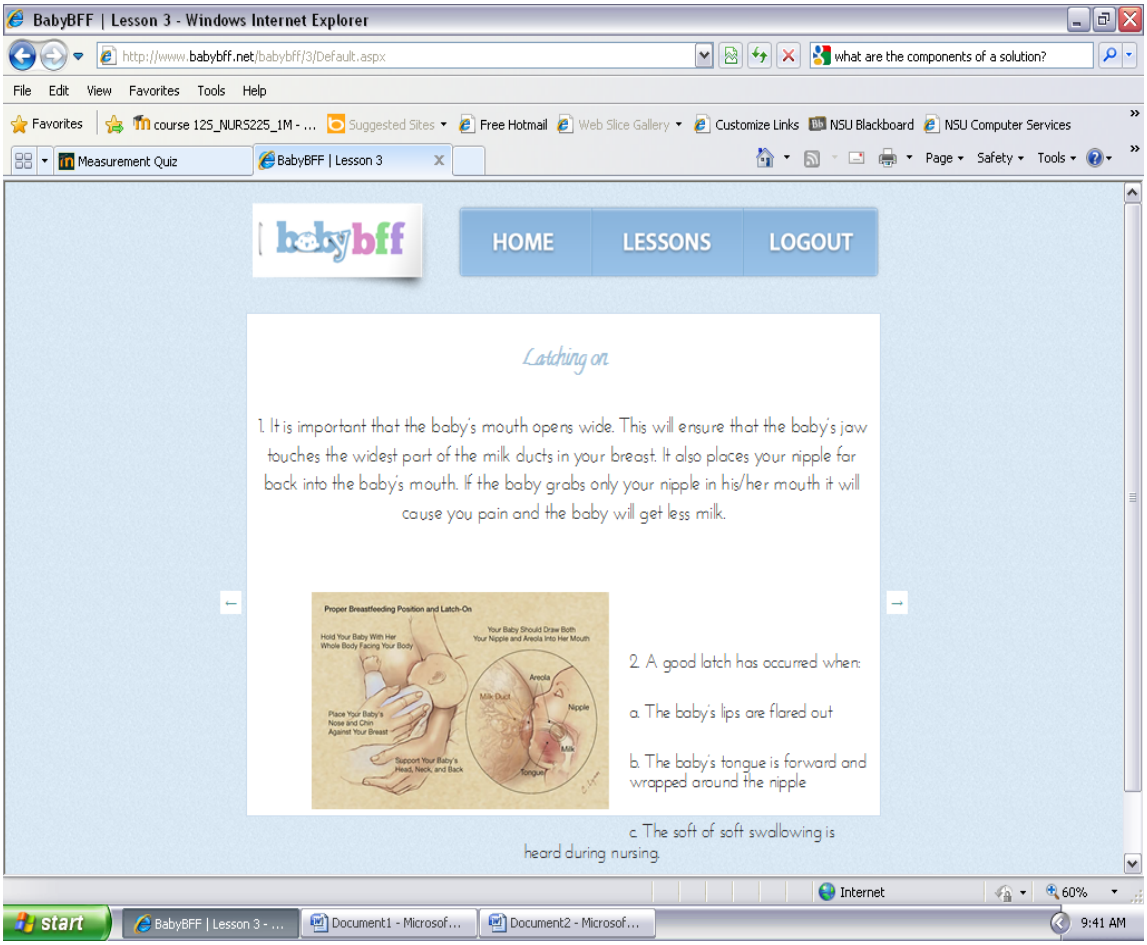
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Latching on
1. It is important that the baby's mouth opens wide. This will ensure that the baby's jaw touches the widest part of the milk ducts in your breast. It also places your nipple far back into the baby's mouth. If the baby grabs only your nipple in his/her mouth it will cause you pain and the baby will get less milk.
Proper Breastfeeding Position and Latch-On
Hold Your Baby With Her Whole Body Facing Your Body
Your Baby Should Draw Both Your Nipple and Areola Into Her Mouth
Areola
Milk Duct
Nipple
Milk
Tongue
Place Your Baby's Nose and Chin Against Your Breast
Support Your Baby's Head, Neck, and Back
2. A good latch has occurred when:
a. The baby's lips are flared out
b. The baby's tongue is forward and wrapped around the nipple
c. The soft of soft swallowing is heard during nursing.
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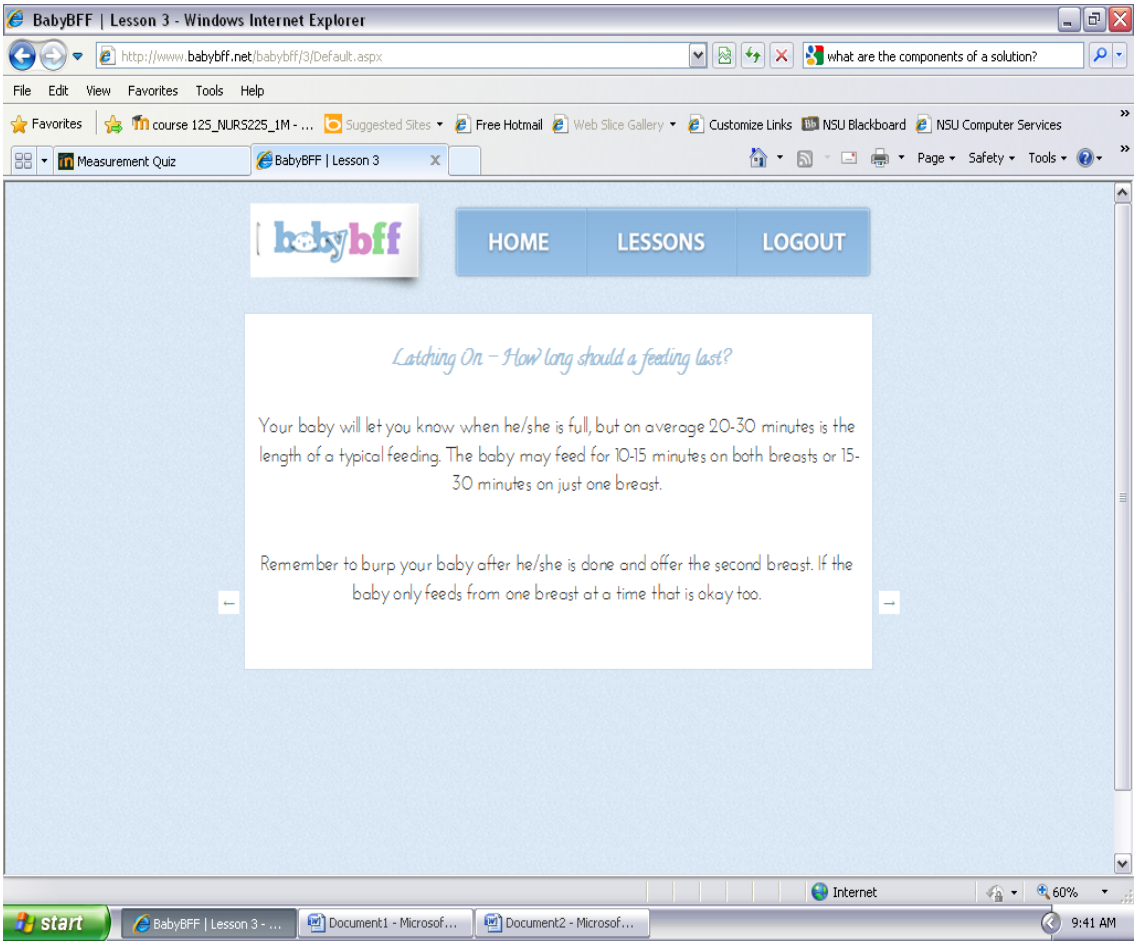
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Latching On – How long should a feeding last?
Your baby will let you know when he/she is full, but on average 20-30 minutes is the length of a typical feeding. The baby may feed for 10-15 minutes on both breasts or 15-30 minutes on just one breast.
Remember to burp your baby after he/she is done and offer the second breast. If the baby only feeds from one breast at a time that is okay too.
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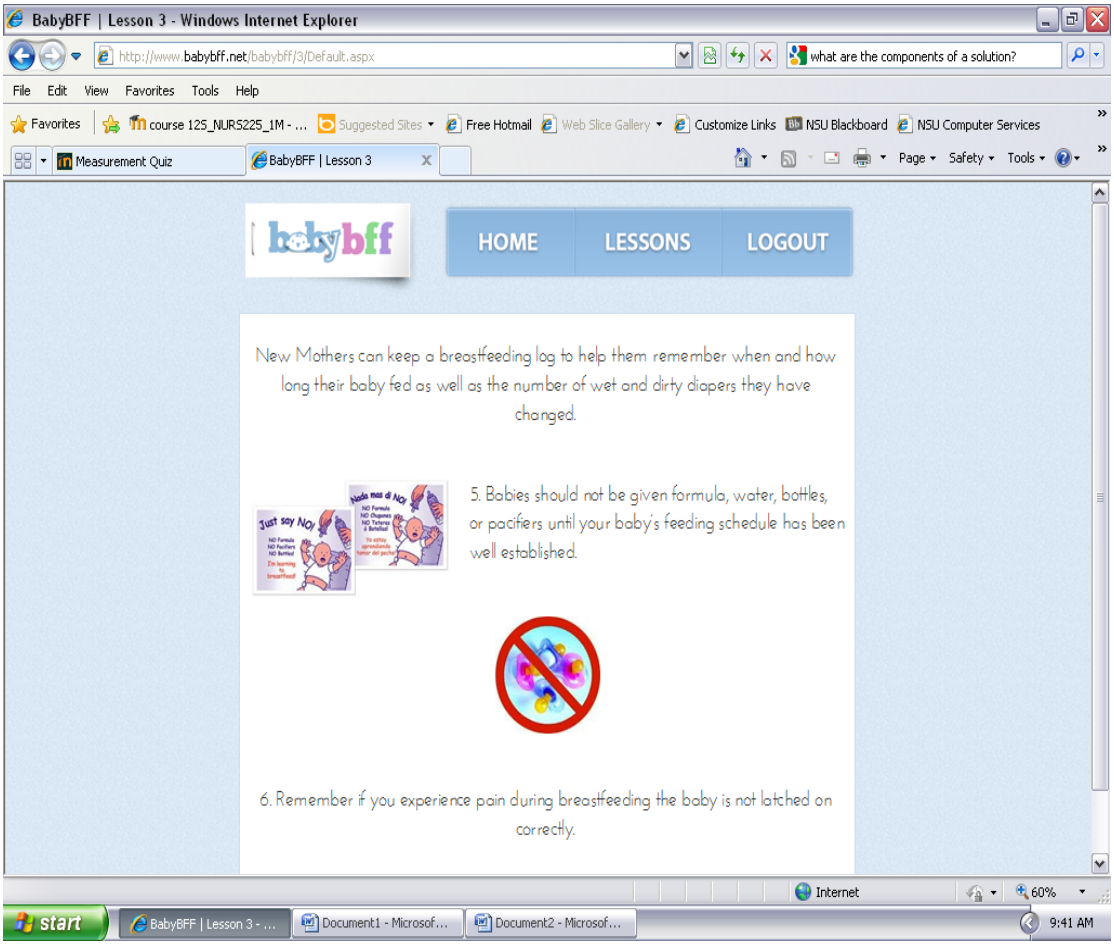
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New Mothers can keep a breastfeeding log to help them remember when and how long their baby fed as well as the number of wet and dirty diapers they have changed.
Just say No!
Nada mas di No!
5. Babies should not be given formula, water, bottles, or pacifiers until your baby's feeding schedule has been well established.
6. Remember if you experience pain during breastfeeding the baby is not latched on correctly.
