

**COMPUTER-BASED LEARNING FOR THE ENHANCEMENT OF
BREASTFEEDING TRAINING FOR SOUTH AFRICAN UNDERGRADUATE
DIETETIC STUDENTS**

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Thesis presented in partial fulfillment of the requirements for the degree of Master of
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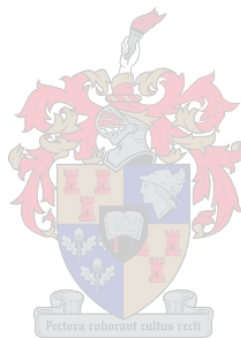
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DECLARATION

Hereby I, Lisanne Monica du Plessis, declare that this thesis is my own original work and that all sources have been accurately reported and acknowledged, and that this document has not previously in its entirety or in part been submitted at any university in order to obtain an academic qualification.

L.M. du Plessis

Date



ABSTRACT

Introduction

In order to address poor breastfeeding rates, both nationally and internationally, there is a great need for ongoing breastfeeding training for students of health care professions and health care workers (HCWs). Despite the availability of courses, there is a need for new approaches to ensure greater and more effective coverage in breastfeeding training. The students of today relate well to the use of computers in the learning environment. It was therefore deemed appropriate to explore this training method as a means to enhance the breastfeeding learning experience for students of health care professions and, more specifically, for undergraduate dietetic students.

This study was aimed at adapting and validating an Indian computer-based undergraduate breastfeeding training module, intended for use by South African (SA) undergraduate dietetic students, in order to assess whether computer-based learning in breastfeeding training could address the relevancy of the topic, assess how students view the learning experience and determine whether it could contribute to a gain in knowledge of the subject.

Methods

An Indian computer-based undergraduate breastfeeding training module in PowerPoint format was adapted to suit the SA scenario. It was converted into web-based interactive material using the Virtual Training Studio (VTS) software tool. The adapted module was assessed for face and content validity by 19 peer reviewers and 17 third year Stellenbosch University (SU) dietetic students, by means of a self-administered questionnaire. A focus group discussion was also conducted with the third year students. The impact of the adapted module on knowledge was evaluated by means of a pre- and post-knowledge test on a total of 29 second year SU (n=14) and University of the Western Cape (UWC, n=15) dietetic students.

Results

All of the peer reviewers and students were of the opinion that their information technology (IT) skills were sufficient to complete the adapted module. The majority of the peer reviewers (94%, n=17) also indicated that they had adequate IT facilities and that it was feasible to administer the module. Peer reviewers and students enjoyed the presentation and delivery mode of the adapted module. Third year

students indicated that computer-based learning (CBL) was a “nice way of learning”, but pleaded that it should not be used as the sole source of instruction. The majority of the peer reviewers and students (53%, n=19) rated the mode of learning to be equally effective compared to conventional lectures, 35% rated it as being more effective and 11% as less effective. Eighty six percent of peer reviewers and students felt that the information in the adapted module was sufficient to enable the students to take the necessary preventive- or treatment action. The majority (91%) were of the opinion that the information in the adapted module was appropriate for the specific needs and cultural context in SA. There was a significant increase in the knowledge test scores for second year students at SU and UWC.

Conclusion

The SA VTS breastfeeding training module can be integrated effectively as part of multi-media methods to increase knowledge and enhance breastfeeding training for undergraduate dietetic students, as well as other students of health care professions and, possibly, HCWs in institutions striving to become Baby Friendly.



OPSOMMING

Inleiding

Daar is 'n groot behoefte aan voortdurende opleiding in borsvoeding vir studente van gesondheidsorgberoep en gesondheidsorgwerkers ten einde swak borsvoeding syfers, nasionaal en internasionaal, aan te spreek. Afgesien van die beskikbaarheid van kursusse is daar 'n behoefte aan nuwe aanslae om groter en meer effektiewe dekking in borsvoedingonderrig te verseker. Hedendaagse studente kan hul vereenselwig met die gebruik van rekenaars in die onderrig omgewing. Dit was daarom gesien as toepaslik om hierdie metode van opleiding te ondersoek as 'n middel om borsvoeding opleiding te verbeter vir studente van gesondheidsorgberoep en, meer spesifiek, vir voorgraadse dieetkunde studente.

Hierdie studie het gepoog om 'n Indiese rekenaargebaseerde voorgraadse borsvoeding opleidingsmodule aan te pas en te valideer vir die gebruik deur Suid-Afrikaanse (SA) voorgraadse dieetkunde studente om, sodoende, vas te stel of rekenaargebaseerde onderrig in borsvoeding opleiding die relevantheid van die onderwerp kan aanspreek, vas te stel hoe studente die leerproses ervaar en vas te stel of die module sou kan bydra tot 'n verbetering in kennis van die onderwerp.

Metodes

'n Indiese rekenaargebaseerde voorgraadse borsvoeding opleidingsmodule in PowerPoint formaat was aangepas om die SA scenario te pas. Dit was herlei na webgebaseerde, interaktiewe materiaal deur middel van die gebruik van "Virtual Training Studio" (VTS) sagteware. Die aangepaste module was geëvalueer vir sig en inhoud geldigheid deur 19 eweknie evalueerders en 17 derdejaar Universiteit Stellenbosch (US) dieetkunde studente deur middel van 'n self-gedadministreerde vraelys. 'n Fokusgroep bespreking was ook met die derdejaar studente gehou. Die impak van die aangepaste module op kennis was, deur middel van 'n voor- en na-kennistoets, op 'n total van 29 tweedejaar US (n=14) en Universiteit van die Wes-Kaap (UWK, n=15) dieetkunde studente geëvalueer.

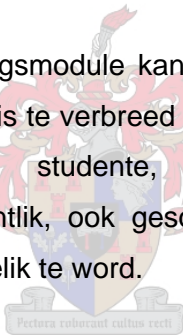
Resultate

Al die eweknie evalueerders en studente was van oordeel dat hul informasie tegnologie (IT) vaardighede toereikend was om die aangepaste module te voltooi. Die meerderheid van die eweknie evalueerders (94%, n=17) het ook aangedui dat

hul oor genoegsame IT fasiliteite beskik en dat dit prakties was om die aangepaste module te administreer. Eweknie evalueerders en studente het die aanbieding- en afleweringsmetode van die aangepaste module geniet. Die derdejaar studente het aangedui dat rekenaargebaseerde onderrig 'n "lekker manier van leer" was, maar het gepleit dat dit nie as die enigste bron van onderrig gebruik moet word nie. Die meerderheid van die eweknie evalueerders en studente (35%, n=19) het gereken dat die metode van leer net so effektief was as konvensionele lesings, 35% het dit as meer effektief gereken en 11% as minder effektief. Agt en sestig persent van eweknie evalueerders en studente het gevoel dat die inligting in die aangepaste module voldoende was om studente in staat te stel om die nodige voorkomende- of behandelingsaksie te neem. Die meerderheid (91%) het gereken dat die inligting in die aangepaste module toepaslik was vir die spesifieke behoeftes en kulturele konteks in SA. Daar was 'n beduidende toename in die getoetsde kennis van die tweedejaar US en UWK studente.

Samevatting

Die SA VTS borsvoeding opleidingsmodule kan effektief geïntegreer word as deel van multi-media metodes om kennis te verbreed en borsvoedingopleiding te verbeter aan voorgraadse dieetkunde studente, asook studente van ander gesondheidsorgberoepes en, moontlik, ook gesondheidsorgwerkers van instansies wat daarna streef om Baba-vriendelik te word.



DEDICATION and ACKNOWLEDGEMENTS

I dedicate this thesis to:

- My mother, Anso Kenmuir, who inspired me to aim high, but reminded me to strike a balance in everything I do. She sacrificed her needs and interests and unselfishly supported her children's efforts over many years. Oh, and she always reminded me to look after myself!
- My husband De Wet and sons, DW and Leslie. De Wet and DW spent many hours entertaining themselves while I was studying and working on my thesis. The latest addition to the family, Leslie, slept at crucial times between breastfeeds in those early days to enable me to finish my thesis! I cherish their love.

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- And most of all, my Heavenly Father who blessed me with this opportunity and enabled me to study and obtain a masters degree in nutrition, a field I love dearly

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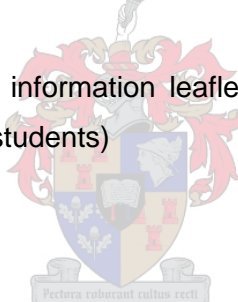
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LIST OF ABBREVIATIONS

BFHI:	Baby Friendly Hospital Initiative
CAL/I:	Computer assisted learning/instruction
CBL:	Computer-based learning
CD-ROM:	Compact disc read only memory
CHW:	Community health worker
DOH:	Department of Health
EBF:	Exclusive breastfeeding
E-LEARNING:	Electronic learning
HCW:	Health care worker
HITI:	The Health Technology Institute
HIV/ AIDS:	Human immunodeficiency virus/Acquired immunodeficiency syndrome
INP:	Integrated Nutrition Programme
IT:	Information technology
IYCF:	Infant and young child feeding
KPA:	Key performance area
LAN:	Local area network
LLL:	La Leche League International
MBChB:	Undergraduate medical degree
MBTI:	Myer-Briggs type indicator
NRNCD:	Nutrition related non-communicable disease
PHC:	Primary health care
PMTCT:	Prevention of mother to child transmission of HIV
TOT:	Trainer of trainers
SA:	South Africa/South African
SD:	Standard deviation
SU:	Stellenbosch University
VTS:	Virtual Training Studio
WHA:	World Health Assembly
WHO:	World Health Organisation
UNICEF:	United Nations International Children's Fund
UWC:	University of the Western Cape

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CHAPTER 1: INTRODUCTION



1.1 Review of Related Literature

1.1.1 Breastfeeding impacts and benefits

Breastfeeding is an unequalled way of providing the ideal natural first food for babies. The formulation of breastmilk provides optimal nutrition for babies, but the benefits of breastfeeding and breastmilk extends far beyond that for the baby alone. It also benefits the mother, the household, communities and nations.^{1,2,3}

Breastmilk provides all the energy and nutrients that an infant needs for the first 6 months of life to ensure healthy growth and development.^{2,4} It continues to provide up to half or more of a child's nutritional needs during the second half of the first year, and up to one-third during the second year of life.^{4,5}

Breastmilk promotes sensory and cognitive development^{6,7} and protects the infant against infectious and chronic diseases through its nutritional and immunological benefits.^{1,4} Exclusive breastfeeding (EBF) reduces infant mortality due to common childhood illnesses such as diarrhoea or pneumonia^{1,3,4} and helps infants to recover quicker during illness. These effects can be measured in poor as well as wealthy societies.^{1,4}

Other benefits of breastfeeding extend beyond reducing risks of morbidity and mortality due to infectious disease. EBF seems to have a preventive effect on the early development of allergic diseases, including asthma,^{8,9,10} atopic dermatitis^{8,10} and suspected allergic rhinitis⁸ in childhood. This protective effect has been shown to also be evident in multiple allergic diseases.⁸

Although there is clear evidence that breastfeeding presents short-term benefits for child health, there has been some controversy about the long-term benefits of breastfeeding, as cited in a report by Horta et al.⁶ This recent report containing systematic reviews and meta-analyses on the "Evidence of the long term effects of breastfeeding"⁶ has shed some light on this issue. It was concluded that the available evidence suggests that breastfeeding may have long-term benefits. It was found that subjects who were breastfed had lower mean blood pressure and total cholesterol as well as a lower prevalence of overweight/obesity and type-2 diabetes in later life.

Subjects also achieved higher scores in intelligence tests. All these effects were statistically significant, but for some outcomes the extent was relatively modest.⁶

South Africa (SA) is classified as a middle income country,¹¹ but the infant and child mortality rates are high compared to other middle income countries. According to the South African Demographic and Health Survey (SADHS) the infant and child mortality rates were 45/1000 and 70/1000, respectively,¹² and in black populations infant mortality rate was as high as 94/1000 in rural areas.¹³ These rates are linked to high rates of infectious diseases, with the second and third ranking cause of death in children and infants, respectively, being diarrhoeal disease.¹²

Furthermore, the burden of chronic disease risk factors in SA is high, illustrated by high levels of hypertension, hypercholesterolemia, obesity and overweight¹⁴ as well as Type 2 diabetes mellitus.¹⁵

Breastfeeding could thus act as a preventive measure and intervention action for both infectious diseases in infants and children as well as nutrition-related, non-communicable diseases (NR-NCDs) in later life for at risk groups in SA.

Breastfeeding also contributes to the health and well being of mothers, including hormonal, physical and psychosocial benefits.^{1,3,4} Frequent EBF helps to delay the return of fertility of the mother,^{16,17} and thus helps to space children.^{1,2,4} Further, early contact between mother and infant increases the mother's self-confidence and bonding with her baby¹⁸ and reduces the risk of ovarian and breast cancer.^{1,4}

Breastfeeding may reduce the risk of postpartum haemorrhage,¹⁸ a condition that has been indicated as a leading cause of death of women in SA.¹² It enhances fat loss in the early postpartum weeks^{19,20} and helps the mother to lose weight if continued beyond 6 months.²¹ Breastfeeding also improves blood glucose control and increases high-density lipoprotein cholesterol levels in women with gestational diabetes.²¹ More recently, breastfeeding has also been associated with a reduced incidence of Type 2 diabetes mellitus.²²

Obesity is a major health risk among women in their childbearing years in SA.²³ Kesa and Oldewage-Theron (2005) found that 79% of pregnant women and 80% of breastfeeding women of low socio-economic status in the Vaal Triangle were

overweight or obese (BMI cut-off of 25).²³ Furthermore, the prevalence of gestational diabetes is increasing among overweight and obese women in SA²⁴ and Type 2 diabetes mellitus is a condition on the increase in the general SA population in overweight and obese adults.¹⁵

Breastfeeding could thus also act as a preventive measure for these NR-NCDs for at risk women of childbearing age in SA.

Breastfeeding further increases family and national resources, since it is an economical feeding choice and is a safe way of feeding.⁴ Considering the high poverty and unemployment levels as well as the poor household food security faced by many families in SA,²⁵ savings from breastfeeding may significantly improve food and economic security in vulnerable households.

Breastfeeding is also environmentally friendly,^{4,26} since it requires no packaging and produces no waste and thus keeps the environment cleaner.

Contra-indications to breastfeeding are uncommon. Medical contra-indications include: infectious disease, specifically HIV/AIDS under certain circumstances, a number of over-the-counter and prescription drugs, recreational drugs and few metabolic disorders. Inconsistent information and a perceived lack of support from health professionals are barriers to initiating and continuing breastfeeding. Other barriers include insufficient maternity leave, facilities at work not supportive of breastfeeding, negative emotions about breastfeeding, embarrassment about breastfeeding in public, not knowing the volume of milk the infant is receiving, fathers feeling left-out from the feeding of the baby and lack of support from family and friends.^{1,18}

The HIV/AIDS pandemic has certainly become a huge threat to breastfeeding.³ Globally the absolute risk of transmission of HIV through breastfeeding for more than one year is 10-20%²⁷ but breastfeeding itself saves millions of lives every year.²⁸ The challenge here is to balance the risk of transmitting HIV via breastmilk with the dangers of not breastfeeding and then to counsel the mother on all feeding options to enable her to make an informed choice on the safest infant feeding strategy for her individual situation.^{29,30}

1.1.2 Breastfeeding statistics worldwide

In spite of the benefits of exclusive breastfeeding for the baby, mother, family and the community, the prevalence of EBF on a global scale is low. Worldwide, only about 44% of babies are currently exclusively breastfed until the age of 4 months.³¹

“Save the Children” has compiled statistics on breastfeeding rates around the world for their "State of the World's Newborns" 2001 report. Below (Table 1.1) is a summary of the percentage of babies aged 0-4 months who were exclusively breastfed in the different regions of the world.³¹

Table 1.1: Percentage of babies aged 0-4 months who were exclusively breastfed in the different regions of the world (1995-2002)³¹

Region	Percentage of infants
Sub-Saharan Africa	34%
Middle East/North Africa	42%
South Asia	46%
East Asia/Pacific	57%
Latin America/Caribbean	37%
Central Europe/Russian Republics, and Baltic States	*
Industrialized Countries	*
World	44%

*Data could not be calculated due to missing data from > 25% of countries in the region.

At a meeting of policy makers jointly sponsored by World Health Organisation (WHO) and United Nations International Children's Fund (UNICEF) in Florence, Italy in 1990, the *Innocenti Declaration* was prepared and adopted by the participants. This declaration set some operational targets for member states on the “Protection, promotion and support of breastfeeding” to be reached by all governments by the year 1995.³²

In a UNICEF press release on 22 November 2005, commemorating the 15th anniversary of the Innocenti Declaration, it was stated that:

“Six million lives a year are being saved by exclusive breastfeeding, and global breastfeeding rates have risen by at least 15% since 1990. Between 1990 and 2000, exclusive breastfeeding levels for children under six months in the developing world have increased by as much as three or fourfold in some countries. *But* the Innocenti partners warned that the original goals of the Declaration are still far from met. For instance, only 39 percent of infants in developing countries are exclusively breastfed. Lack of awareness amongst mothers, and lack of support from health workers and communities, is largely to blame”.³

Although EBF to six months is still infrequent, global breastfeeding rates have increased and substantial progress has been made, especially over the past 15 years, in several countries, particularly where adequate social and nutritional support is available to lactating women.^{3,33}

1.1.3 Breastfeeding statistics in South Africa

There is very little national data available in SA on breastfeeding rates. According to the SADHS the initiation rate of breastfeeding in SA was a seemingly high 87%. Unfortunately, supplementation of breastmilk starts very early and only 7% of infants younger than six months were exclusively breastfed and a further 6% were breastfed, but given supplementary water. An alarming 70% of infants younger than six months received supplementary feeding and 17% were never breastfed.¹²

Other more recent studies, mostly performed to investigate infant feeding practices in the context of HIV/AIDS in smaller communities or areas of SA, have reported that EBF rates are low and that mothers tend to introduce solids and other complementary foods or liquids too early.^{34,35,36,37}

Rapid urbanisation and the nutrition transition in SA have also influenced changes in cultural and traditional nutrition and infant feeding practices. It is well documented that urbanisation has been coupled with the adoption of a more westernized diet by migrating populations,³⁸ and undoubtedly this includes bottle feeding as a more westernized approach to infant feeding.

1.1.4 Global strategies to promote, protect and support breastfeeding

Many different programmes, treaties, and policies have been developed over time to promote, protect and support breastfeeding.

The Innocenti Declaration (1990) set some operational targets for member states by the year 1995,³² whereby all governments should have:

- Appointed a national breastfeeding co-ordinator and a multi-sectoral national breastfeeding committee
- Ensured that every health facility practicing maternity services fully implements the “Ten Steps to Successful Breastfeeding”
- Taken steps to give effect to the principles and aim of the International Code of Marketing of Breastmilk Substitutes
- Enacted creative legislation protecting the breastfeeding rights of working women

The WHO and UNICEF launched the *Baby Friendly Hospital Initiative* (BFHI) in 1991, following the Innocenti Declaration. This initiative is a global effort for improving the role of maternity services to enable mothers to breastfeed their babies for the best start in life. It aims to improve the care of pregnant women, mothers and newborns at health facilities that provide maternity services. Furthermore it aims to strengthen practices that promote, protect and support breastfeeding and to remove practices that hinder the process. The foundation for the BFHI is the *Ten Steps to Successful Breastfeeding*^{2,39,40,41} (Table 1.2).

The evidence of the effectiveness of the Ten Steps has been reported in a scientific review document. According to this document, the evidence for most of the Ten Steps is substantial, but selective implementation of only some of the steps may be ineffective and discouraging to successful breastfeeding practices. The implementation all of the Ten Steps, together with strong policies and adequate, relevant and practical training of staff, including continuing support to mothers and restriction of the use of formula to clearly defined medical reasons, will most effectively increase and sustain exclusive breastfeeding.⁴²

Table 1.2: Ten steps to successful breastfeeding⁴¹

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

A recent study done in Switzerland supported these findings when they found that babies born in a Baby Friendly hospital are more likely to be breastfed for a longer period, particularly if the facility shows high compliance with UNICEF guidelines.⁴³



To date almost 20 000 hospitals in 150 countries have become “Baby Friendly”, more than 60 countries have laws or regulations implementing the International Code of Marketing of Breastmilk Substitutes and many countries have some form of national breastfeeding authority.³

In May 2001, the World Health Assembly (WHA) passed Resolution 47.1 for optimal infant feeding practices.⁴⁴ It was subsequently incorporated into the Joint WHO/UNICEF “Global Strategy for Infant and Young Child Feeding” (IYCF) in 2002. This strategy states that, on a population basis, EBF for 6 months is the recommended duration and way of feeding infants. Thereafter infants should receive appropriate and adequate complementary foods with continued breastfeeding for up to 2 years of age and beyond.^{27,33}

UNICEF and WHO have developed a range of guidelines on HIV and infant feeding. They have urged policy makers and all role players to strengthen their support for the implementation of these guidelines.⁴⁵ Governments urgently need to include the latest strategies for HIV positive mothers and infant feeding into national policies and support women in providing the best nourishment for their children.^{3,44}

Furthermore, the World Breastfeeding week in August of each year, seeks to create awareness of the importance of breastfeeding and supports the international community's concern for the needs of the breastfeeding mother and baby.^{46,47}

One of the latest global attempts to try and renew efforts towards improving maternal and child health is the Millennium Development Goals (MDG's). There are eight goals of which 3 are directly related to health, and one is specifically dedicated to child health, namely: Goal 4: Reduce child mortality (Target: Reduce by two thirds between 1990 and 2015 the under five mortality rate).⁴⁸ Exclusive and extended breastfeeding have a significant role to play in meeting this goal.

1.1.5 Strategies in South Africa to promote, protect and support breastfeeding

In an attempt to reverse declining breastfeeding rates in SA, National Breastfeeding Guidelines for Health Workers were published in 2000,⁴⁹ promoting the WHA Resolution for exclusive and extended breastfeeding. Since then, the promotion, protection and support of breastfeeding has also been prioritised in the Department of Health's (DOH) comprehensive national nutrition strategy for combating malnutrition, namely the Integrated Nutrition Programme (INP).⁵⁰

Two of the eight INP Key Performance Areas (KPA's), "Maternal Nutrition" and "Infant and Young Child feeding" include strategies to promote, protect and support breastfeeding.

SA has 203 Baby Friendly facilities to date and is gaining momentum with attempts to improve breastfeeding rates through the implementation of the BFHI.⁵¹ Proposed legislation of the SA Code of Marketing of Breastmilk Substitutes is in draft format and it is envisaged that legislating the SA Code together with other strategies to promote, protect and support breastfeeding, will contribute to improved breastfeeding

rates, and ultimately improved infant and child health in SA. Lessons learnt from other countries indicate that this can be achieved.⁵²

The World Breastfeeding week is also celebrated in SA as a national and provincial breastfeeding education and promotion strategy.^{46,47}

According to the Labour law, maternity leave in the formal sector in SA allows four months leave. But, legislation on the working conditions and maternity leave benefits for mothers in both the formal and informal sectors,^{53,54} however, still remains grossly inadequate to meet the needs of breastfeeding mothers and will urgently need to be revisited.

The SA government implemented the HIV/AIDS Sexually Transmitted Infections (STI) Strategic Plan in 2000 in response to the HIV pandemic. The intention of this plan was to offer guidance to the provinces, municipalities and districts in their operational plans. Currently, prevention of mother to child transmission (PMTCT) forms part of the government's Comprehensive Treatment Plan of Action for HIV/AIDS, which includes anti-retroviral therapy. According to UNICEF this plan includes appropriate and well-conceived objectives, but has unfortunately created some controversy concerning support for optimal infant feeding in SA.²⁸

SA has however been active in the process of developing appropriate messages in feeding options for infants of HIV positive mothers through the "Integrated Management of Childhood Illnesses" (IMCI) initiative⁵⁵ of the Mother, Child and Women's Health (MCWH) cluster of DOH as well as the active engagement by the Directorate Nutrition of DOH in the development of guidelines for infant and young child feeding.⁵⁶ The newly developed South African Paediatric Food Based Dietary Guidelines also address these important nutrition messages.⁵⁷

Although some progress has been made in SA in policy development, the implementation of some of these policies and guidelines remain problematic. Health care workers (HCWs) are the crucial link between practice and policy and of particular concern is the poor quality of counseling provided to mothers in the PMTCT programme in SA. In a study done in Mpumalanga it was found that most mothers made their decision regarding infant feeding choices based on the information that the HCWs provided. Since the attitudes, personal preferences,

knowledge and resources available to HCWs impacted on the decision made by mothers, particular attention should be paid to appropriate training of these HCWs.⁵⁸

1.1.6 Impact of health workers on mother's decision to breastfeed

Many research studies have recognized that mothers, HCWs and other caregivers require active and ongoing support for establishing and sustaining appropriate breastfeeding practices.^{18,33} Although breastfeeding is a natural act, it is also a learned behaviour.³³ Therefore mothers need practical advice and psychological support to breastfeed successfully.¹⁸

HCWs are in a key position, both in maternity wards and in health facilities to help a mother to decide to breastfeed and to teach her the necessary skills to master the technique, especially with initiating breastfeeding and assisting with early problems.^{18,59}

HCWs should give consistent, up-to-date advice, should be kind and sympathetic and should reassure the mother of her abilities to breastfeed her baby. HCWs who fail to provide this kind of support make failure of the breastfeeding relationship more likely. HCWs who do provide the necessary support can contribute hugely in making breastfeeding successful. It has been shown that breastfeeding counseling delivered by trained health professionals as well as community health workers (CHWs) is an effective intervention to improve EBF rates.^{59,60}

Infant and young child feeding is a neglected area in the basic training of health professionals worldwide.⁶¹ Yet, HCWs who care for infants, daily face the challenge of communicating such complex health care information to parents.⁶² For these reasons, ongoing breastfeeding training is of the essence.⁵⁹

Dietetic students receive lectures on IYCF at most of the tertiary training/education institutions that offer the degree in SA, starting from the second year of study in the subject "Nutrition in the life cycle". At Stellenbosch University (SU), the content in this subject is mainly based on WHO information. This basis of knowledge is further expanded on during the third year in the subject "Community Nutrition" with focus on promotion, protection and support of breastfeeding, including BFHI and the Code of Marketing of Breastmilk Substitutes. During the fourth year Community Nutrition

internship, the knowledge base is sharpened and emphasis is placed on practical skills in supporting the mother and baby in the breastfeeding relationship.⁶³ Lecturers responsible for these subjects are all trained in the UNICEF/WHO 80 hour Trainer of Trainers (TOT) in lactation management. The time spent on breastfeeding training over the three years amounts to approximately 55 hours, which earns the SU students a nationally recognized 18-hour Lactation management certificate, signed by the National Directorate and Provincial Sub-Directorate: Nutrition at the end of their fourth year.

Although breastfeeding training is thus not neglected in the SU BSc Dietetics curriculum, there is always room for improvement in enhancing the learning experience.

1.1.7 Breastfeeding training courses and materials

The need for breastfeeding training and training programmes are clearly summarized by the following statement from the WHO “Child and Adolescent Health Progress report 2000/2001”: that “the introduction of training courses and materials on infant and young child feeding practices into the curricula of pre-service training institutions holds the promise of high sustainability and coverage of health workers”.⁴⁴

A range of breastfeeding courses, manuals and materials have been developed and are widely available, also on the internet.^{39,64,65}

WHO and UNICEF developed the “40-hour Breastfeeding Counseling: A training course” to train HCWs that can provide skilled support to breastfeeding mothers and help them overcome problems. Basic breastfeeding support skills are also part of the 11-day IMCI training course for HCWs.

In 1993 the original 18-hour WHO course was developed in support of the BFHI. This course assisted many health facilities to move towards Baby Friendly status. With new information on the critical importance of breastfeeding and the practices to support it as well as the challenges brought about by the HIV pandemic, the course has been updated and materials have been revised. The course was extended by two hours and includes at least three hours of clinical practice.⁶⁴

These WHO/UNICEF materials are also used by the SA DOH in efforts to promote, protect and support breastfeeding.

“An 8 hour Training Programme for Health workers”,⁵⁹ a breastfeeding education programme developed by the Cape Town Breastfeeding Liaison Group, has been extensively used in the Western Cape by the Nutrition and MCWH Sub-Directorates of the Provincial DOH in the training of HCWs and CHWs in IYCF as well as staff in health facilities striving to become Baby Friendly. This programme consists of comprehensive sets of notes for the facilitator, handouts for participants and visuals in the form of transparencies.