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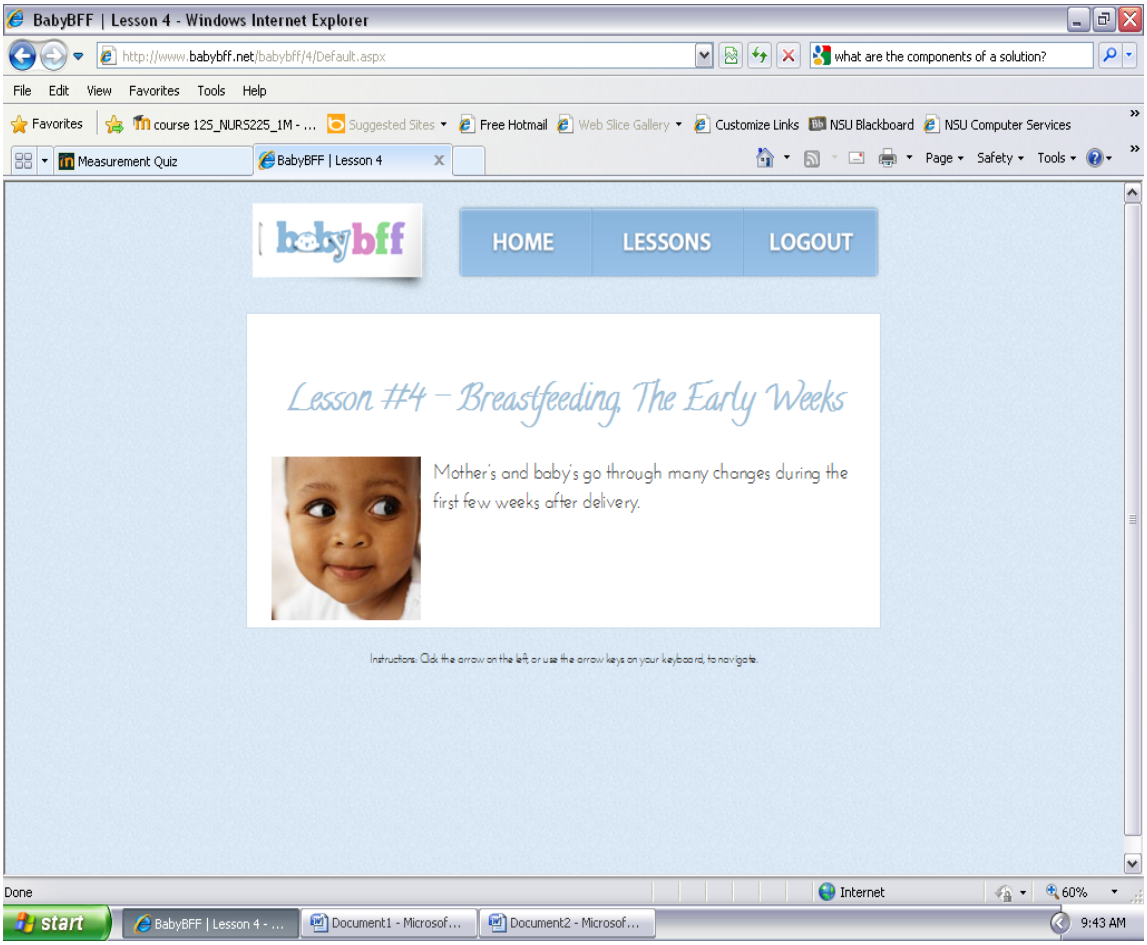
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Lesson #4 – Breastfeeding, The Early Weeks
Mother's and baby's go through many changes during the first few weeks after delivery.
Instructions: Click the arrow on the left or use the arrow keys on your keyboard, to navigate.
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When your baby nurses at your breast it your body sends signals to your brain to release hormones. These hormones cause your breast to make milk for your baby
Brain
Milk Production
Baby nursing at the breast
Breasts
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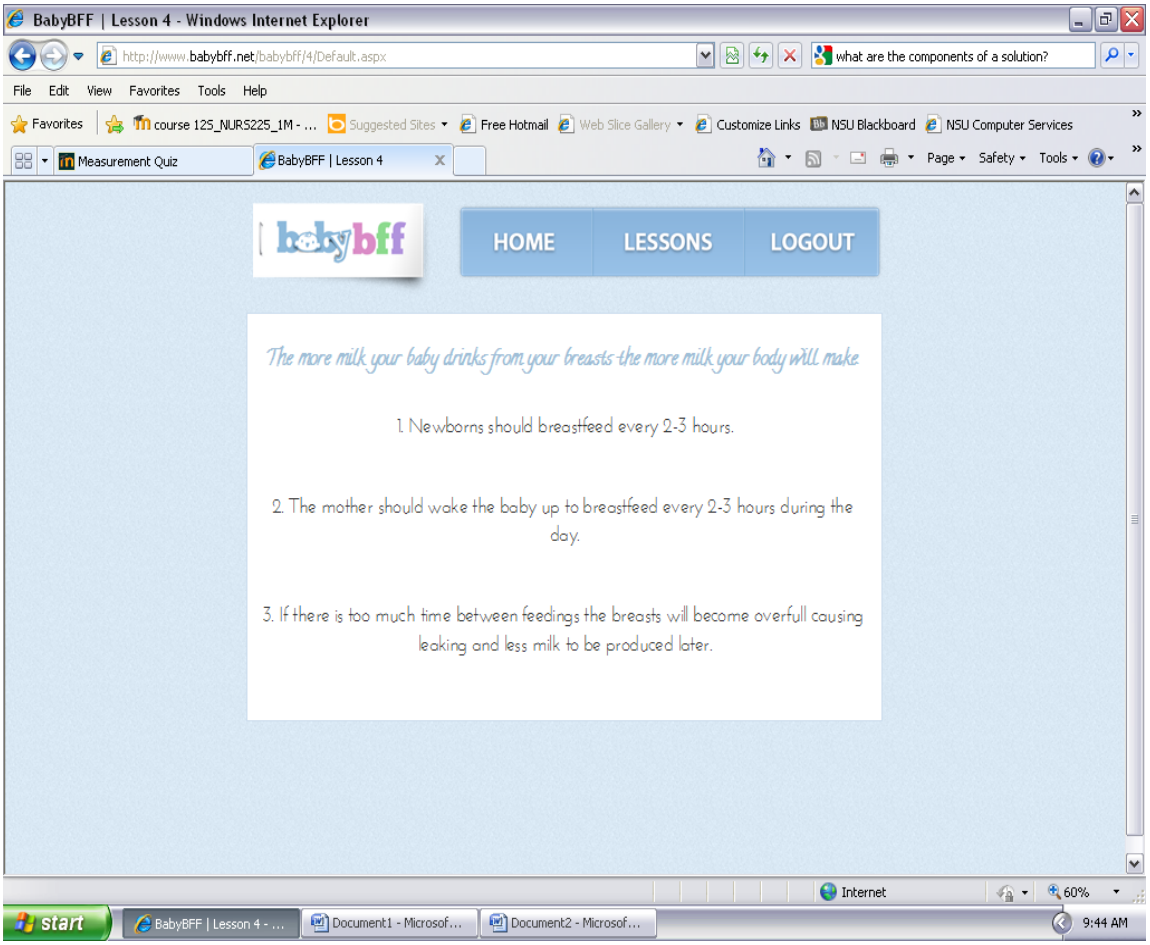
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The more milk your baby drinks from your breasts the more milk your body will make.
1. Newborns should breastfeed every 2-3 hours.
2. The mother should wake the baby up to breastfeed every 2-3 hours during the day.
3. If there is too much time between feedings the breasts will become overfull causing leaking and less milk to be produced later.
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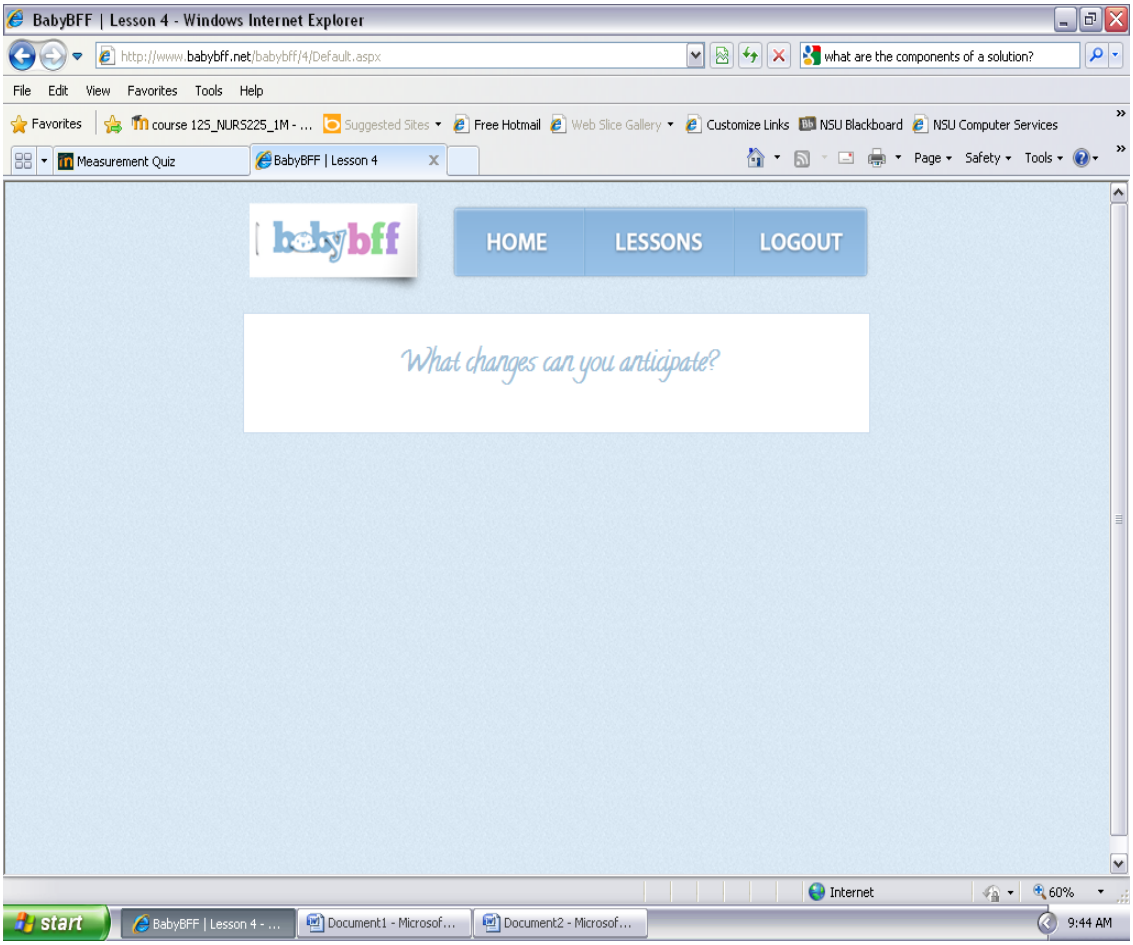
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What changes can you anticipate?
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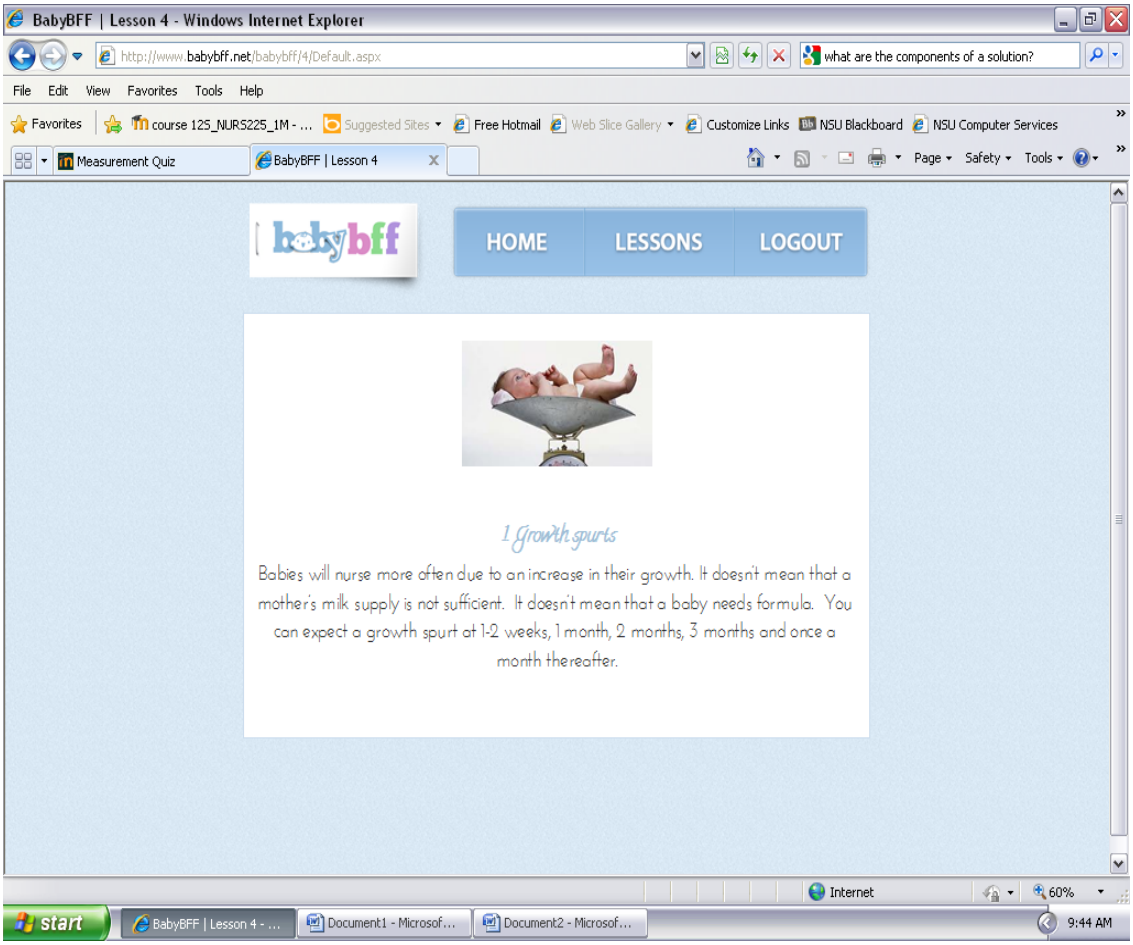
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1 Growth spurts
Babies will nurse more often due to an increase in their growth. It doesn't mean that a mother's milk supply is not sufficient. It doesn't mean that a baby needs formula. You can expect a growth spurt at 1-2 weeks, 1 month, 2 months, 3 months and once a month thereafter.
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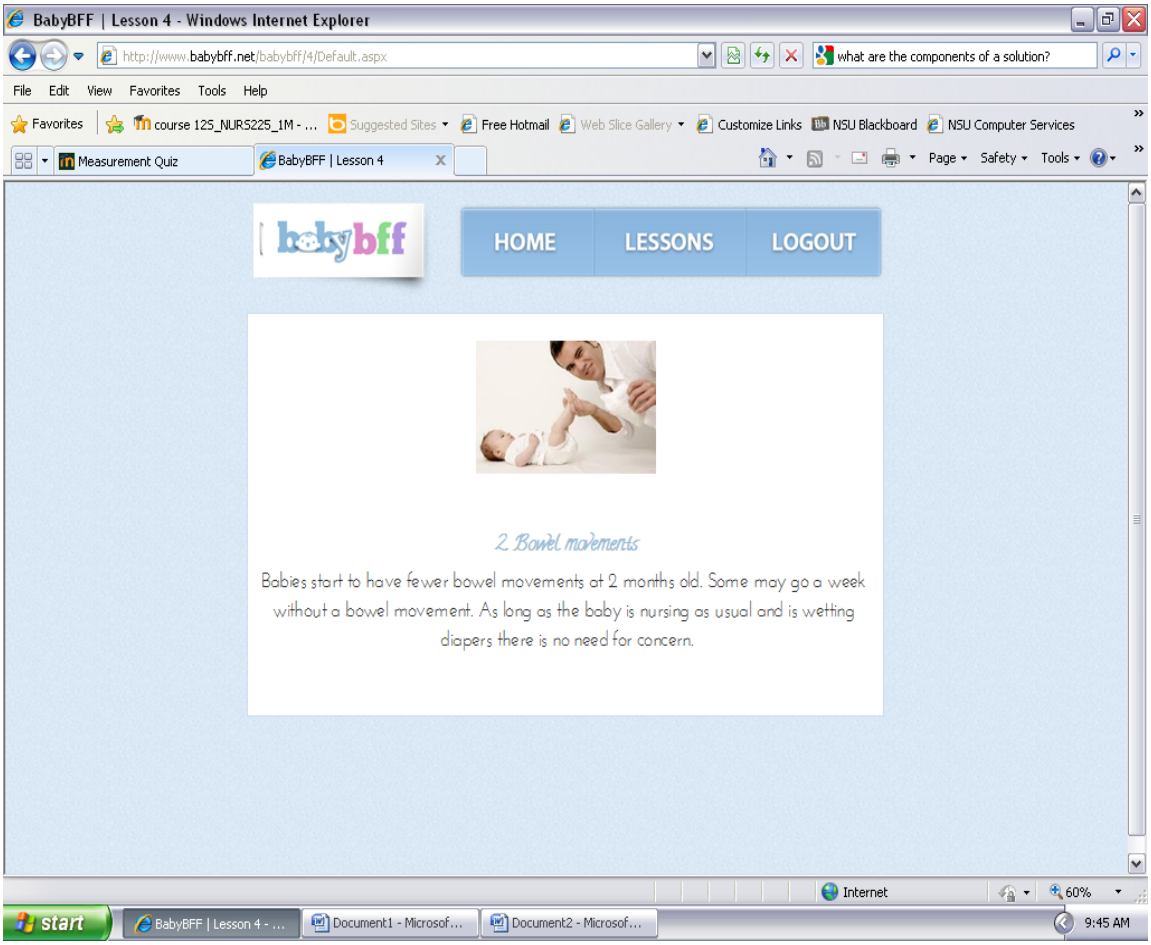
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2 Bowel movements
Babies start to have fewer bowel movements at 2 months old. Some may go a week without a bowel movement. As long as the baby is nursing as usual and is wetting diapers there is no need for concern.
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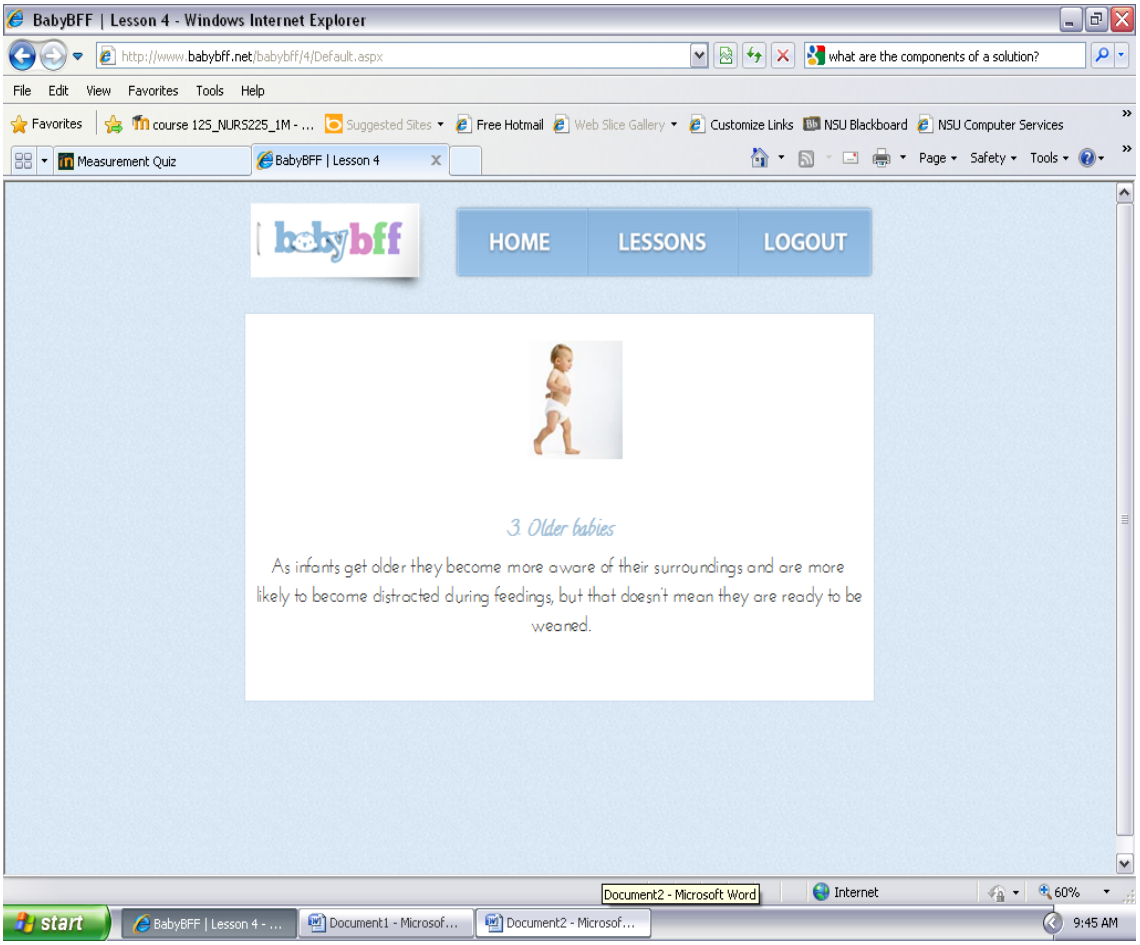
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3. Older babies
As infants get older they become more aware of their surroundings and are more likely to become distracted during feedings, but that doesn't mean they are ready to be weaned.
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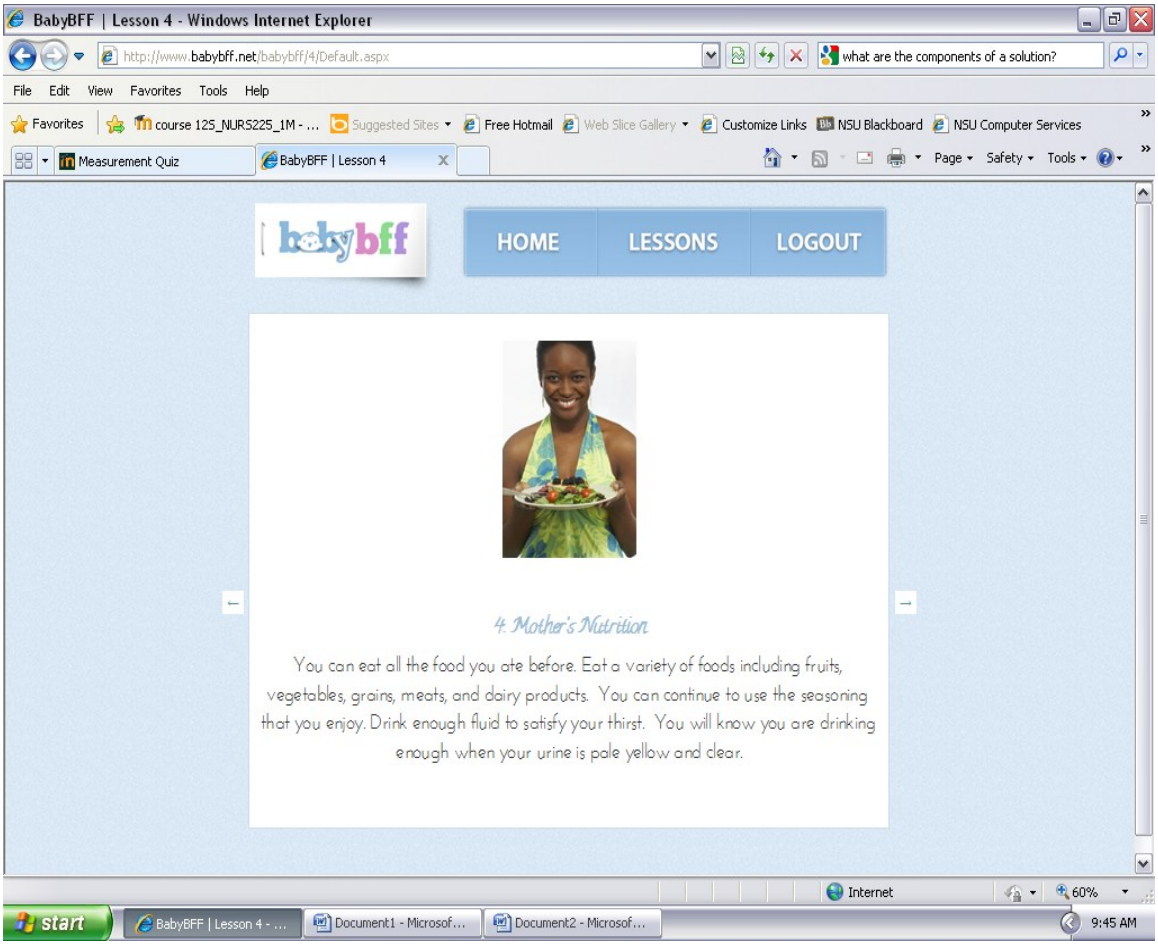
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4. Mother's Nutrition
You can eat all the food you ate before. Eat a variety of foods including fruits, vegetables, grains, meats, and dairy products. You can continue to use the seasoning that you enjoy. Drink enough fluid to satisfy your thirst. You will know you are drinking enough when your urine is pale yellow and clear.
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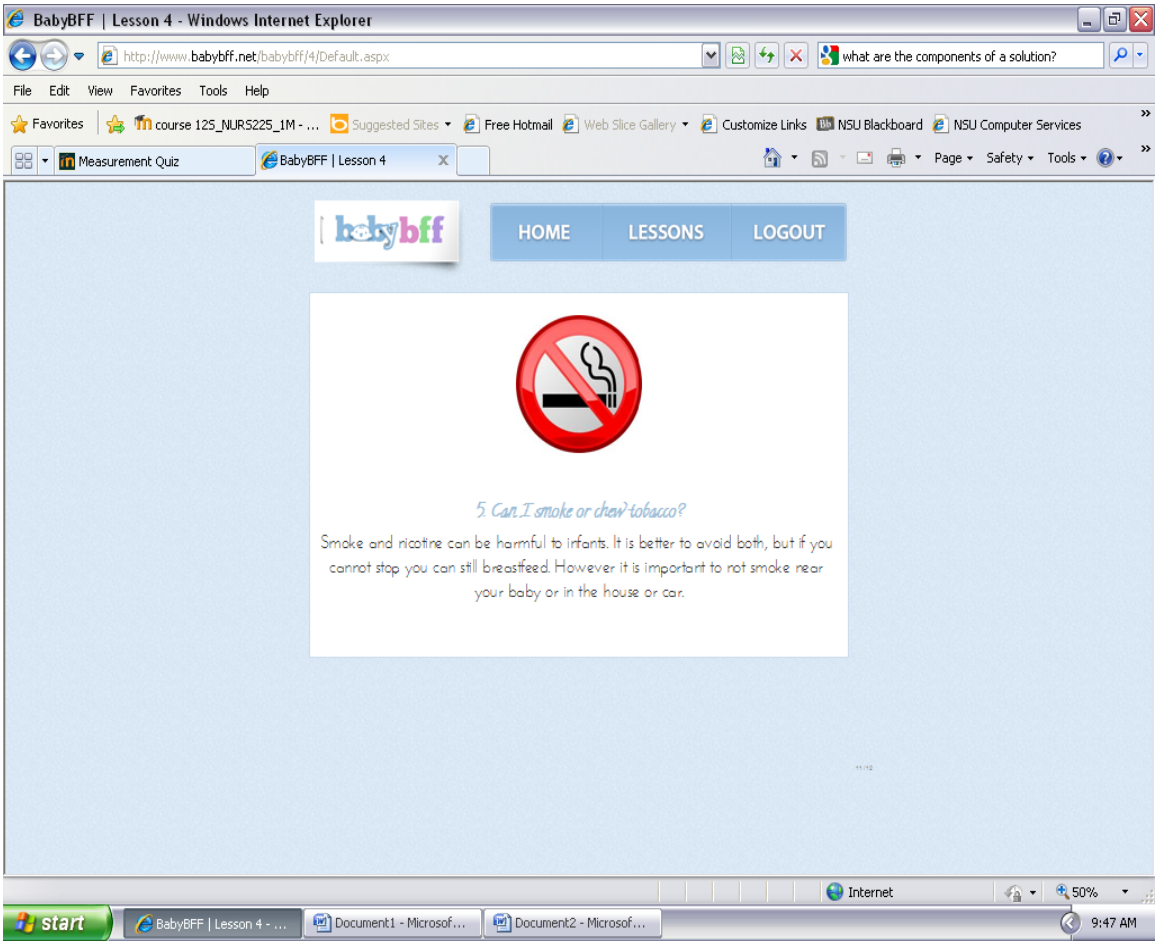
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5. Can I smoke or chew tobacco?
Smoke and nicotine can be harmful to infants. It is better to avoid both, but if you cannot stop you can still breastfeed. However it is important to not smoke near your baby or in the house or car.
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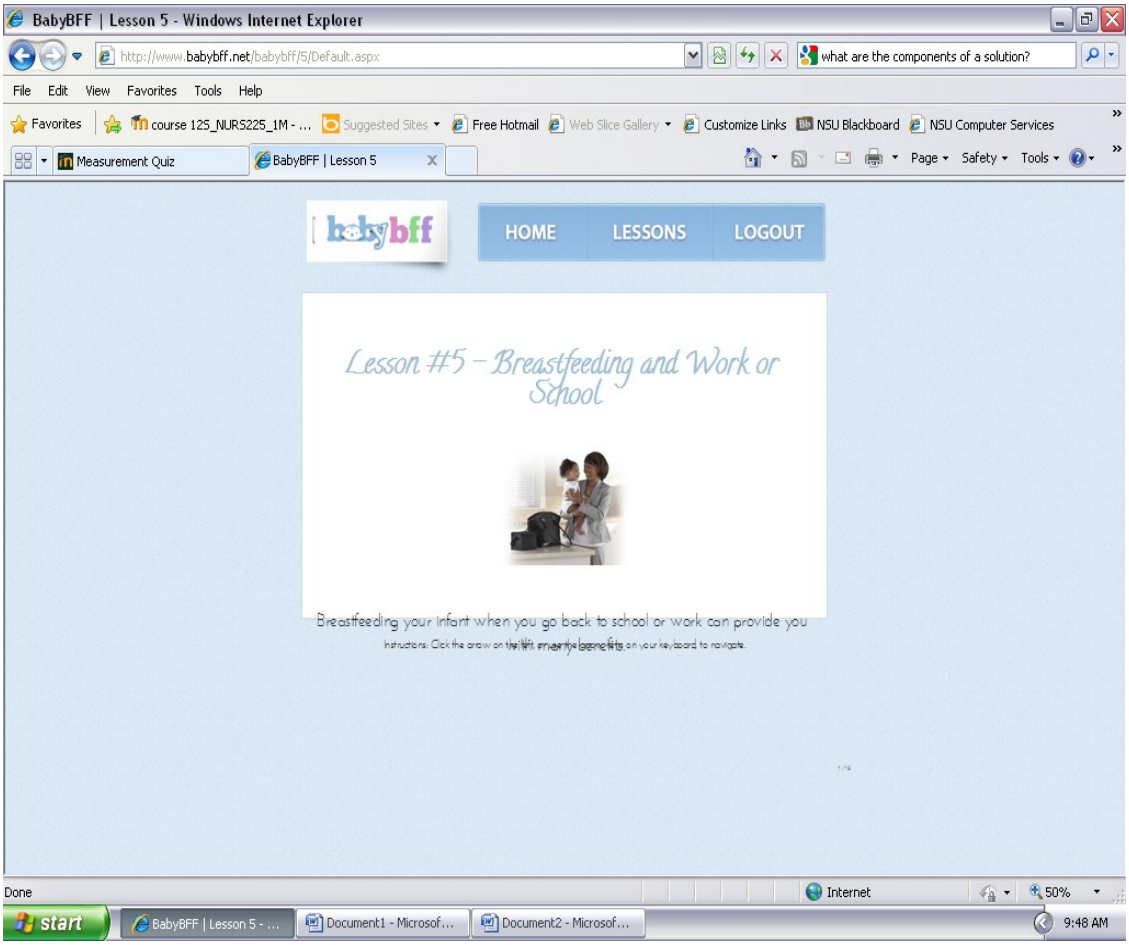
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Lesson #5 – Breastfeeding and Work or School
Breastfeeding your infant when you go back to school or work can provide you
Instructions: Click the arrow on the left, or use the keyboard to navigate.
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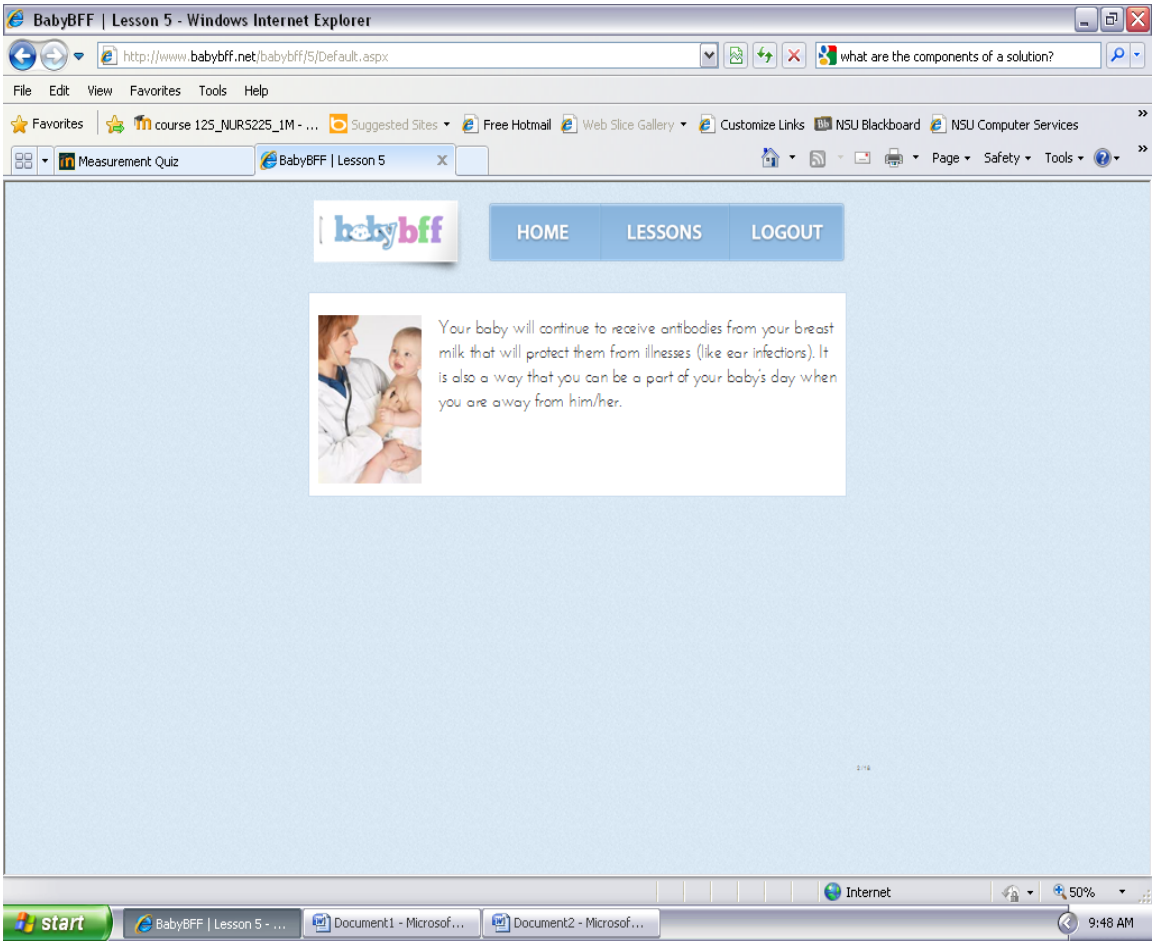
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Your baby will continue to receive antibodies from your breast milk that will protect them from illnesses (like ear infections). It is also a way that you can be a part of your baby's day when you are away from him/her.