Wellstart Publications provides a wealth of breastfeeding materials on their website ranging from manuals, guides and tools to policy and technical documents and research and program reports.⁶⁵

Dornan and Oerman (2006) conducted a study to evaluate the quality of 30 websites on breastfeeding for patient education on the top three search engines, namely Google, Yahoo and MSN.⁶⁶ The websites were evaluated based on the Health Technology Institute (HITI) criteria,⁶⁷ (Table 1.3) readability and content criteria of the policy statement on breastfeeding from the American Academy of Paediatrics (AAP). The top five breastfeeding sites were selected. All five websites contained all eight of the AAP content criteria and met all the HITI criteria. The five quality sites on breastfeeding were listed as follows:

- La Leche League International (www.lalecheleague.org)
- ProMoM, Inc (www.promom.org)
- Breastfeeding Basics (www.breastfeedingbasics.com)
- American Academy of Paediatrics
(www.aap.org/healthtopics/breastfeeding.cfm)
- Medline Plus (www.nlm.nih.gov/medlineplus/breastfeeding.html)

Table 1.3: Set of seven criteria for assessing the quality of health information on the Internet (HITI)⁶⁷

Credibility	Includes the source, currency, relevance/utility, and editorial review process for the information
Content	Must be accurate and complete, and an appropriate disclaimer provided
Disclosure	Includes informing the user of the purpose of the site, as well as any profiling or collection of information associated with using the site
Links	Evaluate according to selection, architecture, content, and back linkages
Design	Encompasses accessibility, logical organization (navigability), and internal search capability
Interactivity	Includes feedback mechanisms and means for exchange of information among users
Caveats	Clarification of whether site function is to market products and services or is a primary information content provider

Shaikh and Scott (2005) undertook a study to identify those websites on breastfeeding most likely to be accessed by consumers.⁶⁸ They were evaluated for extent, accuracy, credibility, currentness, presentation, ease of use and adherence to ethical and internet medical publishing standards. The following tools were used in the evaluation:

- Smith's Shore sheet for "Evaluating Breastfeeding Education Material"
- Compliance with the WHO "Code of Marketing of Breastmilk Substitutes"
- AAP policy statement: Breastfeeding and the use of human milk and the publication: Breastfeeding: A guide for the medical professional
- Health on the net Code of Conduct (HONcode) for medical and health websites (established in 1996 by the Geneva-based Health on the Net Foundation)

Dornan and Oerman and *Shaikh and Scott* used different tools in their evaluation of breastfeeding website information. However, the top five breastfeeding websites of Dornan and Oerman also appeared under the top 20 out of 40 websites evaluated by Shaikh and Scott.

The investigator conducted a search for breastfeeding training programmes and materials on the top five breastfeeding sites, as described by Dornan and Oerman.

It was found that La Leche League International (LLLI) offer peer counselors programmes.⁶⁹ These programmes are not available on-line, but are conducted by trained peer counselors and were started in SA in 1992. In the beginning, in Cape Town, the LLLI Peer Counselor Curriculum was used with some changes to reflect local conditions and culture. In 1996, the Wellstart Programme (Training Curriculum for Community-Based Breastfeeding Support) was adapted and found to work well in practice, since the teaching methods used seemed more suited to the training of Xhosa-speaking CHWs. It is described as an interactive programme, drawing strongly on the knowledge of the CHWs regarding child health problems experienced in the specific communities and this is then linked to breastfeeding. This adopted and adapted programme has now also been used successfully in different cultural groups.⁶⁹

Handouts of this programme are kept to a minimum because of costs, language, and literacy concerns. All participants receive a copy of Felicity Savage King's book, "Helping Mothers to Breastfeed". Trainers refer to this often to help the participants become familiar with it and to suggest ways of using the diagrams when talking to mothers. Efforts are made to make presentations as visual as possible, by using various models, slides and videos.⁶⁹

The other sites that were listed under the top five breastfeeding sites did not mention breastfeeding courses specifically, but offer a wealth of breastfeeding information, mainly in the form of typed information on screen.

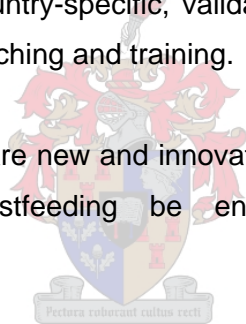
There is no doubt that the courses, guidelines and manuals elaborated on above, have contributed successfully in the huge task of the training of many HCWs in breastfeeding and the subsequent increase in national and international breastfeeding rates. However, although these courses, materials and manuals are widely available, they rely heavily on the time and availability of trained peer counselors and/or HCWs and voluntary and/or CHWs, either to act as trainers or students of these courses.

The crisis in staff shortages of HCWs in South Africa⁷⁰ poses a potential threat to interventions that rely on the time and availability of this workers corps. The costs of handouts and/or time spent on the internet are also of concern. These could be seen as limitations of these courses and materials.

Furthermore, despite the availability of materials, academics in low-income countries, training future nutrition professionals, need new approaches to enable them to translate the scientific knowledge that is available today, into practical, locally feasible and sustainable nutrition actions.⁷¹

Some of the “Key elements of successful large scale behaviour change programmes”, as described in the WHO “Child and Adolescent Health Progress report 2000/2001”, namely that the development of interventions for the promotion of improved IYCF should include: 1) Attention to policy analysis, reform and advocacy and 2) Local adaptation of guidelines and approaches using formative research⁴⁴, further support the need for country-specific, validated programmes and innovative approaches to breastfeeding teaching and training.

The question now arises: what are new and innovative approaches and how can the learning experience in breastfeeding be enhanced for HCWs, including undergraduate dietetic students?



1.1.8 New students, new learning styles?

The dawn of the new millennium has been accompanied by a whole host of changes in health care, education and technology. Change in each of these areas has led to changes in education; also higher education, including dietetics training.⁷² These changes present us with challenges in terms of the needs of students, not only in the type of skills that are required in the work environment, but also with the innovative use of technology to support learning.⁷³

In the past, the traditional learning process was one where “the one who knows” (the teacher) presented ideas to “the one who does not know” (the student). The traditional lecture system covered material through teaching by telling⁷⁴, also referred to as “face-to-face” or “chalk and talk” teaching.⁷⁵ This approach, however, may work

or have worked well for many teachers, but it could be questioned if it fits the preferred learning style of today's students.⁷⁴

At SU the vision for the field of teaching is formulated as follows:

*“A university characterized by quality teaching, by the constant renewal of teaching and learning programmes, and by the creation of effective opportunities for learning/study”.*⁷³

One of the building blocks in realising this vision is the commitment by the SU to move towards a student-centered learning and teaching environment, where the “transferring knowledge” approach is replaced by “teaching activities that facilitate learning” and the focus is on the nature, quantity and quality of learning that takes place.⁷³

In this policy listed under “Points of departure with regard to learning and teaching at SU” it is stated that: “the policy assumes that e-learning* constitutes an integral part of the learning provision of all programmes, not only in terms of providing information and interactive learning opportunities, but also familiarizing students with all aspects of the knowledge society”.⁷³ This point is underpinned by the specific value statements regarding the e-Campus,⁷⁶ including all information and communication technologies at SU that promotes the following:

- A mixed model
- An integrated incorporation of technology in the learning and teaching activities of the SU
- A student-centered approach
- An instrumental or process approach rather than a deterministic approach to the use of technology

SU thus places a high premium on quality teaching and envisages e-learning to form an integral part of the strategies in realising its vision for teaching.

According to Wise, the increase in pressure of teaching at tertiary training/education institutions has also led to a need to consider new methods to support the learning

* Electronic learning – general term used for computer enhanced learning; the process of learning online, especially via the internet or e-mail.
<http://wikipedia.org/wiki/E-learning>, <http://dictionary.reference.com/browse/e-learning>

experience for students.⁷⁷ Edwards has remarked that, if the differences among students and how learning styles relate to the use of technology is taken into account, it might influence the choice of technology and how a course is designed.⁷⁸ Learning theories further indicate that students are more likely to achieve learning outcomes if they react positively to the learning event and/or materials.⁷⁹

The Myer-Briggs Type Indicator (MBTI) is a personality questionnaire designed to identify certain psychological differences. MBTI scores indicate a person's preference on each of the following four dimensions, namely: extraversion/introversion, sensing/intuition, thinking/feeling and judging/perceiving.⁸⁰ The MBTI tool can also indicate how individuals differ in their learning processes. The first two dimensions help in understanding learning styles. Extroversion versus Introversion (E vs. I) indicates whether a person is more interested in the external world of people and things or in concepts and ideas. Sensing versus Intuition (S vs. N) shows whether a person prefers perceiving the world through concrete reality or through impressions and thinking about possibilities.⁷⁴

These preferences can also be combined to form the following learning patterns:

ES: concrete active

IS: concrete reflective

EN: abstract active

IN: abstract reflective



These patterns are not evenly distributed in the general population. The ES pattern is the most frequent with about 50% of high school learners presenting with this pattern. These so-called concrete active learners (ES pattern or sensing learners) are described as being “action-oriented realists”, the most practical of the four patterns who prefer concrete, practical and immediate learning experiences.⁷⁴

Staff in the Department of Student Life Studies at Saint Louis University, USA, under the direction of Dave Kalsbeek, initiated an 8-year longitudinal study called TRAILS (Tracking retention and academic integration by learning styles). The TRAILS project discovered that the concrete active (ES) pattern was the dominant pattern in schools of business, nursing and allied health.⁷⁴

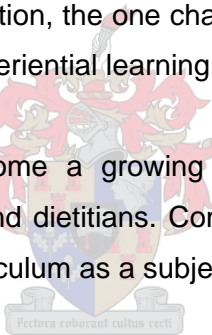
Hagan and Taylor reported that in a sample of 84 American dietetics final year students given the MBTI test, more than half (n=45) were characterised as having the sensing/judging temperament.⁸¹

The dietetic course is designed to aid the transfer of knowledge to practice. Theory is complimented with hands-on practical exposure and life-long learning is encouraged.⁷² This kind of experiential learning is often extremely effective for sensing learners or students who prefer the ES pattern⁷⁴ and is widely used, especially in the medical, nursing and allied health fields.⁸²

Experiential learning might therefore particularly appeal to the average dietetic student. Examples of such learning include: small group discussions and projects, class presentations and debates, peer evaluation, service learning, field experiences, simulations and case studies.⁷⁴

In order to improve dietetics education, the one challenge could thus be to find which learning systems can advance experiential learning.

The use of computers has become a growing influence on the workplace for everyone, including nutritionists and dietitians. Computer skills have therefore been incorporated into the dietetics curriculum as a subject,⁷⁷ abroad and also in SA.⁶³



Most computer applications in the field of nutrition in the past have however been used for nutrient analysis and it has not been used primarily as a teaching tool.⁸³ Since integrated learning systems appear to offer great superiority in the area of retention of information learnt, compared to more conventional one-dimensional approaches,⁸⁴ it might be worth exploring this technology as a tool for enhancing learning in the dietetics curriculum.

Breastfeeding could be an ideal topic as a starting point in this process, since it lends itself to a variety of teaching methods to ensure the effective transfer of knowledge on breastfeeding, understanding and insight in factors that impact on the breastfeeding relationship as well as very important practical skills needed to ensure a successful breastfeeding relationship.

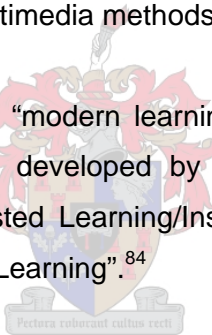
The Iowa State University developed a distance education technology programme for their dietetic internship. They found that when given the opportunity, dietetic students will use online teaching. Students could appreciate the role of computer technology in the field of dietetics, but their comfort level with the technology could be further improved. It is believed that these comfort levels could be improved through online teaching during the dietetic internship.⁷²

The use of web-based or computer-based learning as a tool during practical exposure could also encourage student centered and lifelong learning,⁸² aspects that are specifically encouraged in the SU Learning and Teaching policy.⁷³

1.1.9 Computer-based learning

Computer-based learning (CBL) can be described as the use of computers as a key component of the educational environment for teaching purposes. It can also be integrated effectively as part of multimedia methods of teaching.⁸⁵

The development of the so-called “modern learning devices” started in the 1950’s when “Teaching machines” were developed by B.F. Skinner. The 1970’s were characterized by “Computer Assisted Learning/Instruction” (CAL/I) and the 1990’s introduced “Multimedia Interactive Learning”.⁸⁴



Computers entered schools and universities in the ‘70’s. Barker remarked in 1987 that “in terms of educational effectiveness, it is commonly accepted that those systems in which several media are used are often far more effective than the use of a single medium of teaching”. As previously stated, it has been shown that integrated learning systems, rather than the more conventional one-dimensional system, are more effective in the retention of information learnt.⁸⁴

Since information technology (IT) has become an integral part of the modern world it could be argued that students need more exposure to it, in order to increase their comfort level with this technology. This could lead to a greater acceptance of this potentially valuable educational tool.⁷⁹

Features of the internet that are useful in teaching include:⁸⁶

- E-mail that is used to answer specific questions for individual students or to communicate with groups of students
- Discussion threads or boards that allow communication on topics to continue over time and remain available to the students
- Quizzes that allow the students to grade themselves and give immediate feedback
- Questionnaires that are administered and the responses are immediately recorded in a database
- Course content with graphics, narration and video
- Synchronous communication that is accomplished through chat rooms or conferencing software

With all these available techniques the instructor is challenged to select the combination of features that will best meet the course goals and objectives.⁸⁶

1.1.10 Effectiveness of Computer-based learning

CBL has been a subject of scrutiny and debate since its inception with arguments both in support of and in opposition to its use. Among the arguments used by the supporters of CBL is its ability to provide quantifiable and instant feedback to its users. It provides educators with the opportunity to measure progress in a more structured environment than the typical classroom. It also limits stress,⁸⁵ creates a flexible learning environment where students can work at their own pace, repeat sections and can work in their own time.^{79,86} It further brings variety and interactivity to the learning process,⁷⁹ and adds new ways of demonstrating knowledge and competencies.⁸⁶

CBL is seen as an efficient and effective way of education, since it allows students to study at their own pace, either via the internet or software installed on individual computers at various sites.⁸⁵