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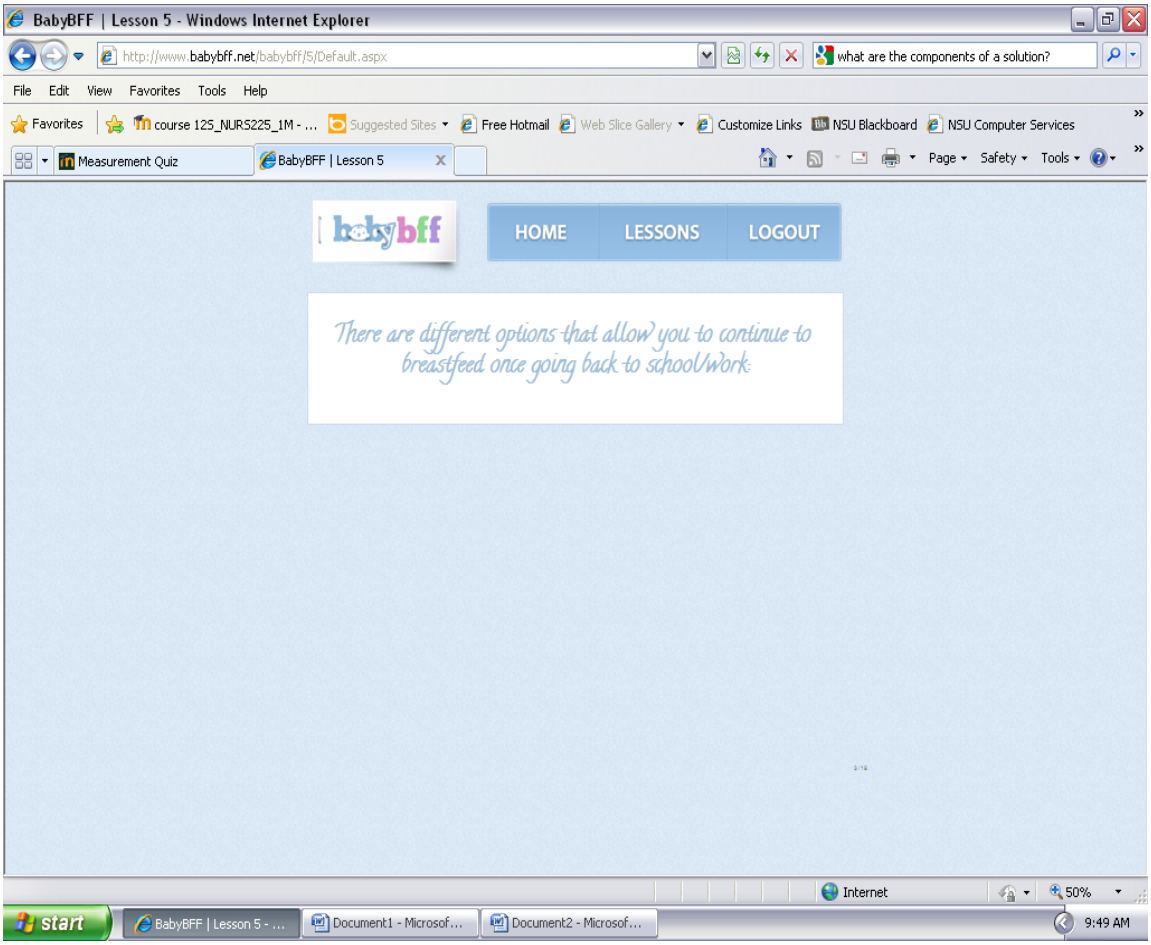
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There are different options that allow you to continue to breastfeed once going back to school/work:
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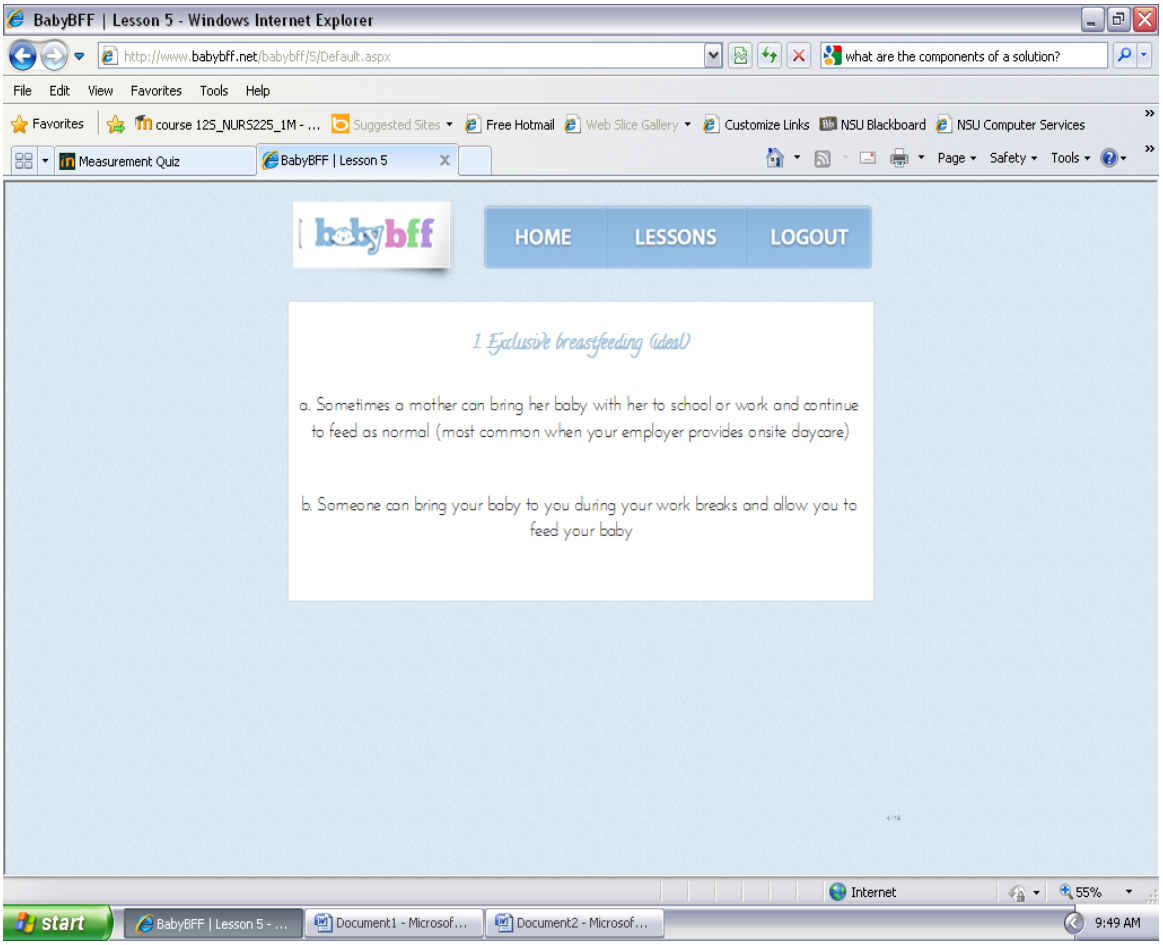
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1 Exclusive breastfeeding (ideal)
a. Sometimes a mother can bring her baby with her to school or work and continue to feed as normal (most common when your employer provides onsite daycare)
b. Someone can bring your baby to you during your work breaks and allow you to feed your baby
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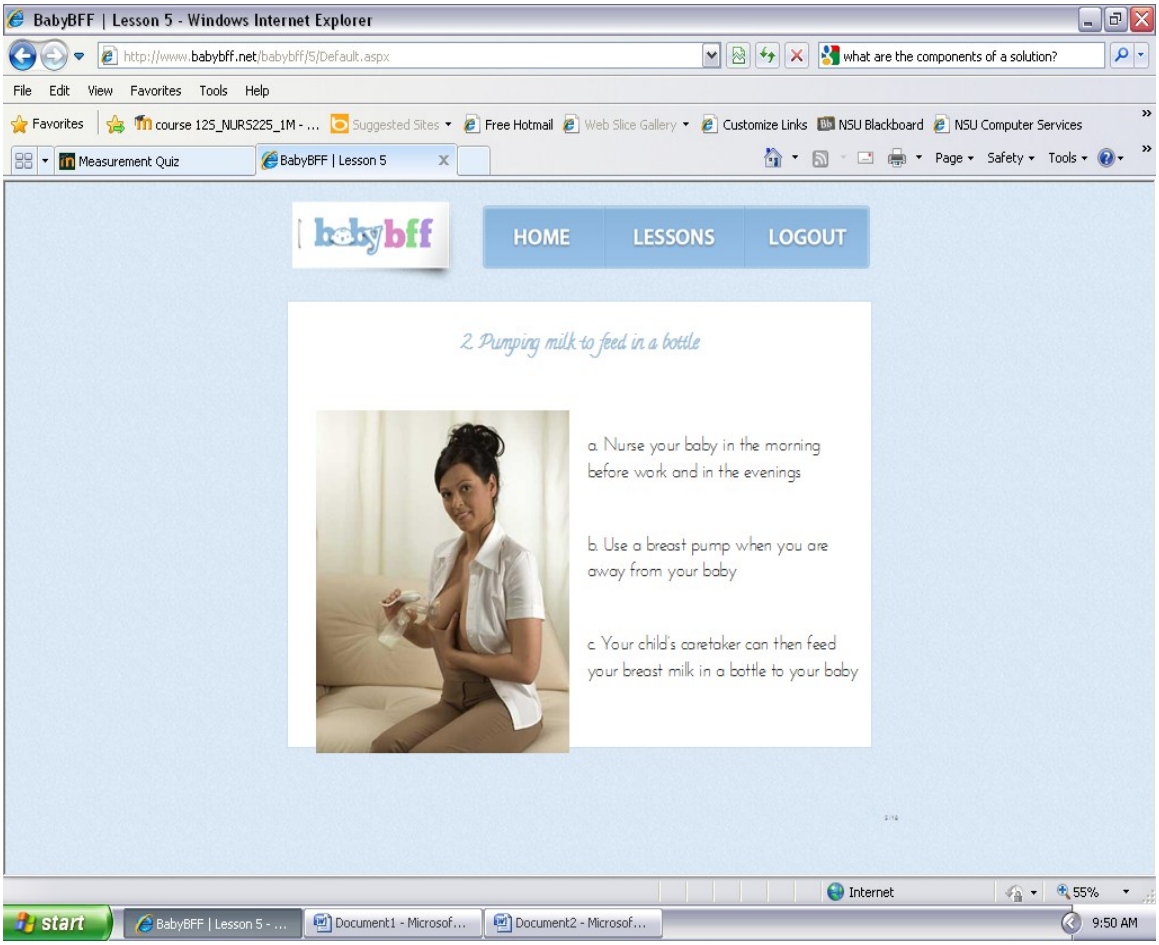
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2. Pumping milk to feed in a bottle
a. Nurse your baby in the morning before work and in the evenings
b. Use a breast pump when you are away from your baby
c. Your child's caretaker can then feed your breast milk in a bottle to your baby
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LOGOUT
3. Breastfeeding plus formula feeding
a. Nurse your baby when you are with him/her.
b. Your baby's caretaker can feed your baby formula when you are away
c. Your milk production will adjust so that your milk supply is only producing at the times of day your baby typically eats
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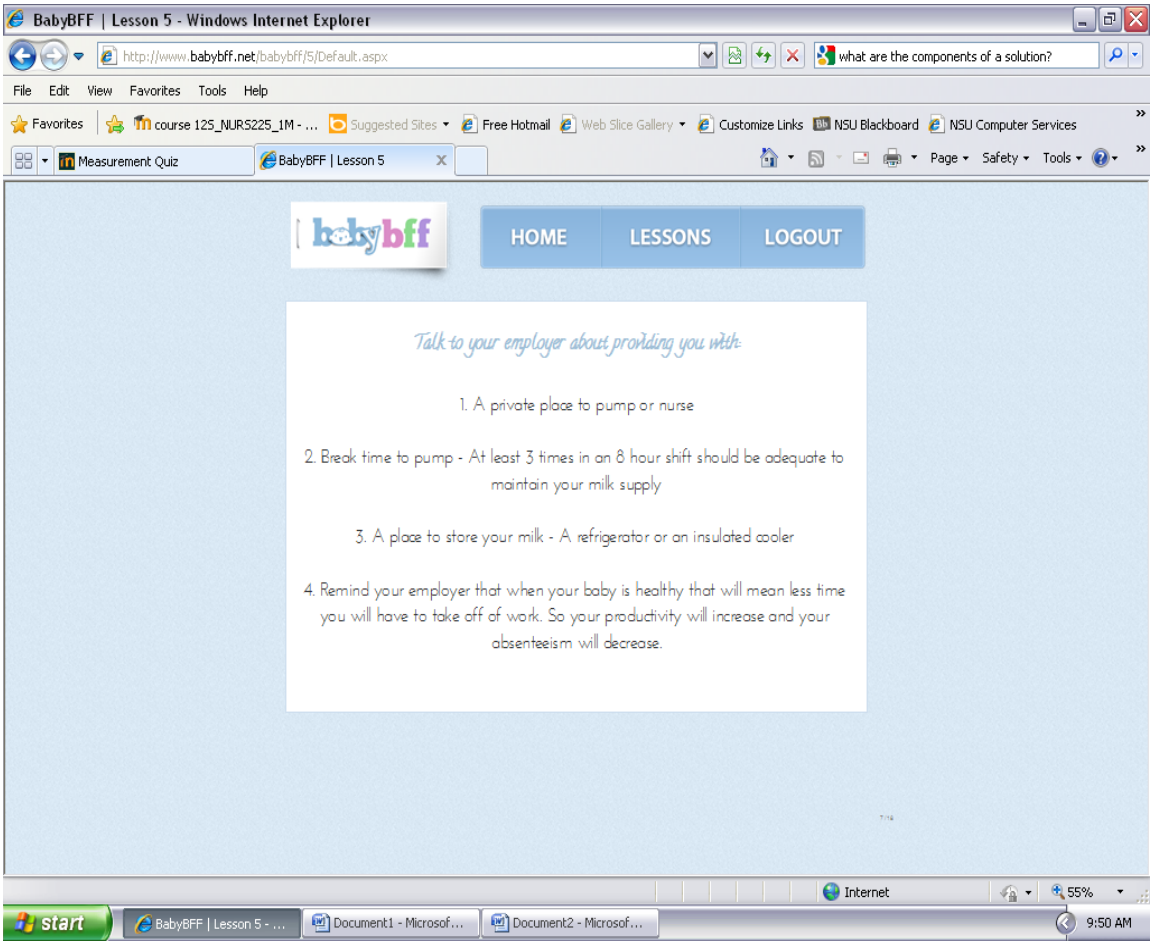
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LESSONS
LOGOUT
Talk to your employer about providing you with:
1. A private place to pump or nurse
2. Break time to pump - At least 3 times in an 8 hour shift should be adequate to maintain your milk supply
3. A place to store your milk - A refrigerator or an insulated cooler
4. Remind your employer that when your baby is healthy that will mean less time you will have to take off of work. So your productivity will increase and your absenteeism will decrease.
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Working moms who are successful at maintaining a good milk supply do these things
1. Nurse often the first 4-6 weeks after delivery establishing a healthy milk supply.
2. Breastfeed exclusively (do not offer the baby water or formula unless it is medically necessary)
3. Stay home from work/school for as long as they can
4. Wait to offer the baby his/her first bottle at 3-4 weeks after delivery
5. Begin pumping and storing milk 2-4 weeks before returning to work
6. Discuss how to store, thaw, and use breast milk with their infant's caretaker
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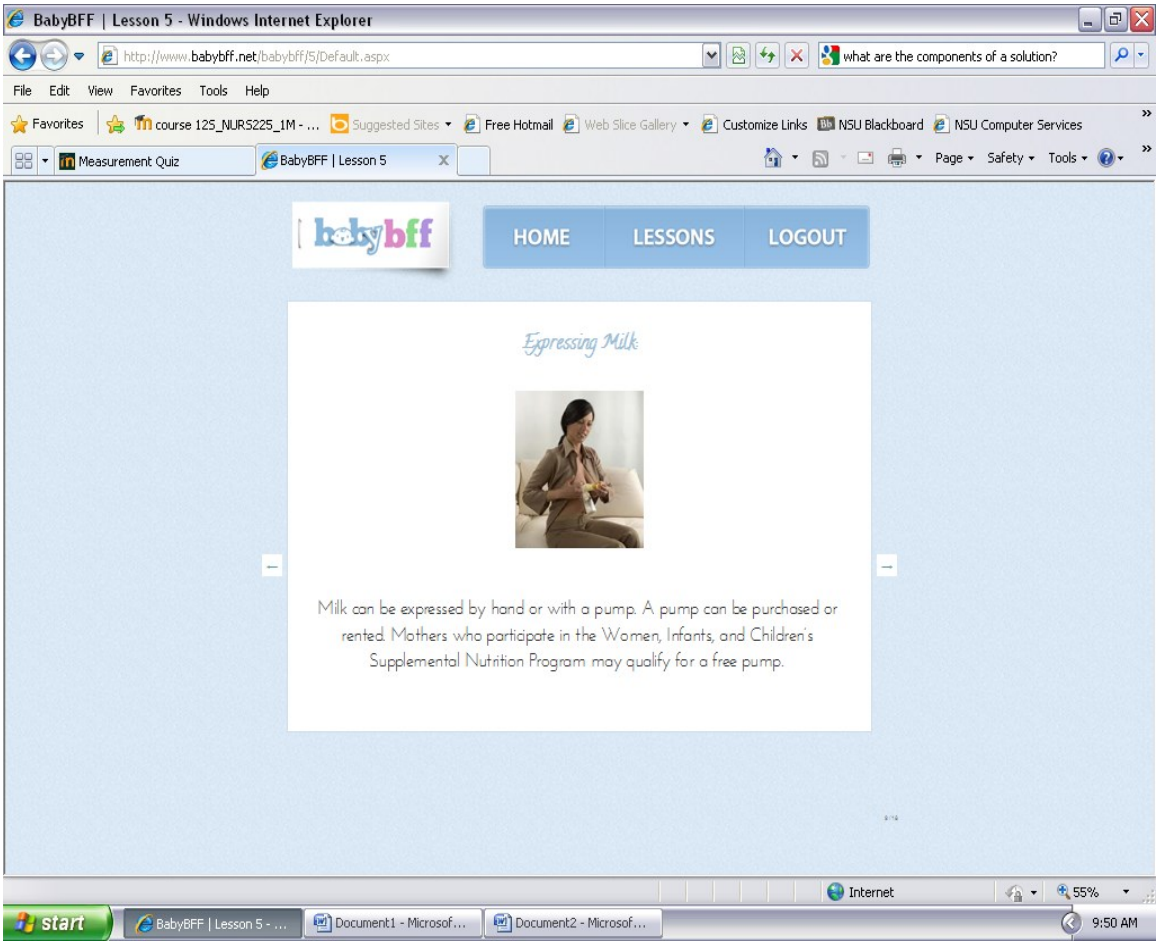
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Expressing Milk
Milk can be expressed by hand or with a pump. A pump can be purchased or rented. Mothers who participate in the Women, Infants, and Children's Supplemental Nutrition Program may qualify for a free pump.
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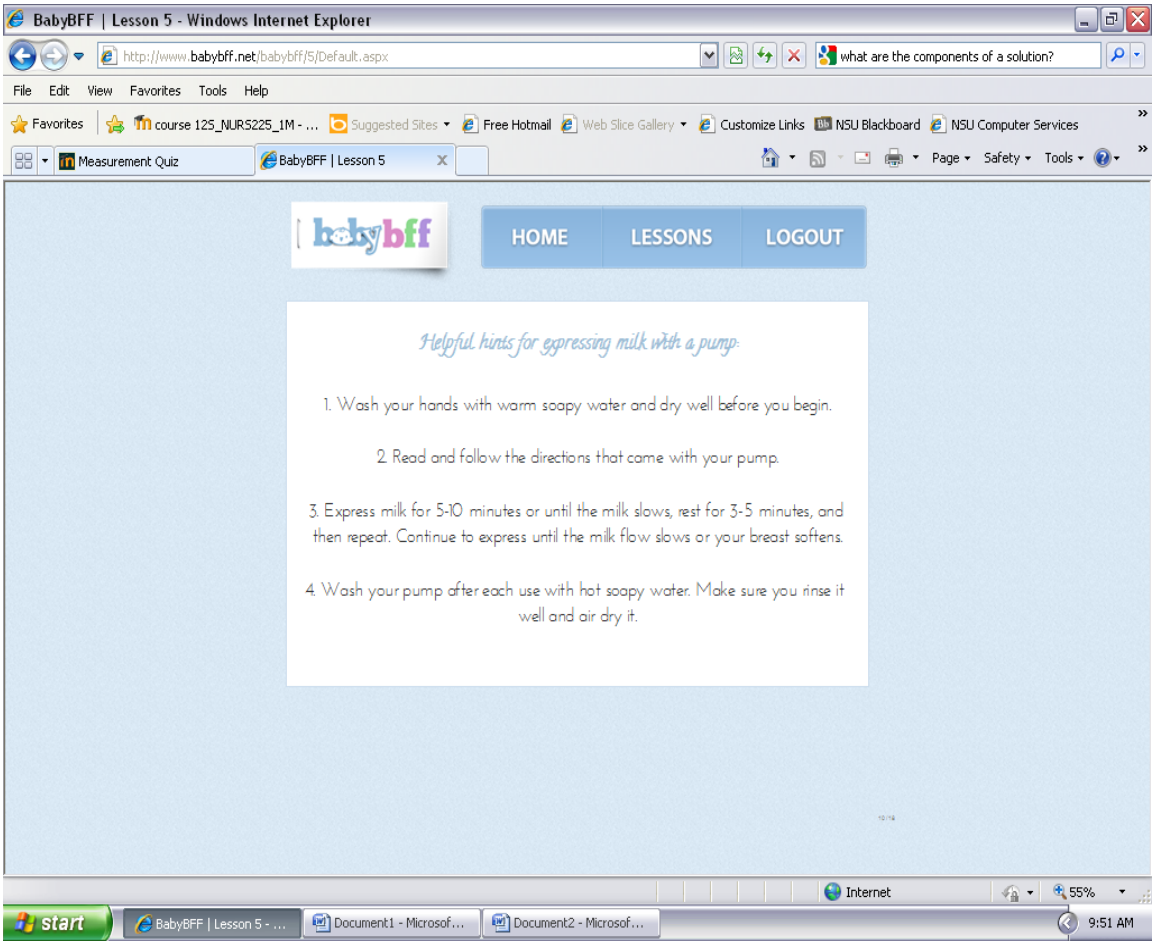
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Helpful hints for expressing milk with a pump:
1. Wash your hands with warm soapy water and dry well before you begin.
2. Read and follow the directions that came with your pump.
3. Express milk for 5-10 minutes or until the milk slows, rest for 3-5 minutes, and then repeat. Continue to express until the milk flow slows or your breast softens.
4. Wash your pump after each use with hot soapy water. Make sure you rinse it well and air dry it.
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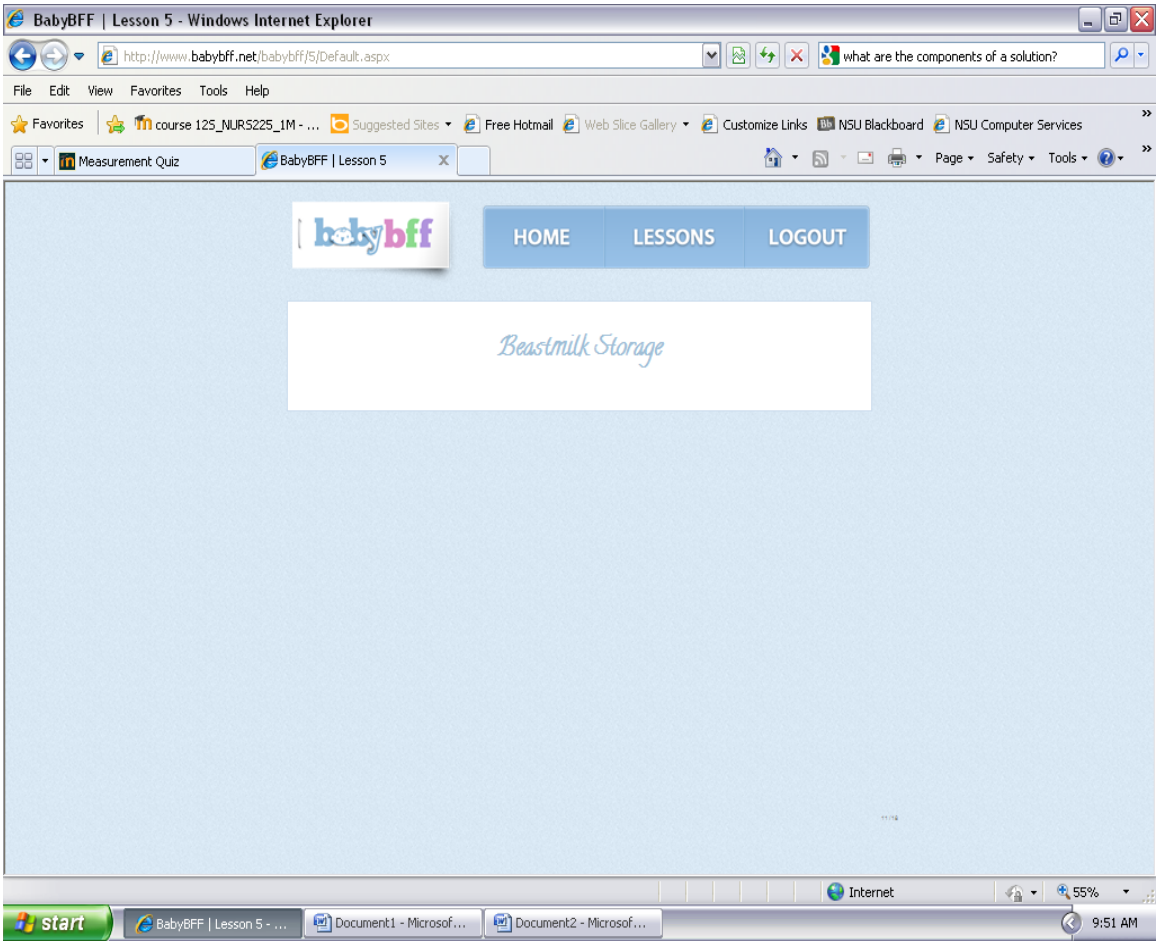
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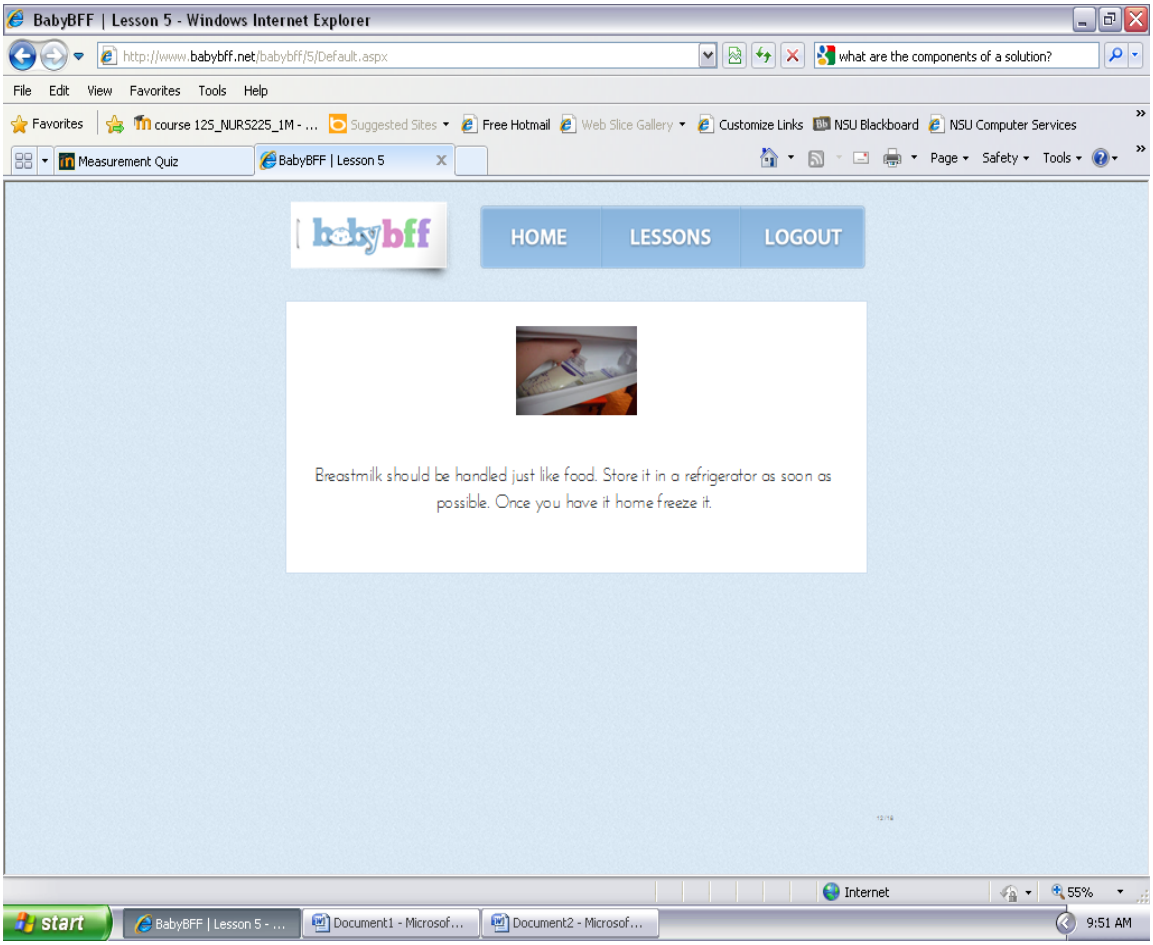
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Breastmilk should be handled just like food. Store it in a refrigerator as soon as possible. Once you have it home freeze it.
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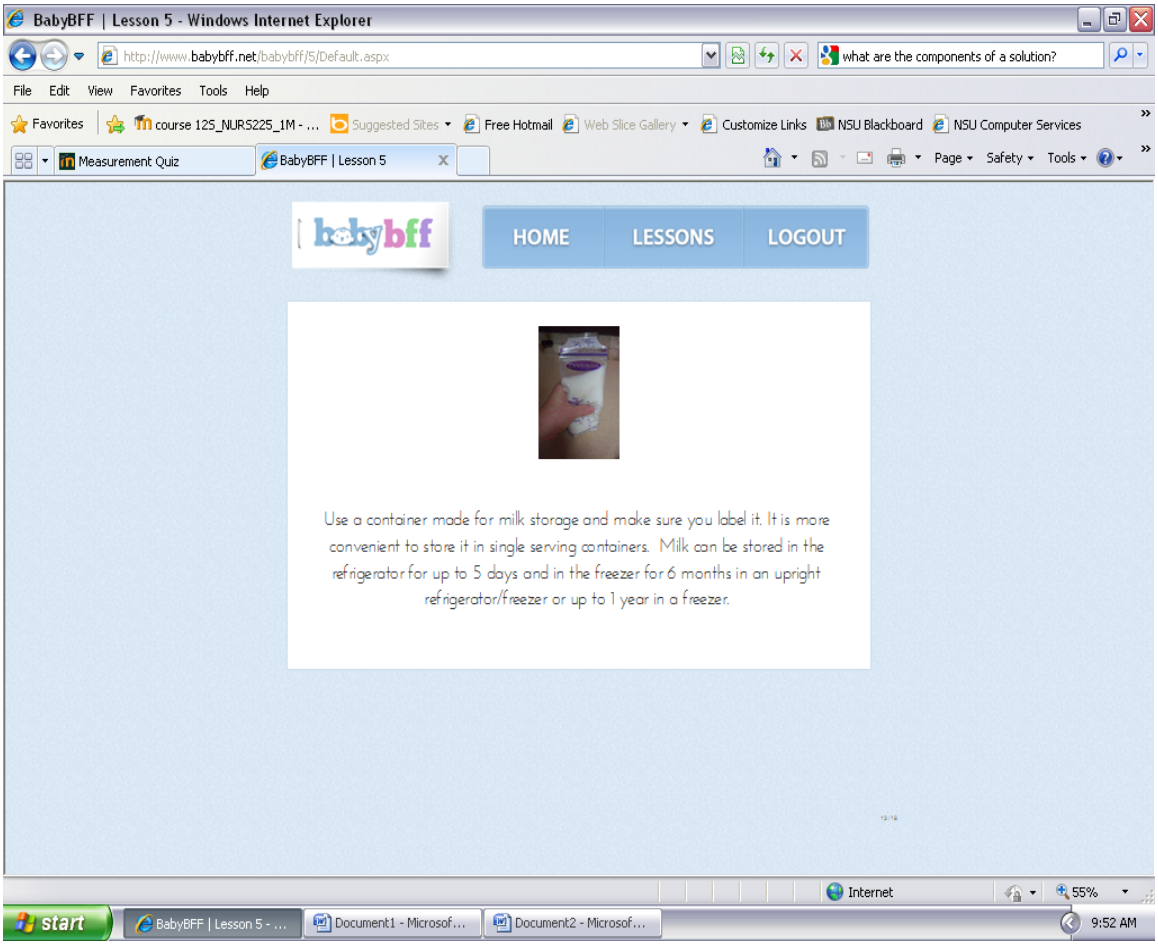