The skeptics have often argued that CBL can only teach as far as its programmatic limitations.⁸⁵ Some students experience a lack of tutor support with CBL, particularly the inability to ask direct questions.⁷⁹ They feel that it is not as good as having a

human teacher because it can only answer questions for which it has been pre-programmed.⁸⁵ It has been reported that students experience problems with concentration, there is a need for self discipline to ensure good time management and they experience isolation from peers with this method of teaching. CBL also requires a student to have a degree of computer literacy.⁷⁹ In a study that was done to evaluate the use of IT in teaching nutrition, it was found that some students remained less confident after the intervention. It was concluded that IT should be offered as an aid to those students who find it useful, but that a course would fail to support some students if it relied too much on computers for teaching material.⁷⁷

Some advocates of CBL suggest that the best use of CBL is alongside a more traditional curriculum, playing a supplementary role, facilitating interest in a topic while developing technical and informational skills. Many “teaching effectiveness” surveys report that multimedia methods result in the best retention of knowledge.⁸⁵ (Table 1.4)

According to the literature most learners are keen on engaging with CBL and are satisfied with the medium of teaching, although not more satisfied compared to ratings of traditional methods. There is no evidence that students learn more from computer programmes than from traditional methods either.⁸⁷

Table 1.4: Different sources of information and the level of retention of information⁸⁵

Source	Percentage retention
Textbooks	30%
Lectures	40%
Multimedia methods	80-90%

CBL has been described as a valuable addition to our educational armory, but it should not replace traditional methods such as text books, lectures, small-group discussions or problem based learning⁸⁷ or become the sole source of instruction.⁷⁵ If used appropriately, it can enhance interaction between students and lecturers, group learning, and sharing of resources and experiences, which will ultimately lead to greater comprehension of subject material.⁷²

CBL clearly has its pro's and con's and it seems that it best used as part of multimedia methods of teaching. A recent systematic review of the literature on "Effective e-learning for health professionals and students – barriers and their solutions"⁸⁸ identified the following issues that caused concern for managers, lecturers and students related to e-learning:

- Organisational issues. Undertaking e-learning requires change and change management was found to be poor, including organisational apathy and staff resistance. Adopting, developing and evaluating e-learning programmes were time consuming for trainers and students struggled to time manage e-learning tasks.
- Economics. E-learning was found to have a wide range of associated costs, including hardware costs: start up costs, sufficient equipment, and keeping this equipment up to date, as well as software costs: particularly licenses, programme development, cost of training and development of educators. Students were concerned about the cost of courses and associated requirements, including computers, internet access and printing.
- Hardware and software issues of concern were similar, in the sense that it might be insufficient for the task (inappropriate, not used to its full potential or technically problematic), transportability and compatibility might cause problems and costs were of concern.
- Support. A lack of technical and administrative support to staff and students were of concern.
- Pedagogical issues. E-learning packages might be of poor quality and inappropriate or insufficient for the task. Lecturers could be reluctant to adopt new systems that disrupt established practices and could be skeptical of their benefits. Lecturers experienced the lack of interactivity and personal contact as problematic, and were concerned about intellectual property rights, copyright and plagiarism. Students could lack motivation to undertake studies and would need to change their learning styles. They might experience lack of

interactivity as a problem and might prefer personal contact. E-learning could be time consuming and posed a significant risk of information overload.

- Psychological issues. Lecturers and students experienced similar concerns, including: resistance to change, motivation, technophobia, computer anxiety, lack of IT confidence, dissatisfaction at losing the benefits and enjoyment of personal contact.
- Skills. A lack of appropriate skills, the need for training, time constraints related to training and a lack of interest in learning new skills were identified as causes for concern.

The review concluded that both lecturers and students felt that e-learning was effective and it improved education and training. The key benefit of e-learning was found to be the flexibility it provides. The systematic literature review revealed that for e-learning to be successfully delivered in the health context, the issues listed above should be addressed and solutions should be put in place.⁸⁸

Interestingly, similar issues as in the above systematic review of the literature were raised in the document “A quantum leap towards an e-campus at the University of Stellenbosch, 2002”.⁷⁶ It was stated that success in at least the following 16 listed performance areas is essential for enabling developments in information and communication technology at SU:

- Overall management
- Infrastructure
- Support
- Information skills training
- E-learning environment
- Producing learning and teaching material(s)
- Electronic information
- Communication
- Evaluation and quality assurance
- Administration
- Funding
- Security

- Co-operation and consortia
- E-research
- Web-portals
- An electronically accessible administration system

It has thus been established that, although CBL is considered an effective teaching method, there are certain performance areas of concern in CBL that needs to be addressed by the relevant and responsible structures within the teaching facility in order to ensure effective e-learning for health professionals and students.

1.2 Statement of the Problem

Breastfeeding is the only teleological correct option to be recommended for infant feeding. However, despite the benefits of EBF for the baby, mother, family and the community and all the programmes, treaties, and policies that have been developed over time to protect, promote and support breastfeeding, the prevalence of EBF on a global scale is low.

It is clear from the literature that there is a great need for ongoing breastfeeding training for students of health care professions and HCWs in order to address this situation. Many breastfeeding courses, materials and manuals are available, but there is a need for new approaches to ensure greater and more effective coverage of these groups. Most of the available courses rely heavily on the availability of trained peer counselors and/or HCWs. The availability of these groups is often hampered in SA due to staff shortages in the health care sector.

In order to optimize any learning experience, it is imperative to know which methods and mediums enhance learning. It has been shown that the students of today relate well to the use of computers in the learning environment. It was therefore deemed appropriate to explore this training method as a means to enhance the breastfeeding learning experience for students of health care professions, and more specifically for undergraduate dietetic students.

According to available literature, CBL can be integrated effectively as part of multimedia methods of teaching and has the potential to enhance learning. It creates a flexible learning environment in which students can work at their own pace, revise

sections and can work in their own time. It further brings variety and interactivity to the learning process, and creates new opportunities to increase knowledge and competencies. However, there should be caution raised regarding the indiscriminate use of this teaching method, since students might miss the presence of a human teacher and their peers and some students struggle with concentration, time management and self discipline. CBL also requires a degree of computer literacy and support in different forms is needed to create an effective e-learning environment at teaching facilities.

1.3 Motivation of the Study

This project, “Computer-based learning for the enhancement of breastfeeding training for South African undergraduate dietetic students”, formed part of the Indo-SA intergovernmental Science and Technology co-operation programme and focused on collaboration on web-based undergraduate Nutrition training modules.

Prof Tejinder Singh developed a computer-based breastfeeding training module for undergraduate students of health professions in India in the form of a PowerPoint presentation with animation and interaction on a CD-ROM. A recent independent peer review of this CD-ROM concluded that the programme “will be most helpful for students of the health professions, including nursing, midwifery, medicine and medical support services”. It was viewed as “an accurate, clear and welcome addition to the menu of options for learning how to provide effective encouragement and support for the nursing couple.”⁸⁹

This study aimed to adapt and validate an Indian computer-based undergraduate breastfeeding training module intended for use by SA undergraduate dietetic students in order to assess whether computer-based learning in breastfeeding training could address the relevancy of the topic, assess how students view the learning experience and determine whether it could contribute to a gain in knowledge on the subject.

The process of adaptation and validation followed some of the “Key elements of successful large scale behaviour change programmes”, as described in the WHO “Child and Adolescent Health Progress report 2000/2001”,⁴⁴ namely that the

development of interventions for the promotion of improved infant and young child feeding should include:

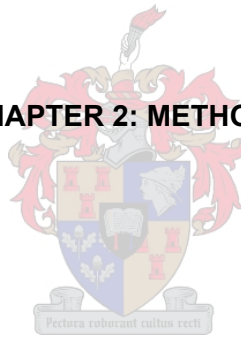
- Attention to policy analysis, reform and advocacy and
- Local adaptation of guidelines and approaches using formative research

This process might further prove to hold true to the following statement, also from the WHO “Child and Adolescent Health Progress report 2000/2001”: That “the introduction of training courses and materials on infant and young child feeding practices into the curricula of pre-service training institutions holds the promise of high sustainability and coverage of health workers.”⁴⁴

It is believed that computer-based breastfeeding training can help to increase the coverage of training in students of health care professions and HCWs and enhance the breastfeeding learning experience in the global and national strive to optimally promote, protect and support breastfeeding.



CHAPTER 2: METHODS



2.1 Aim and Objectives

Aim:

To adapt and validate an Indian computer-based undergraduate breastfeeding training module intended for use by SA undergraduate dietetic students.

Objectives:

1. To assess the relevancy of the information contained in the breastfeeding training module designed for Indian undergraduate students of health professions, for the SA situation and curriculum
2. To evaluate the face and content validity of the adapted breastfeeding training module
3. To evaluate the impact of the adapted breastfeeding training module on knowledge

2.2 Study Design

The study was a cross-sectional descriptive study.

2.3 Study Population

2.3.1 Peer reviewers

Peer reviewers (Appendix 1) were selected to evaluate face and content validity of the adapted breastfeeding training module based on their broad involvement with breastfeeding in SA, including:

- Employees of the National Directorate and Provincial Sub-Directorate Nutrition of DOH – selected for their extensive input in two of the KPAs of the INP programme, namely: “Maternal Nutrition” and “Infant and Young Child feeding” which includes strategies to promote, protect and support breastfeeding, also for their involvement in policy formulation in this area and BFHI as well as on-going training in breastfeeding on national and provincial level
- Colleagues from the Dietetics and Human Nutrition Departments at the three universities in the Western Cape as well as lecturers from the SU Obstetrics



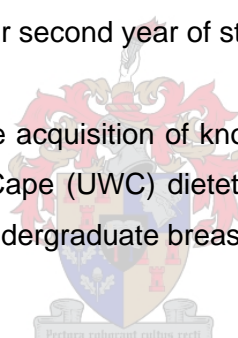
and Gynecology, Paediatric and Nursing Departments – selected for their experience in breastfeeding training at tertiary institutions

- Lecturers at the six universities outside the Western Cape that offer courses in Human Nutrition/Dietetics – selected for their experience in breastfeeding training at tertiary institutions outside of the Western Cape
- Non-governmental organisations involved in breastfeeding training as well as private practicing lactation consultants and breastfeeding counselors - selected for their expertise and experience in breastfeeding training and consultations at community and individual level
- Study leaders - selected for their experience in the use of the software programme, Virtual Training Studio (VTS)

2.3.2 Students

The study population for face and content validity included third year SU Dietetic students (class of 2006), since they had been exposed to undergraduate breastfeeding training during their second year of study (2005).

The study population to evaluate acquisition of knowledge included second year SU and University of the Western Cape (UWC) dietetic students (class of 2006), since they had not been exposed to undergraduate breastfeeding training before.



2.3.3 Sample Selection

Peer reviewers were selected for face and content validity by means of judgement sampling[†].

The undergraduate student sample for face and content validity included all third year SU dietetic students who gave informed consent.

The undergraduate student sample for acquisition of knowledge included all second year SU and UWC dietetic students who gave informed consent.

[†] A type of convenience/non-random sampling, where the investigator selects individuals based on his/her own judgement.

Katzenellenbogen JM *et al.* Epidemiology: A manual for South Africa. Oxford University Press Southern Africa 1997: 74-81 and 82-98)

2.3.4 Sample size

Thirty-six peer reviewers were invited to participate in the evaluation of the face and content validity of the adapted breastfeeding training module.

Twenty three third year SU dietetic students were invited to participate in the evaluation for face and content validity of the adapted breastfeeding training module.

Fourteen second-year SU dietetic students and 15 second-year UWC dietetic students were invited to participate in the evaluation of acquisition of knowledge for the adapted breastfeeding training module.

2.4 Data Collection

2.4.1 The Indian breastfeeding training module

A computer-based breastfeeding training module for Indian undergraduate health professional students, based on WHO guidelines and recommendations, had been developed in the form of a PowerPoint presentation, converted into a read only document and transferred to a CD-ROM.

The structure of the PowerPoint module included an explanation on the navigation of the programme. The content started with a problem-oriented approach (case history). It then listed the learning issues and learning objectives for the module. The body of the module was divided into 8 sections. The topic of each section was not stated specifically, but it was explained on the first slide of each section.

Optional advance levels of information were included for the interested student. Each chapter ended with a recapitulation and a formative test (true/false questions). Animation and interaction were incorporated. The Indian module was tested on 20 Indian computer literate undergraduate health professional students during the development process. Ten adaptations were made before it was in an acceptable format.

The final product took 45-60 minutes to complete and contained: 400 frames, 10 recapitulations and 30 formative test questions with revision for each wrong answer. It further contained text-based references, web-based references and provision for help and clarifications.

2.4.2 Adaptation of the Indian breastfeeding training module

The Indian computer-based breastfeeding training module was reviewed by the investigator regarding the relevancy of the content for the SA context and acceptability of the mode of administration. To assess the relevancy of the information contained in the module, the investigator compared the Indian computer-based undergraduate breastfeeding PowerPoint training module to the SA situation by paying specific attention to cultural, language as well as policy issues.

Since the Indian module was based on WHO guidelines and recommendations, the bulk of the content remained the same for the SA context. The investigator decided to split the first section of the Indian module (Case study and anatomy of the breast and the physiology of breastfeeding) into 2 sections and therefore the adapted module contained 9 sections. The nine sections were named according to the explanations given on the first slide of each section of the Indian module, namely:

Section 1: Case study and learning objectives

Section 2: Anatomy of the breast and the physiology of breastfeeding

Section 3: Physiology of breastfeeding (continued) and attachment

Section 4: Composition of breastmilk and the advantages of breastfeeding

Section 5: Role of breastmilk in protecting the baby from infections

Section 6: Taking a history and supporting the mother

Section 7: Ten steps to successful breastfeeding and expressed breastmilk

Section 8: Breastfeeding in special situations

Section 9: Breastfeeding problems and solutions

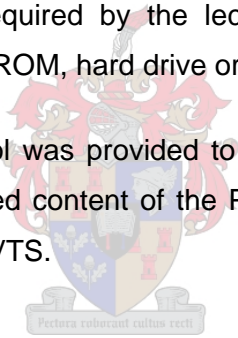
Cultural issues that were changed or incorporated included: removal of pictures of Indian women and inclusion of photographs taken specifically for the National Directorate Nutrition, DOH that represents the SA context, as visual material in the adapted module. These photographs were taken by UNICEF and permission for the use in this module was obtained from the National Directorate Nutrition, DOH. Photographs from Jack Newman's training CD-ROM, which contain no copyright restrictions, and free video material from the internet, were further utilized. The latter visual material, although not of SA origin, were judged to be culturally acceptable for the SA context. Examples of indigenous SA foods were further included. Vernacular adaptations were made to the text to represent SA English.