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Use a container made for milk storage and make sure you label it. It is more convenient to store it in single serving containers. Milk can be stored in the refrigerator for up to 5 days and in the freezer for 6 months in an upright refrigerator/freezer or up to 1 year in a freezer.
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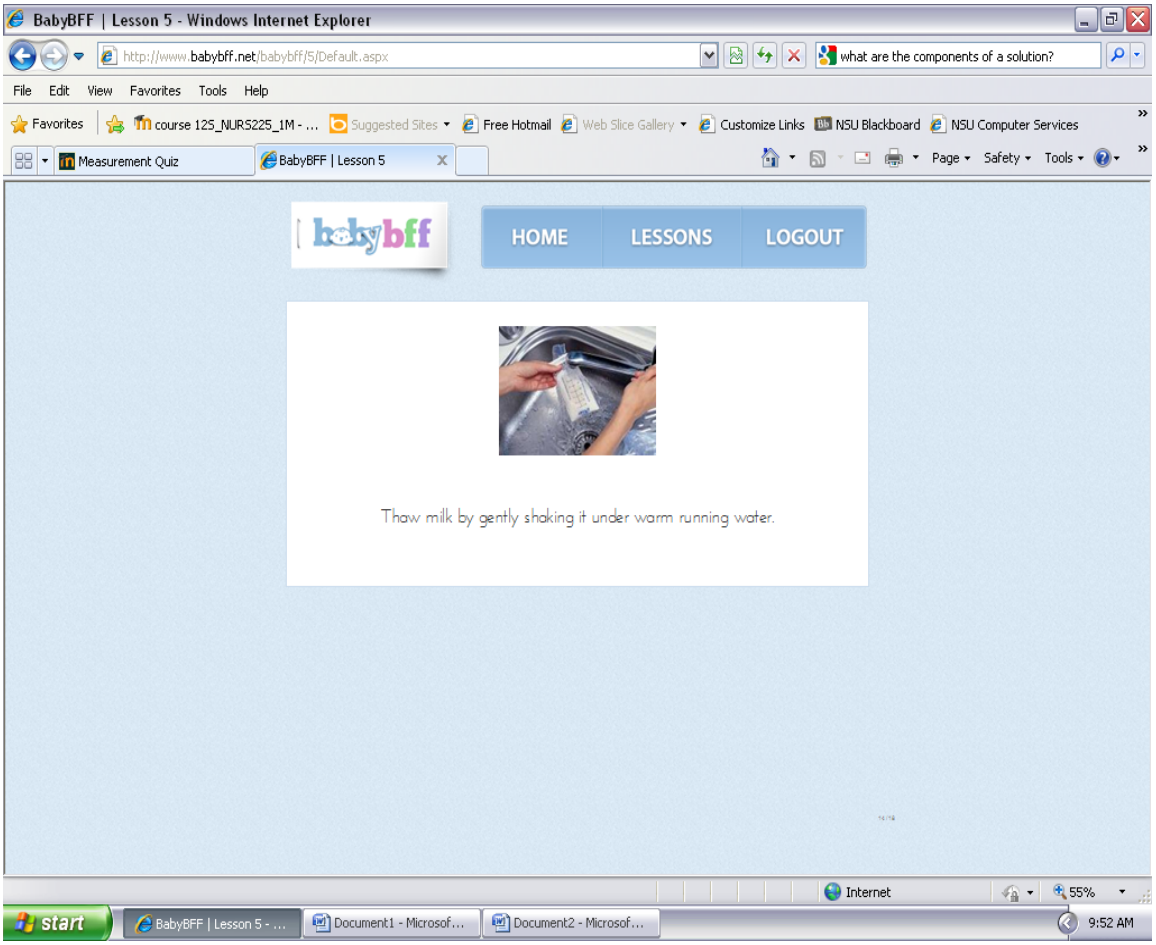
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Thaw milk by gently shaking it under warm running water.
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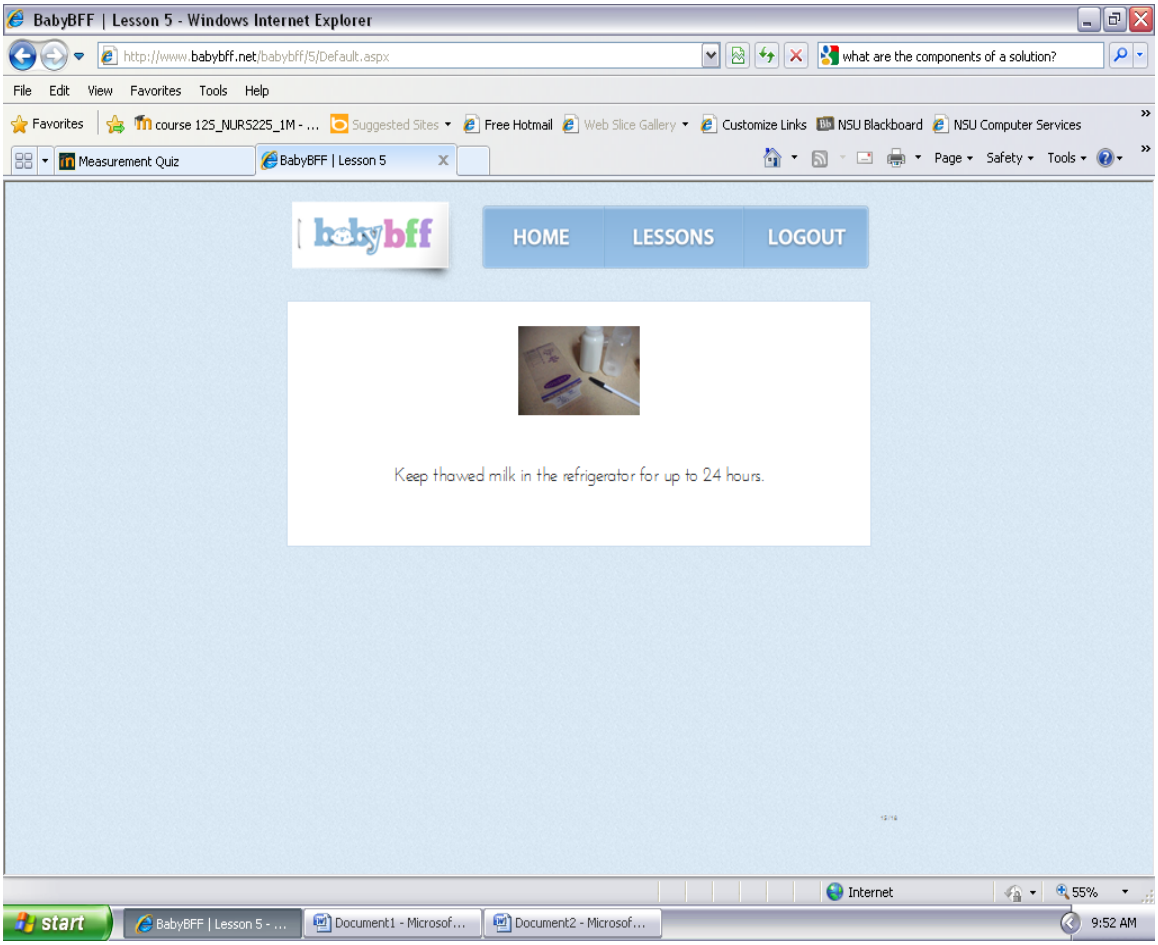
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Keep thawed milk in the refrigerator for up to 24 hours.
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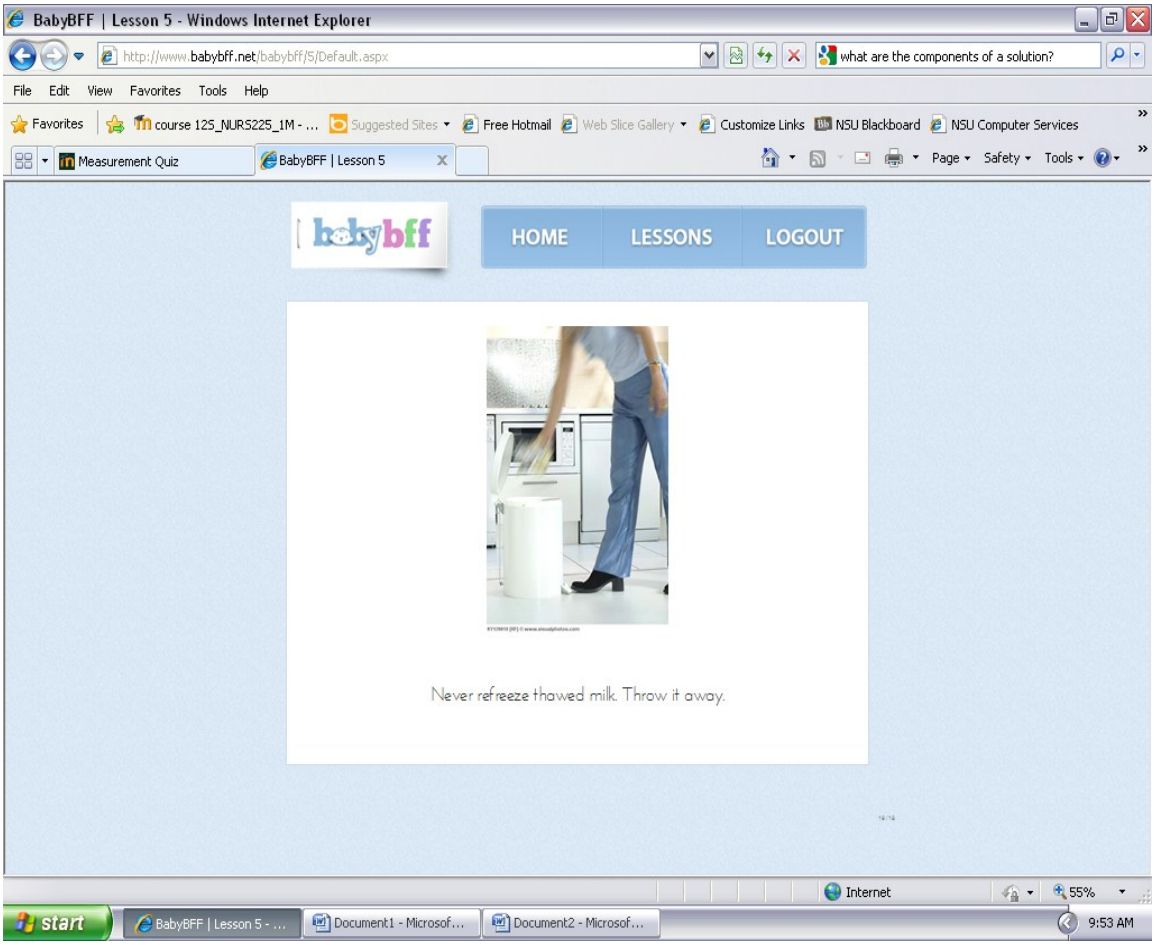
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Never refreeze thawed milk. Throw it away.
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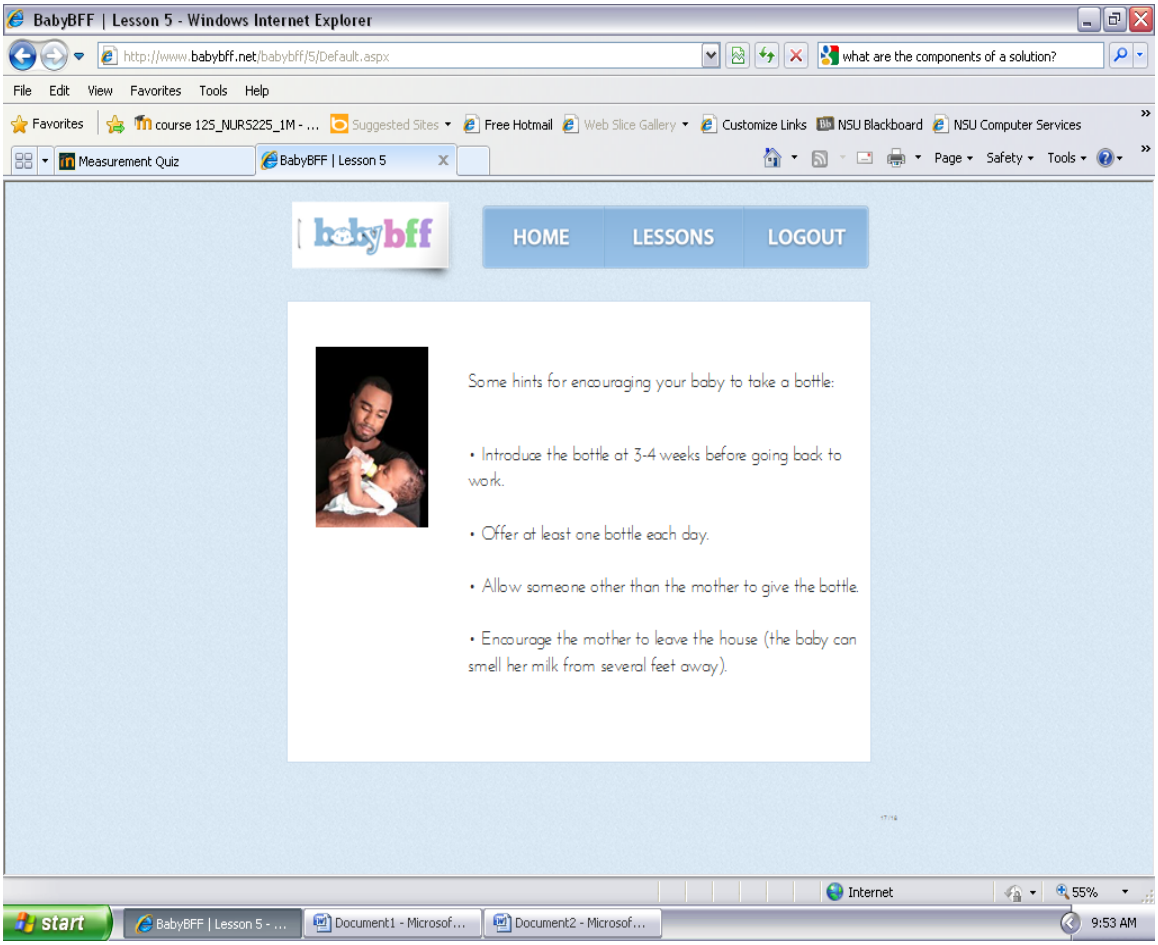
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Some hints for encouraging your baby to take a bottle:
• Introduce the bottle at 3-4 weeks before going back to work.
• Offer at least one bottle each day.
• Allow someone other than the mother to give the bottle.
• Encourage the mother to leave the house (the baby can smell her milk from several feet away).
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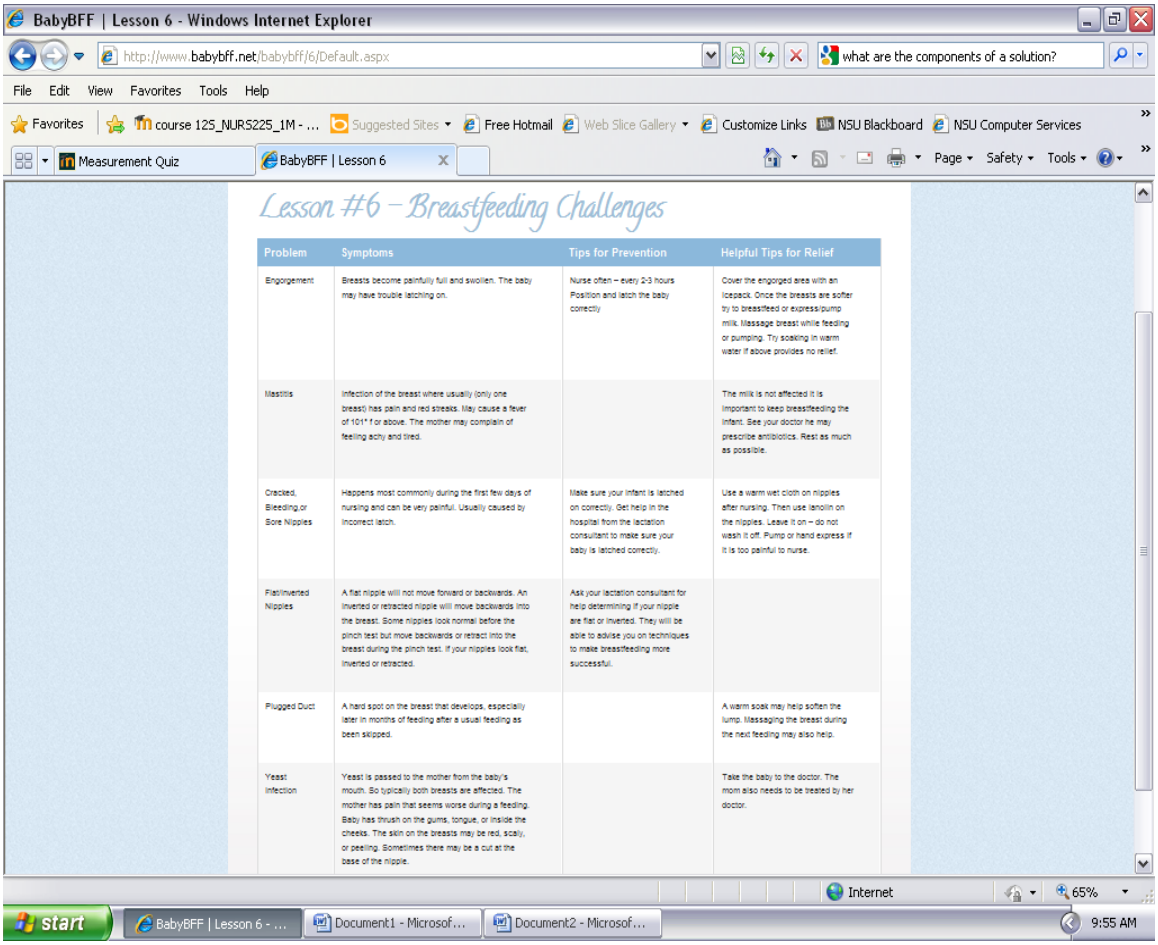
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Lesson #6 – Breastfeeding Challenges
Problem
Symptoms
Tips for Prevention
Helpful Tips for Relief
Engorgement
Breasts become painfully full and swollen. The baby may have trouble latching on.
Nurse often – every 2-3 hours Position and latch the baby correctly
Cover the engorged area with an icepack. Once the breasts are softer try to breastfeed or express/pump milk. Massage breast while feeding or pumping. Try soaking in warm water if above provides no relief.