Policy issues that were reviewed were specifically related to the SA National Breastfeeding Guidelines for Health Workers⁴⁹ and IYCF in the context of HIV/AIDS and the PMTCT programme, to ensure that messages were consistent. The current curriculum for the second year SU BSc Dietetics course in the subject: “Nutrition in the life cycle” was consulted to compare the contents. The contents were found to be similar and therefore no further content adaptations were made.

It was decided to utilize a different mode of administration than PowerPoint as it was deemed that a software tool for web-based learning, the Virtual Training Studio (VTS) had been specifically designed for use in developing countries, therefore taking the unique situation and specific constraints of developing countries into account⁹⁰.

VTS is a software tool supported by a web-platform, which is a free software tool for web-based learning. Key features of VTS are that it enables the creation of professional-looking, low-bandwidth interactive teaching material without extensive work or technical knowledge required by the lecturer. It enables material to be presented via the internet or CD-ROM, hard drive or Local Area Network (LAN)⁹¹.

Training in the VTS software tool was provided to the investigator, where after the investigator formatted the adapted content of the PowerPoint programme into web-based interactive material using VTS.



2.4.3 The South African VTS breastfeeding training module

The first window (Figure 2.1) of the South African VTS breastfeeding training module (hereafter referred to as the adapted module) opened on an introduction page, indicating the authors and target audience. On the next window, reviewers were able to select their own starting point within the adapted module (Figure 2.2).

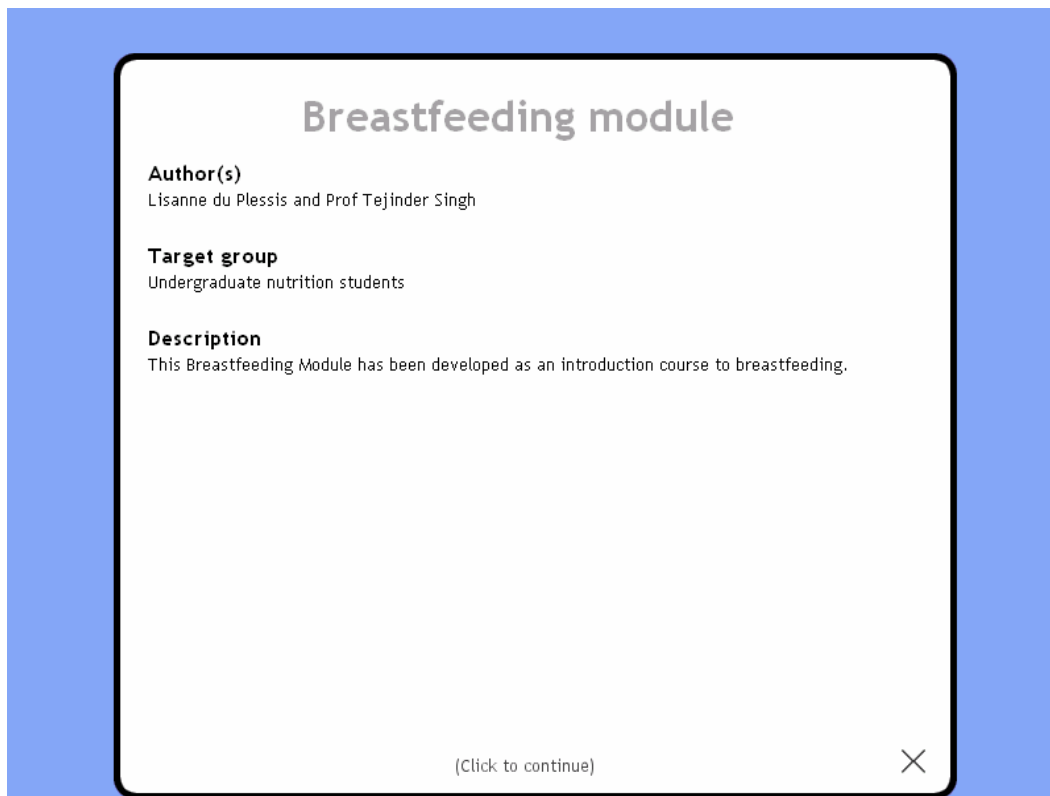


Figure 2.1: The introductory window of the SA VTS breastfeeding training module

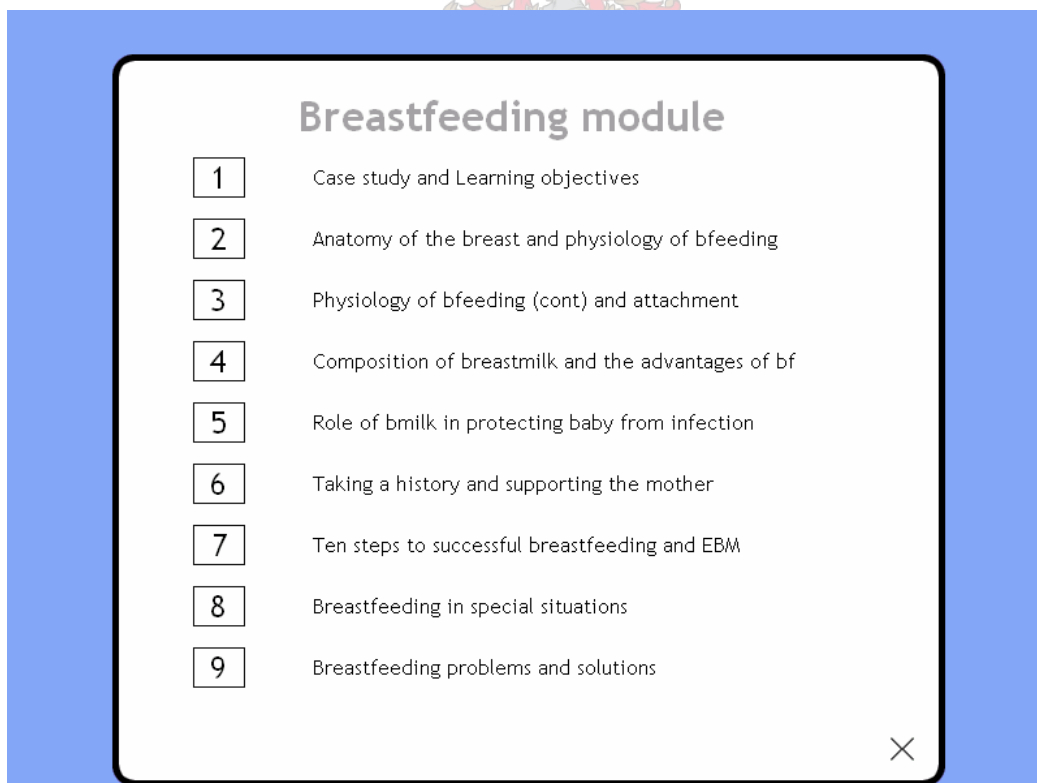


Figure 2.2: Window providing selection options of starting points of the different sections contained in the SA VTS breastfeeding training module

The VTS module also started with a problem-oriented approach (case study) as the Indian module had, but was adapted to the SA context in terms of names and places. (Figure 2.3) It then listed the learning issues and learning objectives for the module.

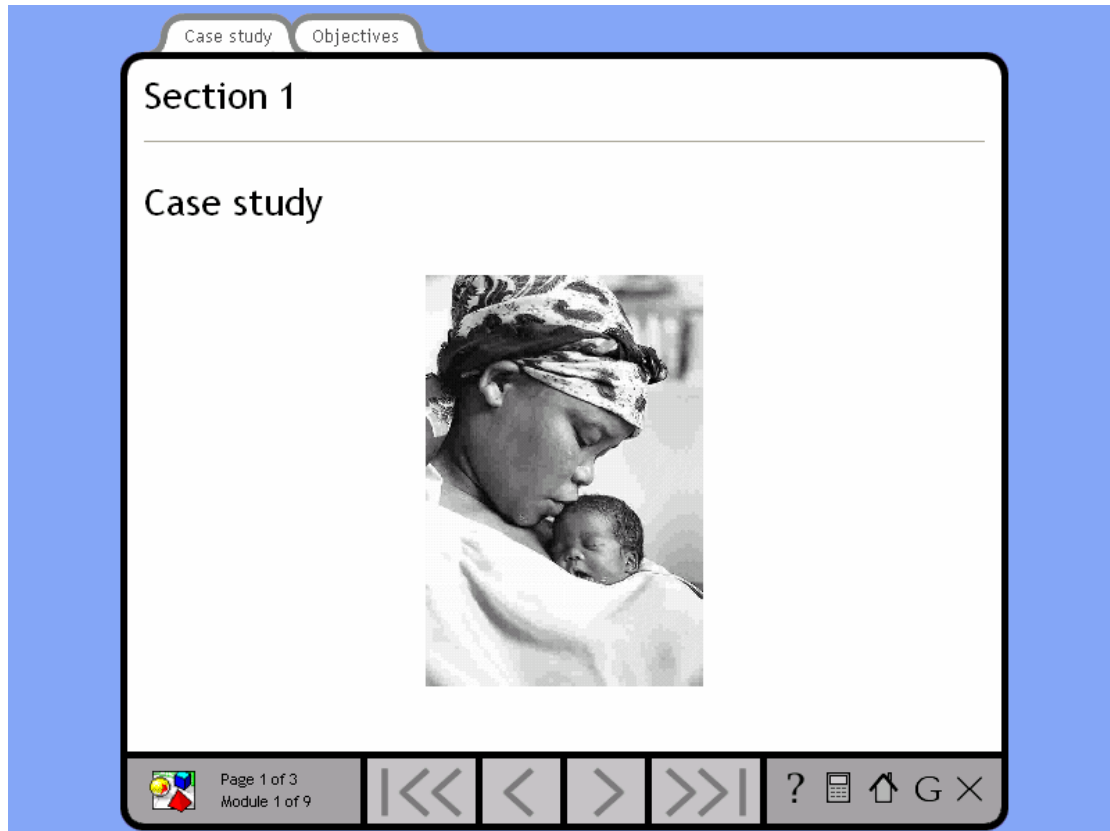


Figure 2.3: Window depicting the case study and learning objectives of the SA VTS breastfeeding training module

Figure 2.4 indicates the guiding and interactivity tools available in VTS, namely “Coloured clickable text” and “Navigation buttons” that are inherent in the programme. All these tools were included in the adapted module.

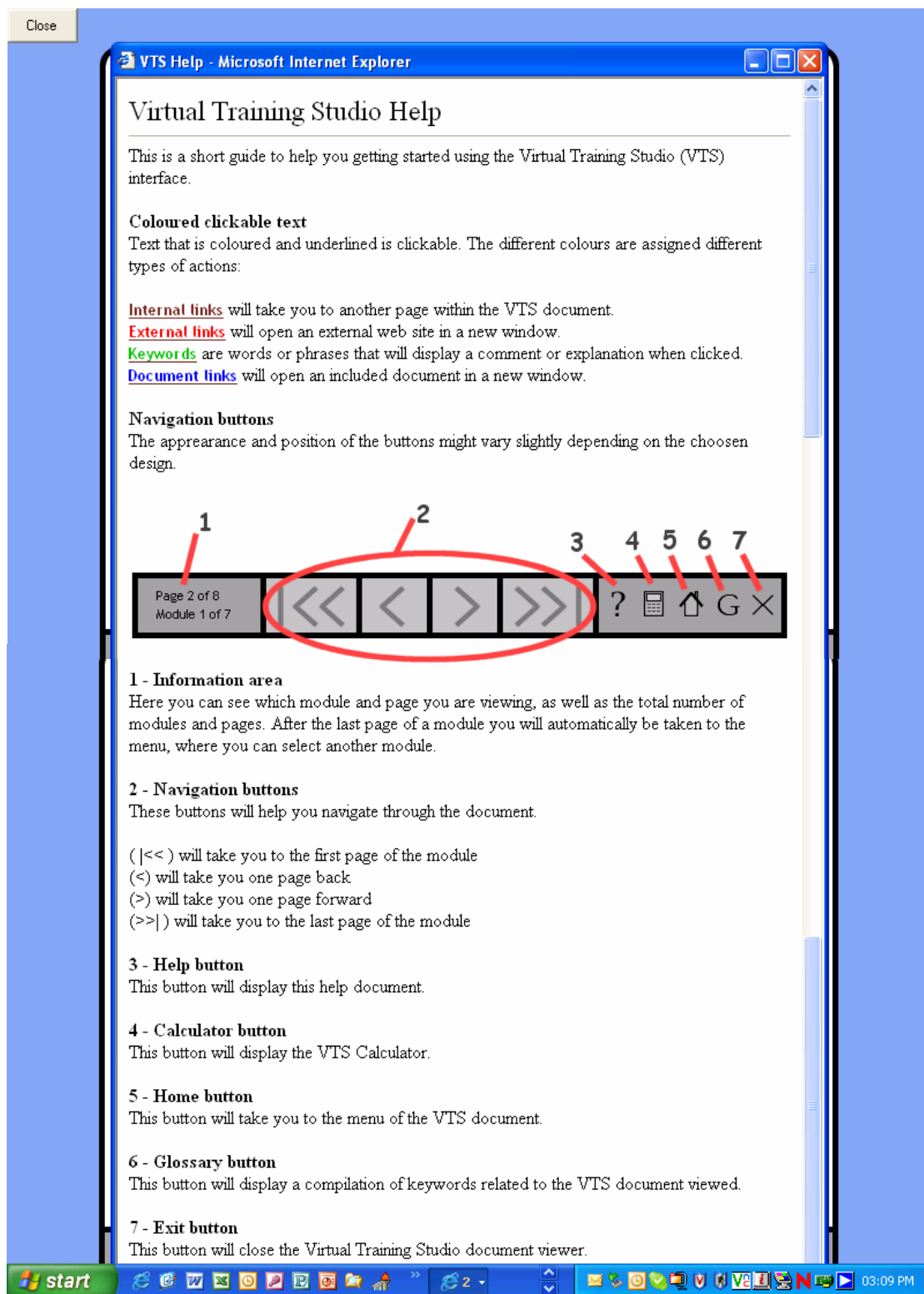


Figure 2.4: “Help” window indicating guiding and interactivity tools available in VTS

Each section opened on a window containing the name of the section with a photograph as well as tabs at the top of the page indicating the different topics that were included in the section (Figure 2.5). Students were thereafter able to go directly to that topic by clicking on the tab on the top of the screen or use the navigational arrows at the bottom of the screen to work through the material consecutively. Revision was therefore possible at any time.

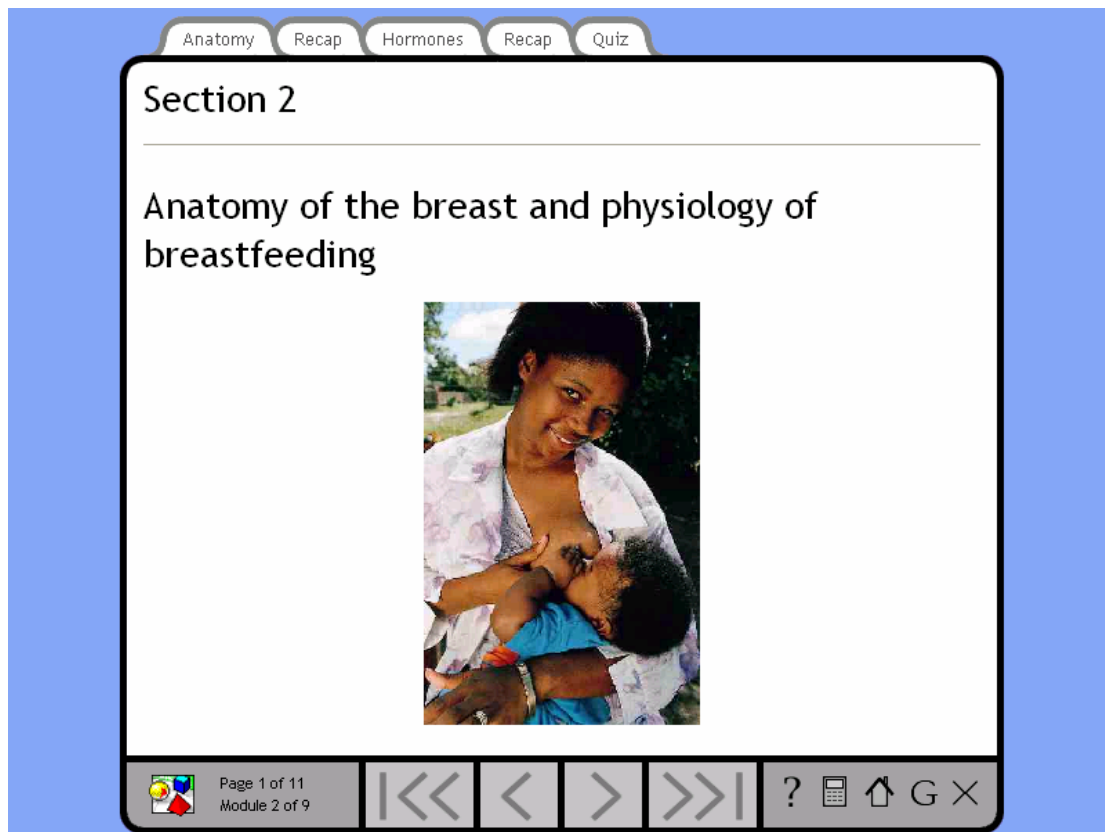


Figure 2.5: Example of an opening window of a section of the SA VTS breastfeeding training module

Each topic ended with a recapitulation (Figure 2.6) and each section with a formative test (quiz) with true/false questions, similar to the Indian module (Figure 2.7).

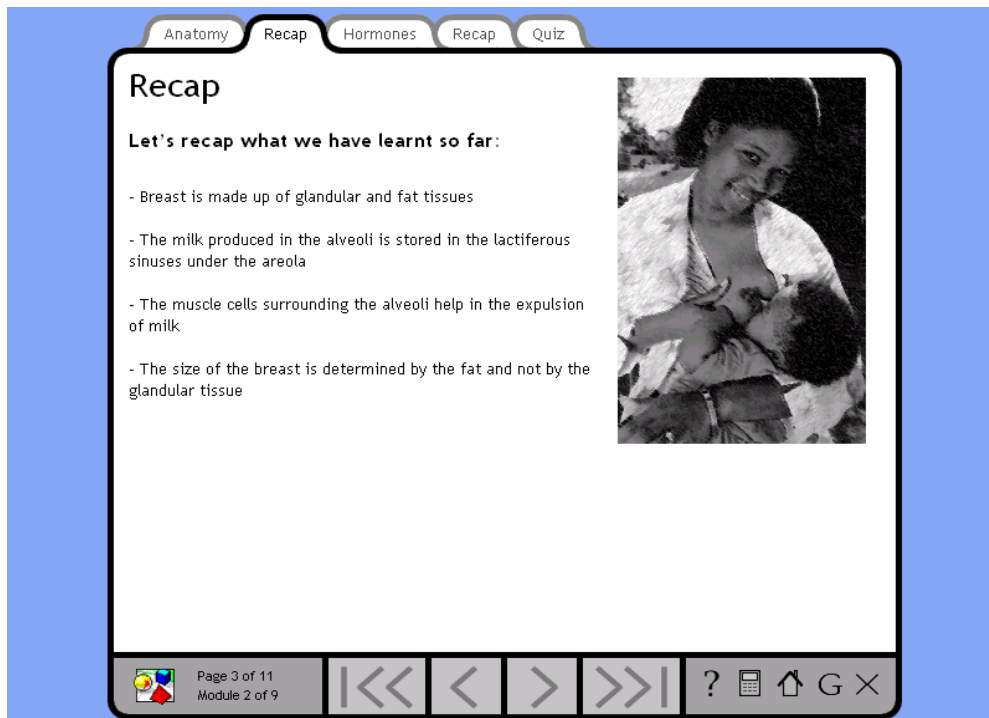


Figure 2.6: Example of a recapitulation section following a specific topic within the SA VTS breastfeeding training module

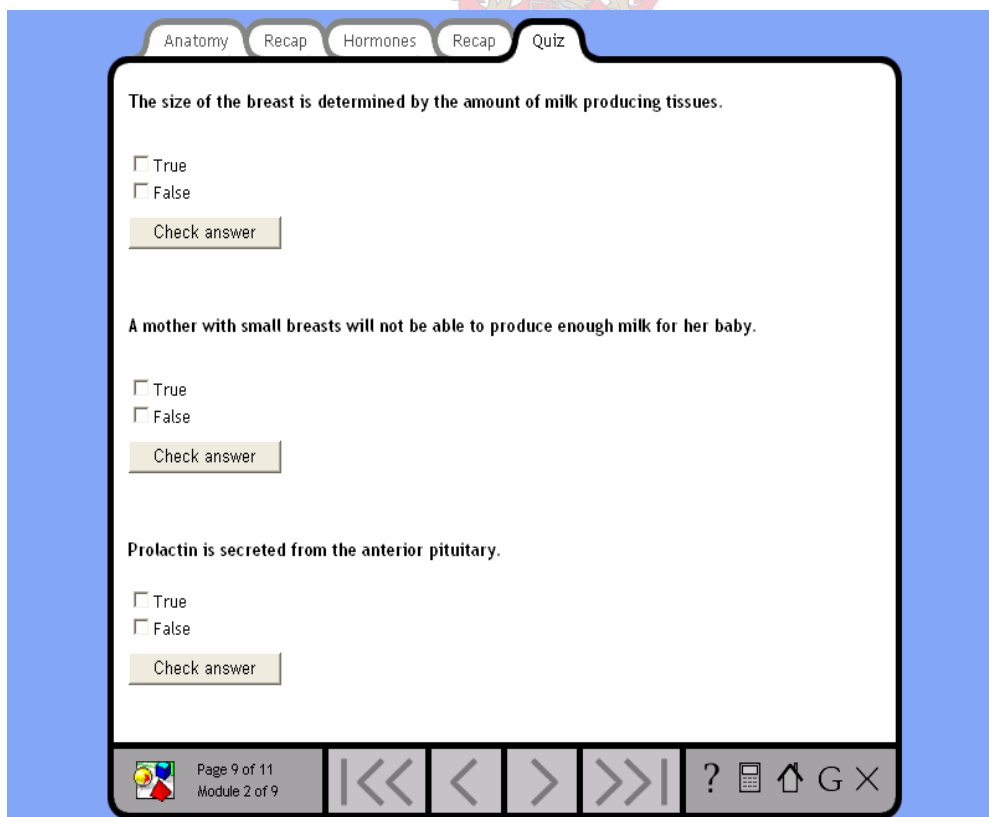


Figure 2.7: Example of a formative test (quiz) following a specific section within the SA VTS breastfeeding training module

For the quiz or formative test, students were able to click on the answer they thought was correct and then click on the “Check answer” button. The answer was either that they answered correctly or should revisit the content to check their response. Interactivity was thus possible and revision was encouraged.

Further interactivity was incorporated by means of coloured clickable text (Figure 2.4) which enabled definitions of key words to be accessed by “pop-ups” if required. It also provided additional resources in the form of document links (policy documents, journal articles), external links to websites of interest or internal links to other relevant topics within the adapted module.

Multimedia was incorporated by means of photographs, video clips and cartoons (Figure 2.8).



Figure 2.8: Window depicting an example of multimedia used within the SA VTS breastfeeding training module

The adapted module ended with text-based references, web-based references and provision for help and clarification, also similar to the Indian module.

The adapted module was considered ready at this stage to be subjected to the validation process (face and content validity). The adapted module was exported as a read only programme on a CD-ROM.

2.4.4 Validation of the adapted module

2.4.4.1 Face and content validity

The peer reviewers were mailed a letter outlining the research (Appendix 2), a CD-ROM with instructions on how to work through the adapted module and a peer reviewer questionnaire (Appendix 3), to evaluate the adapted module.

The peer reviewer questionnaire contained 6 questions on demographic information (age, gender, residing province, experience in breastfeeding training), 14 administrative questions (mode of delivery, sufficiency of instructions and information, place and situation of module completion, effectiveness of learning and sufficiency of IT skills), 8 questions on content (level, adequacy, skills acquired, relevancy and applicability of interactive tools and culturally specific), 17 questions on the mode of delivery (familiarity of icons and menu, functionality and usefulness of links and other visuals and colour scheme) and 7 questions on the perceived efficiency of the breastfeeding module. Each section contained open and close ended (yes/no, choose the most appropriate and Lickert scale) questions.



Module editing occurred after feedback from the expert reviewers, before evaluation of the adapted module on the second year students.

The third year SU Dietetic students (student reviewers) were also provided with a CD-ROM with instructions on how to work through the adapted module and a student reviewer questionnaire (Appendix 4) to evaluate the adapted module.

The student reviewer questionnaire contained 3 questions on demographic information (age, gender, year of study), 17 administrative questions (mode of delivery, assistance provided, sufficiency of instructions and information, place and situation of module completion, effectiveness of learning and sufficiency of IT skills), 9 questions on content (level, adequacy, skills acquired, relevancy and applicability of interactive tools and culturally specific) and 14 questions on the mode of delivery (familiarity of icons and menu, functionality and usefulness of links and other visuals

and colour scheme). Each section contained open and close ended (yes/no, choose the most appropriate and Lickert scale) questions.

Most of questions in the peer reviewer' and students' questionnaires were similar or exactly the same. Some of the sections that differed were specifically related to peer reviewers' or students' work or study fields, or frame of reference.

The peer reviewer questionnaire and student reviewer questionnaire were adapted from a questionnaire developed and validated in the following studies: "Information Technology (IT) with a Human Face: A collaborative research project to improve higher nutrition training in Southern Africa" and "Development of an interactive computer-based learning (CBL) module on Nutrition Transition in Developing Countries".

2.4.4.2 Focus group discussion

A list of discussion points was compiled from the feedback and comments (Appendix 5) received from the third year SU student reviewers on the completed questionnaires.

A focus group discussion was then held with the third year SU dietetic students at a pre-arranged time in a lecture hall dedicated to this group of students for all their theoretical classes on the campus of the SU, Faculty of Health Sciences. There were 22 SU third year dietetic students who participated. The investigator explained the purpose of the focus group discussion and initiated the session by mentioning the themes that emerged from the comments received on the completed questionnaires.

Each theme was then individually put forward for discussion. The investigator transcribed the comments and repeated the comments to the students to ensure accuracy of recording. After all the themes were discussed individually, the investigator gave the students the opportunity to make any general or specific additional comments and suggestions.

Finally the investigator mentioned to the class the way breastfeeding training was incorporated into the current BSc Dietetics curriculum at the time, namely:

- 2nd year: Receive lectures on introduction and management of breastfeeding
- 3rd year: Receive lectures on promotion and protection of breastfeeding

- 4th year: 8-hour theoretical breastfeeding training, ARV and PMTCT tutorial and discussion. Students receive at least 2 hours of practical exposure in the clinical skills laboratory before students are exposed to actual consultations of mothers in a primary health care (PHC) clinic

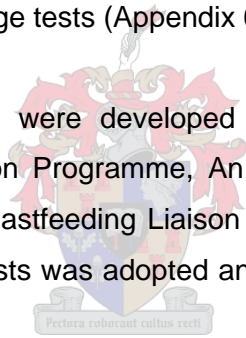
The investigator then asked the student reviewers how they see the adapted module being incorporated into the future SU, BSc Dietetics curriculum training. Their suggested incorporation in the course was recorded.

The discussion lasted for about 45 minutes. After feedback from the third year students, further module editing was effected.

2.4.4.3 Acquisition of knowledge

The adapted module was evaluated on second year SU and UWC dietetic students to determine the impact of the adapted module on acquisition of knowledge by means of pre- and post-knowledge tests (Appendix 6 and 7).

Pre- and post-knowledge tests were developed and validated for the following course: “Breastfeeding Education Programme, An 8 hour Training Programme for Health workers, Cape Town Breastfeeding Liaison Group”.⁵⁹ The knowledge part of the pre- and post- knowledge tests was adopted and utilised for the purposes of this study.



The pre- and post-knowledge tests included 14 multiple choice questions, 10 questions with statements where the students had to indicate which statement they agreed with and 19 statements that they had to rate on a Lickert scale of “Strongly agreed” to “Strongly disagreed” or “Cannot answer this question”. There was a section at the end of the post-knowledge test where students could give additional comments.