Mastitis
Infection of the breast where usually (only one breast) has pain and red streaks. May cause a fever of 101° f or above. The mother may complain of feeling achy and tired.
The milk is not affected it is important to keep breastfeeding the infant. See your doctor he may prescribe antibiotics. Rest as much as possible.
Cracked, Bleeding,or Sore Nipples
Happens most commonly during the first few days of nursing and can be very painful. Usually caused by incorrect latch.
Make sure your infant is latched on correctly. Get help in the hospital from the lactation consultant to make sure your baby is latched correctly.
Use a warm wet cloth on nipples after nursing. Then use lanolin on the nipples. Leave it on – do not wash it off. Pump or hand express if it is too painful to nurse.
Flat/Inverted Nipples
A flat nipple will not move forward or backwards. An inverted or retracted nipple will move backwards into the breast. Some nipples look normal before the pinch test but move backwards or retract into the breast during the pinch test. If your nipples look flat, inverted or retracted.
Ask your lactation consultant for help determining if your nipple are flat or inverted. They will be able to advise you on techniques to make breastfeeding more successful.
Plugged Duct
A hard spot on the breast that develops, especially later in months of feeding after a usual feeding as been skipped.
A warm soak may help soften the lump. Massaging the breast during the next feeding may also help.
Yeast Infection
Yeast is passed to the mother from the baby's mouth. So typically both breasts are affected. The mother has pain that seems worse during a feeding. Baby has thrush on the gums, tongue, or inside the cheeks. The skin on the breasts may be red, scaly, or peeling. Sometimes there may be a cut at the base of the nipple.
Take the baby to the doctor. The mom also needs to be treated by her doctor.
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APPENDIX C

PILOT TESTING FORM

1. What is your first impression of the website? Explain.
2. What were your first thoughts on opening the website? Explain.
3. Is the web page laid out attractively? Explain.
4. Does the page look well-organized? Explain.
5. Are the titles, headings, and subjects easy to identify? Explain.
6. Can the reader find information easily?
7. What are your impressions of the colors, fonts, and font sizes used? Explain.
8. Is there enough contrast between the colors used and the text?
9. Are there any distractions on the website? Explain.
10. Are there any barriers to accessing information? Explain.
11. Do you feel that the writing level is appropriate for most people? Explain.
12. Does the website increase your interest in the topic? Explain

Please comment and provide suggestions for improvements:

APPENDIX D

RECRUITMENT FLYER

Free Infant Feeding Education and a Chance to Win 1 of 5 $100 Wal-Mart Gift Cards

All interested pregnant women will receive free information about infant feeding.

Eligible women must be:

1. Pregnant (less than 27 weeks pregnant)
2. Speak/read English
3. Have access to the internet
4. Ability to receive text messages
5. Live in Lafourche or Terrebonne Parish

TEXT the word BABY to 985.227.6466 if you are interested in participating! Interested women may also call the above number.

APPENDIX E

LETTER TO PHYSICIANS

Dear Physicians and Office Managers,

I am writing to you in hopes that you can help me with a research study I am conducting to complete the requirements of my doctoral degree. I am providing free infant feeding education (encouraging breastfeeding) to interested mothers via the internet. I have included in this packet some advertisements that could be placed in the packet of information you give women when they come in for their first pregnancy appointment or they could be put out in your waiting room. I have also included a copy of my Institutional Review Board approval form from the University of Southern Mississippi so that you can be ensured that this is a legitimate endeavor.

If you have questions and want to talk to me more about the study please feel free to call me at: 985.804.5859 or 985.227.6466. I appreciate your help.

Sincerely,

Brigett Scott, MS RD LDN
PhD Candidate at the University of Southern Mississippi

APPENDIX F

INFANT FEEDING STUDY SCREENING FORM

Hello. My name is Brigett Scott. Thank you for agreeing to participate in this infant feeding education study. The first part of this process includes a screening questionnaire. I will ask you some questions to determine if you are eligible for participation. If you are not eligible I will mail you an infant feeding education book for agreeing to participate. All eligible women who complete the screening and two additional surveys over 6 weeks will be entered into a drawing to win 1 of 5 $100 Wal-Mart gift cards.

1. What is your name?

2. How old are you?

3. Are you fluent in English?

4. What state do you live in?

5. How many weeks pregnant are you?

6. Do you have access to the internet?

7. Do you send and receive text messages?

8. What is your cell phone number?

9. What is your email address?

10. What is your mailing address? (Part of this study may require that we send you educational information through the mail)

APPENDIX G

LETTER TO UNQUALIFIED MOTHERS

Dear _____ ,

You are receiving this book (Breastfeeding: Your guide to a healthy, happy baby) as part of your interest in the infant feeding study. Unfortunately, you do not qualify for inclusion because you are past 27 weeks in your pregnancy. Please accept this book as a sign of my appreciation for your willingness to participate. And please pass on the word to any pregnant friends who may be willing to participate (in Louisiana or Mississippi). They can call or text me at 985.227.6466.

Thank you,

Brigett Scott, MS RD LD

APPENDIX H

EMAIL WITH LINK TO FIRST QUESTIONNAIRE

Thank you for agreeing to participate in this research study. Please complete the questionnaire at the following link: https://www.surveymonkey.com/s/BABYBFF
You will receive your free infant feeding education once this 50 question survey is complete.

After 6 weeks you will receive another 23 question survey and once that is complete you will be entered into a drawing for one of five $100 Wal-Mart gift cards.

Thank you for taking time to help me out.

https://www.surveymonkey.com/s/BABYBFF

Brigett Scott, MS RD LDN

APPENDIX I

LETTER TO WRITTEN GROUP

Dear Infant Study Participant,

You are receiving this book (Breastfeeding: Your guide to a healthy, happy baby) as part of your participation in this study. In six weeks you will receive an email from the study staff asking that you fill out a 23 question questionnaire to complete your part in this study. After you have completed the questionnaire you will be entered into the drawing for one of five $100 Wal-Mart gift cards.

Thank you for your participation.

Brigett Scott, MS RD LDN

APPENDIX J

STUDY CONSENT FORM AND DEMOGRAPHIC TOOL

PURPOSE OF THE STUDY
The purpose of this study is to determine the effectiveness of a breastfeeding educational program. You must be 18 years or older to participate.

PROCEDURES
You will be asked to view educational materials regarding infant feeding methods that may help you to make a decision about how you choose to feed your baby. If you agree to participate you will be assigned to one of three groups. You will not be able to choose which group you are
assigned to. One group will receive written educational materials through the mail, one group will be given an email and password to access an educational website, and the third group will receive the same website access as group two but they will also receive text messages reminders twice a week about the website. You will be asked to spend approximately one hour per week for six weeks reviewing the educational materials. It doesn't matter whether you spend a full hour at one time, or view the materials for shorter time periods multiple times. The actual amount of time you spend is up to you. If you are assigned to a web-based education group, the researcher will track your logins to the website (the number of times you login) and page hits (the number of times and time you spend accessing each page on the website). This is only for purposes of comparison among the different educational groups. You will also be asked to complete online questionnaires through a web-based survey site. These questionnaires ask about your infant feeding preferences, about how you like to learn new information, and for some brief demographic information, such as your age and marital status, and your pregnancy history and current status. Each participant who meets the screening criteria and consents to participate, the breastfeeding education intervention will begin when the participant completes the first online questionnaire. You will be tracked for six weeks following enrollment, at which time you will be notified to complete A follow-up questionnaire and your participation will be concluded.

RISKS
There are no known risks associated with participation in this study. You may experience slight inconvenience due to the requirement that each participant will be asked to complete online questionnaires that will take approximately fifteen minutes each (for a total of 6090 minutes).

BENEFITS
You may benefit because you will receive free educational materials (either written or via the website) that can help you make a decision about how to feed your baby. .
If you choose to participate, your name will be entered into a raffle to win one of five $100.00 Wal-Mart gift cards. Only those participants who complete all applicable study questionnaires will be included in the raffle.

PARTICIPANT CONFIDENTIALITY

Data from the questionnaires you complete online will be downloaded by the researcher onto her personal computer, into a file that is password protected. If you are in one of the web-based education groups, data on your logins and page hits will be transferred to a database. Only the
researchers will have access to your individual data. Your name and other identifying information such as your phone number will not be associated in any publication or presentation with the information collected about you or with the research findings from this study. Instead, the researcher(s) will group your data with other participants. No individual data will be reported. When all data analyses for this study are completed, all electronic data files will be deleted. Your participation is completely voluntary and may be discontinued at any time without penalty or prejudice to the subject.

QUESTIONS ABOUT PARTICIPATION

Questions about procedures should be directed to the researcher listed at the end of this consent form.

PARTICIPANT CERTIFICATION:

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study. This project has been reviewed by the Human Subjects Protection Review Committee, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about the rights as a research subject should be directed to the chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 394060001,(601) 2666820.

I agree to take part in this study as a research participant. By my signature I affirm that I am at least 18 years old and that I have received a copy of this Consent and Authorization form.

____ YES

____ NO

Researcher Contact Information:

Brigett L. Scott, MS RD LDN

PO BOX 2090

Thibodaux, LA 70310

985.227.6466

Brigett.scott@yahoo.com

This questionnaire contains 50 questions. It is important that you answer all 50 questions. Once you have completed them, the researcher will provide you with free infant feeding education.
After 6 weeks, you will receive an email requesting that you complete another questionnaire. After completing both questionnaires you will be entered into a drawing to win one of five $100 Wal-Mart gift cards. Thank you for your participation.

2. Please provide the following for survey verification.

Name:

Email Address:

3. Do you consider yourself Hispanic or Latino? (A person of Mexican, puerto Rican, Cuban, South or Central American, or other Spanish culture or origin regardless of race)

- ◯ Yes, Hispanic or Latino
- ◯ Not Hispanic

4. What race do you consider yourself to be? Select one or more of the following.

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White
- ☐ More than two of the above
- ☐ Don't know
- ☐ Refuse answer

5. How many times have you been pregnant?

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 or more

6. What is your current marital status?

- ◯ Married
- ◯ Single and living with the baby's father
- ◯ Single and not living with the baby's father

7. What is your highest level of education?

- ◯ Some High School
- ◯ High School Graduate
- ◯ Some College
- ◯ College Graduate
- ◯ Some Graduate or Professional School
- ◯ Graduate Level or Professional degree
- ◯ Don't know

8. What is your yearly household income?

- ◯ Less than $5,000
- ◯ $5,000-$9,999
- ◯ $10,000-$14,999
- ◯ $15,000-$19,999
- ◯ $20,000-$24,999
- ◯ $25,000-$29,999
- ◯ $30,000 - $34,999
- ◯ $35,000 - $39,999
- ◯ $40,000 – $44,999
- ◯ $45,000 – $49,999
- ◯ $50,000 – $54,999
- ◯ $55,000 or more

9. Have you ever received information about breastfeeding from a health professional?

- ◯ Yes
- ◯ No
- ◯ I Don't Know

10. Have you ever breast-fed an infant?

- ◯ Yes
- ◯ No

11. Are you currently receiving Women Infants and Children (WIC) Program assistance?

- ◯ Yes
- ◯ No

APPENDIX K

INFANT FEEDING INTENTIONS

Please choose the answer that most closely matches your opinion considering both your feeding plans and the likelihood that you will carry out those plans.

29. I am planning to only formula feed my baby (I will not breastfeed at all).

- ◯ Very Much Agree
- ◯ Somewhat Agree
- ◯ Unsure
- ◯ Somewhat Disagree
- ◯ Very Much Disagree

30. I am planning to at least give breastfeeding a try.

- ◯ Very Much Agree
- ◯ Somewhat Agree
- ◯ Unsure
- ◯ Somewhat Disagree
- ◯ Very Much Disagree

31. When my baby is 1 month old, I will be breastfeeding without using formula or other milk.

- ◯ Very Much Agree
- ◯ Somewhat Agree
- ◯ Unsure
- ◯ Somewhat Disagree
- ◯ Very Much Disagree

32. When my baby is 3 months old, I will be breastfeeding without using any formula or other milk.

- ◯ Very Much Agree
- ◯ Somewhat Agree
- ◯ Unsure
- ◯ Somewhat Disagree
- ◯ Very Much Disagree

33. When my baby is 6 months old, I will be breastfeeding without using any formula or other milk.

- ◯ Very Much Agree
- ◯ Somewhat Agree
- ◯ Unsure
- ◯ Somewhat Disagree
- ◯ Very Much Disagree

APPENDIX L

NEED FOR COGNITION TOOL

For each of the following statements below, please indicate whether or not the statement is characteristic of you or of what you believe.

34. I prefer complex to simple problems.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

35. I like to have the responsibility of handling a situation that requires a lot of thinking.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

36. Thinking is not my idea of fun.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

37. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

38. I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

39. I find satisfaction in deliberating hard and for long hours.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

40. I only think as hard as I have to.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

41. I prefer to think about small daily projects to long term ones.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

42. I like tasks that require little thought once I've learned them.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

43. The idea of relying on thought to make my way to the top appeals to me.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

44. I really enjoy a task that involves coming up with new solutions to problems.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

45. Learning new ways to think doesn't excite me very much.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

46. I prefer my life to be filled with puzzles I must solve.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

47. The notion of thinking abstractly is appealing to me.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

48. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

49. I feel relief rather than satisfaction after completing a task that requires a lot of mental effort.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

50. It's enough for me that something gets the job done; I don't care how or why it works.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

51. I usually end up deliberating about issues even when they do not affect me personally.

- ◯ extremely uncharacteristic
- ◯ somewhat uncharacteristic
- ◯ uncertain
- ◯ somewhat characteristic
- ◯ extremely characteristic

APPENDIX M

INFANT FEEDING ATTITUDES TOOL

For each of the following statements, pelase indicate how much you agree or disagree by selecting the answer that most closely corresponds to your opinion.

12. The nutritional benefits of breast milk last only until the baby is weaned from breast milk.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

13. Formula-feeding is more convenient than breast-feeding.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

14. Breast-feeding increases mother-infant bonding.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

15. Breast milk is lacking iron.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree or disagree
- ◯ agree
- ◯ strongly agree

16. Formula-fed babies are more likely to be overfed than are breast-fed babies.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

17. Formula-feeding is the better choice if a mother plans to work outside the home.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

18. Mothers who formula-feed miss one of the great joys of motherhood.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

19. Women should not breast-feed in public places such as restaurants.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

20. Babies fed breast milk are healthier than babies who are fed formula.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

21. Breast-fed babies are more likely to be overfed than formula-fed babies.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

22. Fathers feel left out if a mother breast-feeds.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

23. Breast milk is the ideal food for babies.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

24. Breast milk is more easily digested than formula.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

25. Formula is as healthy for an infant as breast milk.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

26. Breast-feeding is more convenient than formula feeding.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

27. Breast milk is less expensive than formula.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

28. A mother who occasionally drinks alcohol should not breast-feed her baby.

- ◯ strongly disagree
- ◯ disagree
- ◯ neither agree nor disagree
- ◯ agree
- ◯ strongly agree

APPENDIX N

EMAIL POST-INTERVENTION

It has been six weeks since you received your infant feeding study educational materials.

I am now asking you to complete the survey that can be found at the following link: https://www.surveymonkey.com/s/babybff2

Upon completion of this questionnaire, your name will be entered into the drawing for one of five $100 Wal-mart gift cards. The drawing will occur at the completion of the study (in the spring). I will notify all winners via mail.

It is very important to my research study that you complete this final questionnaire. I appreciate your time and thank you for your participation.

Brigett Scott, MS RD LDN

APPENDIX O

GIFT CARD LETTER

Dear Infant Study Participant,
Thank you for agreeing to participate in this research study. You have randomly been selecting as one of the recipients of a $100 Wal-Mart gift card. Please find it enclosed. I just want to thank you and all the other participants for helping me to reach my goal of finishing my doctoral degree. I wish you the best of luck with your family.

Sincerely,

Brigett Scott, MS RD LDN

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