No pilot studies were done to validate the peer reviewer and student reviewer questionnaires as well as the pre- and post-knowledge tests, since all of these had been validated in the original studies they were developed for.

2.5 Analysis of the Data

A statistician appointed by the Faculty of Health Sciences, SU gave advice on the analysis of the data.

2.5.1 Peer and students reviewers' questionnaires

In order to provide ordinal data, which would enable statistical comparison, the scaled responses in the peer and student reviewers' questionnaires were given values ranging between 1 and 4 (Table 2.1).

Table 2.1: Values assigned to the different Lickert scales used in the reviewers' questionnaires

1	2	3	4
Strongly disagree	Disagree	Agree	Strongly agree
Never	Seldom	Most of the time	Always
Less effective	Equally effective	More effective	
Too basic	Appropriate	Too difficult	
Not useful	Somewhat useful	Very useful	
Not feasible	Average	Very feasible	
Yes	No	Sometimes	
Inadequately	Adequately		

2.5.2 Themes from focus group discussion

Themes emerged from the comments received on the completed questionnaires from the focus group discussion with the third year student reviewers. The themes were grouped into positive and negative themes for data presentation:

Positive themes:

- The module is different/gives variation from normal lectures
- One can work at one's own pace
- Module is interactive
- Enjoyed the module

Negative themes:

- Need self-discipline to work through module on one's own
- There is nobody to ask question to
- Difficult to remain focused and keep concentration
- Technical issues

2.5.3 Pre- and post-knowledge test scores

The total scores for the pre- and post- knowledge test counted out of 63 marks. The questions of the pre- and post-knowledge test were scored as follows:

- The 14 multiple choice questions only had one correct answer
- The 10 questions with statements where the students had to indicate which statement they agreed with had several correct answers
- In the case of the 19 statements, there were two correct answers for each question. If the answer was “Strongly agreed”, both “Agreed” and “Strongly agreed” were marked correct. The same applied to the “Strongly disagreed” answers where “Disagreed” and “Strongly disagreed” answers were marked correct

An improvement of 20% or more in the scores from the pre-test to the post-test was regarded as good. Any worsening in score was regarded as poor, but regarded as very poor if it decreased by 5% or more. A total of 3 students in the group represented 5%. The number of correct answers per question were grouped in quartiles (<25%, 26-74% and >75%) to assess an improvement or worsening in the number of questions answered correctly.

2.5.4 Statistical methods

Analyses were done by using Statistica 7. [StatSoft.Inc (2004) STATISTICA (data analysis software system), version 7. www.statsoft.com]. All statistical analyses were done at a significance level of 5%.

Descriptive statistics like frequency tables and histograms were used to analyse the initial data. Demographic and other characteristics of peer reviewers and students were compared using t-tests and chi-square tests, as appropriate.

When nominal variables were compared to other nominal variables, appropriate contingency table analyses were used. When continuous variables were compared to other continuous variables, appropriate regression methods were used.

Means and standard deviations for continuous variables were calculated. If continuous variables were compared to nominal variables, analyses of variance (ANOVA) or non-parametrical analyses of variance were used depending on the normality of the recorded data.

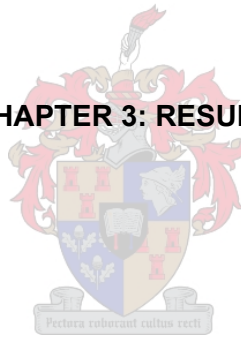
For pre- and post- knowledge test analyses of data, repeated measures ANOVA were used.

2.6 Ethics and Legal Aspects

The study protocol was submitted to the Committee of Human Research of SU for ethics approval (Project number: N06/06/114).

By completing and returning the completed questionnaires, the peer reviewers consented to participation. Anonymity was ensured in that no names had to be indicated on the questionnaires and the questionnaires were coded upon receipt.

The investigator provided SU and UWC Dietetic students with informed consent forms (Appendix 8). The standard informed consent form used by the Faculty of Health Sciences, SU, was adapted for the specific research study. Anonymity was ensured for the validity testing by the third year student reviewers in that no names had to be indicated on the questionnaires and the questionnaires were coded upon receipt. Only student numbers of the second year students were used to identify the pre- and post-knowledge tests as they had to be matched to determine changes or improvements.

CHAPTER 3: RESULTS

3.1 Sample Demographics

A: Content and Face Validity

3.1.1 Peer reviewers

Nineteen out of 36 peer reviewers completed and returned the evaluation questionnaires. The response rate of the peer reviewers was 53%. Two weeks after mailing the CD-ROM, letter and questionnaire to the peer reviewers, the investigator sent an e-mail reminder and again 3 weeks later in order to increase the response rate from the peer reviewers. Three days before the module had to be tested on the second year students for evaluation of acquisition of knowledge, the investigator could not wait for any more responses, due to time constraints related to getting the edited batch of CD-ROMs burnt in time for further testing.

The mean age of the peer reviewers was 41.5 years (SD 10.2), with the majority in the age range 30-40 and 45-50 years (Figure 3.1).

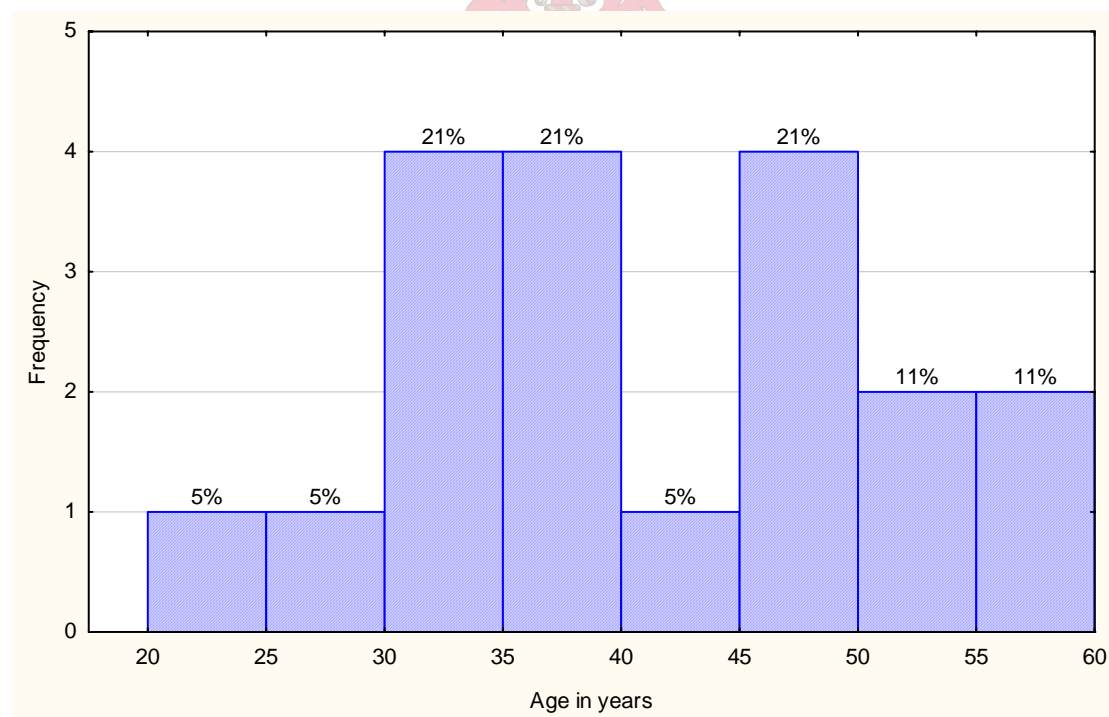


Figure 3.1: Age distribution of peer reviewers who reviewed the SA VTS breastfeeding training module

Of the total of 36 peer reviewers who were invited to take part in the study, 86% (n=31) were women and 14% (n=5) were men. Of the 19 peer reviewers who responded, 79% (n=15) were women and 21% (n=4) were men.

The majority of the peer reviewers were dietitians (37%, n=7) or lecturers in tertiary training/education institutions (32%, n=6), but pediatricians and breastfeeding consultants were also included in the sample (Figure 3.2), which represented almost all groups invited to take part in the testing of content and face validity (Table 3.1)

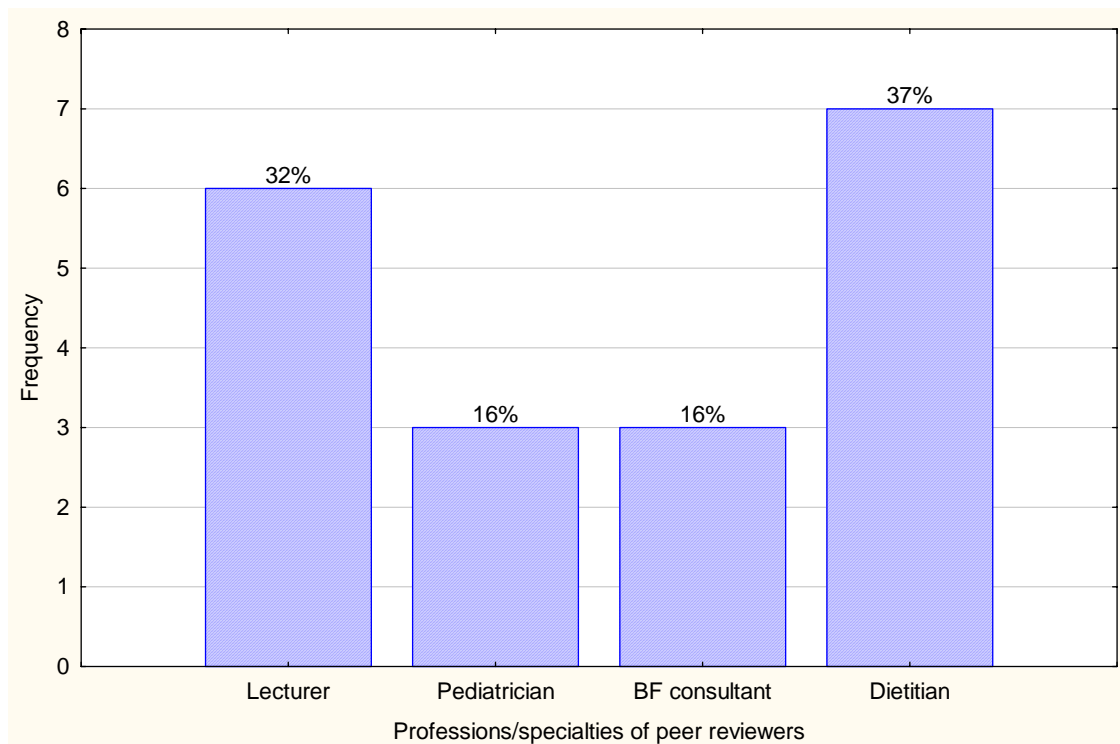
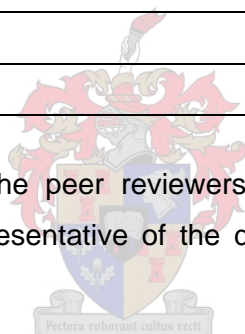


Figure 3.2: Professions/specialties of peer reviewers who reviewed the SA VTS breastfeeding training module

Table 3.1: Total respondents from invited groups of peer reviewers

Groups	Nr invited	Total respondents
Directorate and Sub-directorate Nutrition, DOH, SA <ul style="list-style-type: none"> National Directorate Nutrition Western Cape Provincial Sub-directorate Nutrition Western Cape INP district dietitians Western Cape Hospital based INP dietitians 	3 1 2 3	0 0 0 3
Division of Human Nutrition, SU Lecturers	4	3
Sister departments at other Western Cape Universities	2	1
Universities outside of the Western Cape	5	3
Other SU Departments	4	3
NGO's involved in breastfeeding training	3	0
Private practicing breastfeeding consultants and counselors	6	4
Study leaders	3	2
Grand total	36	19

The majority (74%, n=14) of the peer reviewers who responded resided in the Western Cape, which was representative of the demographic distribution of those invited to participate (Table 3.2).

**Table 3.2: Demographic distribution of the invited peer reviewers and those who responded**

Province	Invited reviewers (%)	Number (n)	Reviewers who responded (%)	Number (n)
Western Cape	64	23	74	14
Gauteng	22	8	5	1
North West	3	1	5	1
KwaZulu Natal	3	1	5	1
Free State	3	1	5	1
Limpopo	3	1	0	0
Ludhiana, India	3	1	5	1

The training that the peer reviewers had received in breastfeeding was varied. Thirty nine percent (n=7) had been trained as TOTs in lactation management, 67% (n=12) had at least received 18 hours of breastfeeding training, 17% (n=3) had been trained as BFHI Assessors, and half (50%, n=9) had received training in PMTCT of HIV. Additional experience in breastfeeding was also varied (Table 3.3).

Table 3.3: Additional experiences in breastfeeding of peer reviewers who reviewed the SA VTS breastfeeding training module

29 years experience in managing BF complications and lecturing on the topic
IMCI, Pre- and Postgraduate pediatrics
Linkages modules, Reviewer of Breast Ed (Australian), Workshops, Lectures in private practice
Peer counselor administrator
Counseling mums in hospital
Previous training of staff in breastfeeding and maternal nutrition. Evaluation of breastfeeding education programme.
Training on site (Ante Natal Care and maternity ward)

3.1.2 Student reviewers

Seventeen of the 23 third year SU dietetic students completed and returned the student reviewer questionnaires, which was a response rate of 71%. The mean age of the students reviewers was 21.3 years (SD 1.1), with most being 21 years old (Figure 3.3). They were all female students.

Twenty two of the 23 third year SU dietetic students took part in the focus group discussion, which was a response rate of 96%.

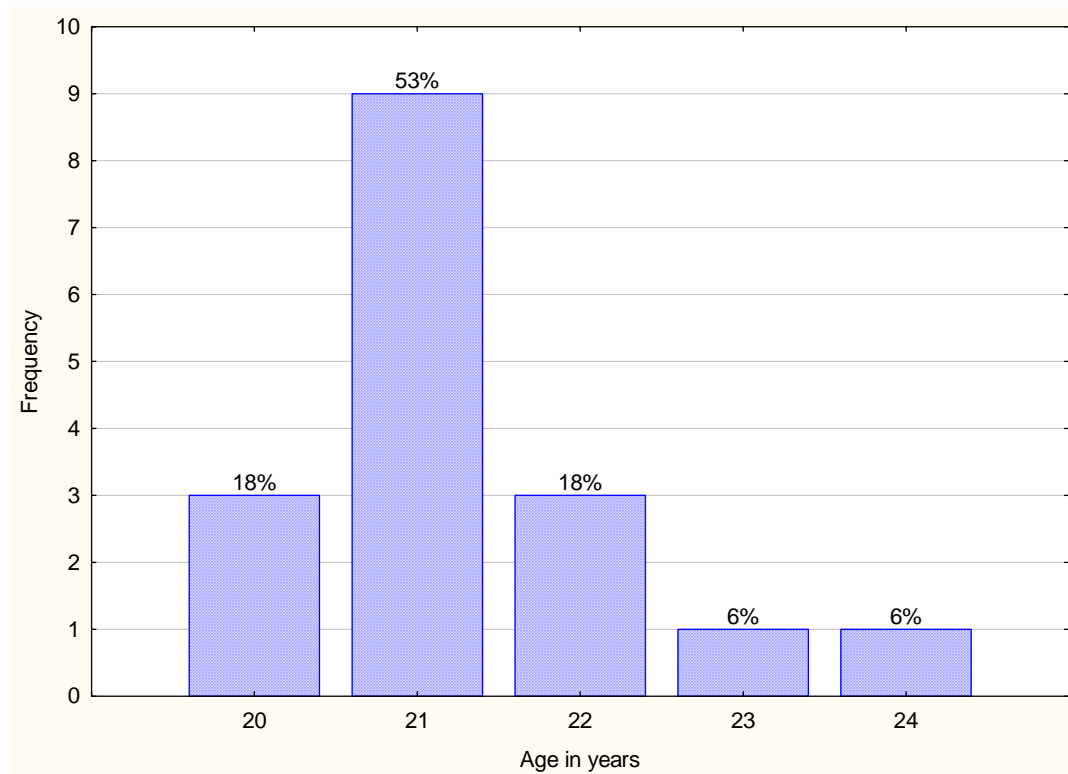


Figure 3.3: Age distribution of third year students who reviewed the SA VTS breastfeeding training module

B. Evaluation of Acquisition of Knowledge: Pre- and Post-knowledge Test

3.1.3 Second year dietetic students

Fourteen second year students from SU (48%) and fifteen second year students from UWC (52%) completed the pre- and post-knowledge test, resulting in a 100% response rate. In total, 29 second year students completed the pre- and the post-knowledge tests. Most of the second year students (83%, n=24) fell in the age range: 19 to 21 years. They were mostly female (93%, n=27) and English (41%, n=12) or Afrikaans (38%, n=11) speaking (Figure 3.4).

Fifty two percent (n=15) of the students were from the White ethnic group, 21% (n=6) were Coloured and 14% (n=4) from the Black and Asian ethnic groups respectively (Figure 3.5).

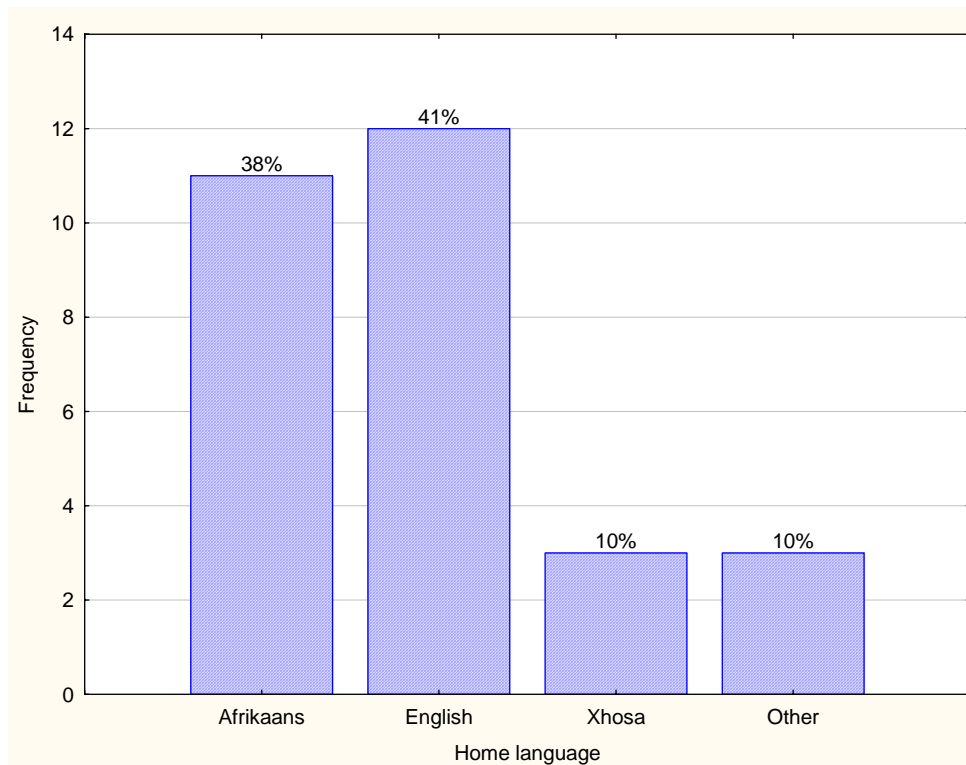


Figure 3.4: Home language of second year students who completed the pre- and post-knowledge tests

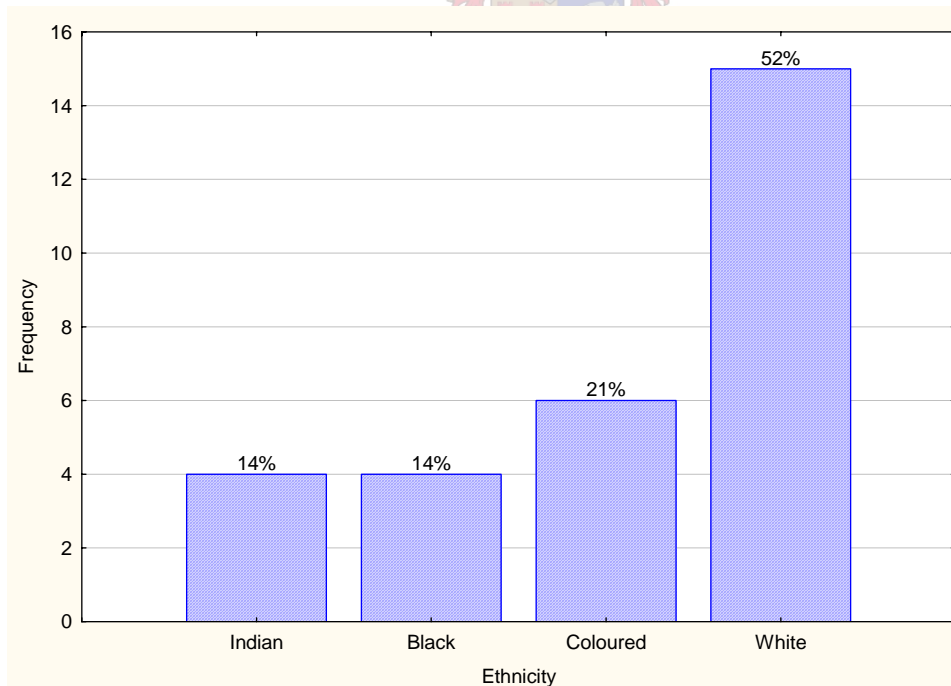


Figure 3.5: Distribution of ethnicity of second year students who completed the pre- and post-knowledge tests

3.2 Content and Face Validity of the Adapted Module

For the following sections, the responses of the peer reviewers (n=19) and student reviewers (n=17) were pooled for data analysis, as the questionnaires were very similar or exactly the same. The pooled answers from the two groups are hereafter referred to as “the combined group” (n=36) and where responses were individually reported or where questions differed, reference will be made to “the peer reviewers” and “students reviewers” as separate groups.

3.2.1 Administrative aspects of the adapted module

Ninety one percent of the combined group (n=29) indicated that the instructions in the preamble were sufficient to complete the module and 9% (n=3) that it was insufficient. Seventy six percent of the combined group (n=26) strongly agreed that their IT skills were sufficient to complete the module and 24% (n=8) agreed to the statement, with none indicating that their IT skills were not sufficient. The majority (78%, n=28) completed the module at home, 3% (n=1) in a classroom, 6% (n=2) in a computer laboratory, 3% (n=1) in a library, 11% (n=4) completed it elsewhere and none worked in an internet café. All the students completed the module after hours.

On average, 26% (n=9) of the combined group reported completing the adapted module in less than 1 hour, 53% (n=18) in 1-2 hours and 21% (n=3) indicated that it took 2-3 hours to complete the adapted module. It took students reviewers an average of 1.53 (SD 0.65) hours and peer reviewers an average of 2.26 (SD 0.55) hours to complete the adapted module ($p < 0.01$) (Figure 3.6). The difference in time to completing the adapted module between peer reviewers and student reviewers could not be attributed to age. The Spearman correlation coefficient was $r = -0.12$ with a p-value $p = 0.61$ for the peer reviewers and $r = 0.38$ with $p = 0.16$ for the student reviewers.

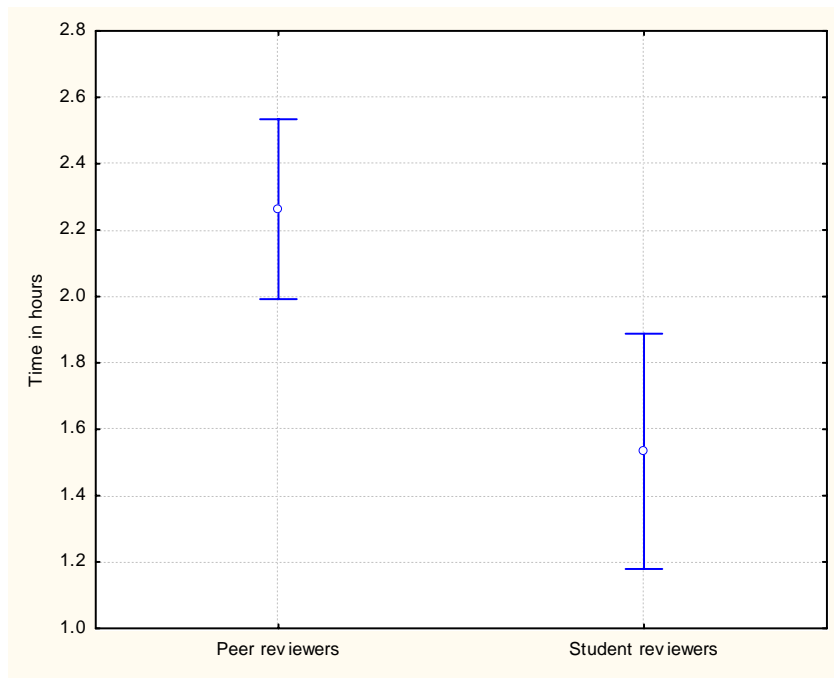


Figure 3.6: Plot of means and confidence intervals of time it took peer reviewers and student reviewers to complete the SA VTS breastfeeding training module

Only eleven percent ($n=4$) of the combined group rated the adapted module as “less effective” than conventional lectures whereas 35% ($n=10$) rated the adapted module to be “more effective”. The majority (53%, $n=19$) rated the adapted module to have been “equally effective” compared to conventional lectures (Figure 3.7).

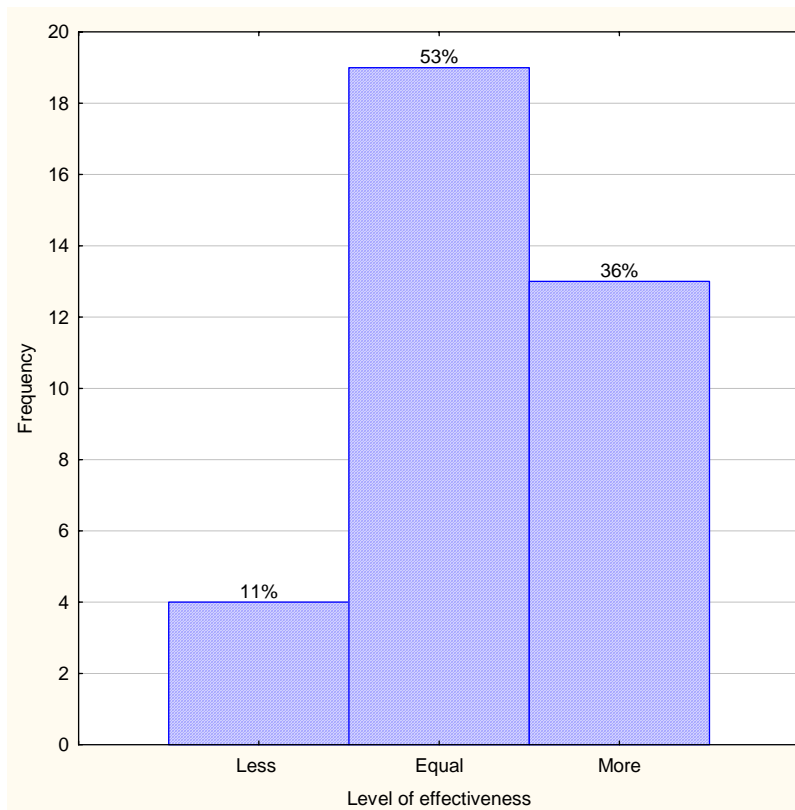


Figure 3.7: Level of effectiveness of the SA VTS breastfeeding training module as experienced by the combined group of reviewers when compared to conventional teaching methods

When asked to explain their responses in an open question, the group that was of the opinion that it was “less effective” said that personal contact was necessary to teach and explain breastfeeding concepts and clinical skills. The group that was of the opinion that it was “equally effective” said that both lectures and computer training have pro's and con's. CBL was experienced as being different and interactive and students can complete it at leisure. It was felt that it depended on the type of learner and might suit the motivated learners better than those needing interaction. One peer reviewer said that “it is best used along with conventional methods”. The group that was of the opinion that it was “more effective” said that it was very user friendly, visually stimulating, one can work at one's own pace in one's own time. They indicated that recapping was possible with the module and that the quizzes aided concentration.

When the answers of the peer reviewers and student reviewers to the question on effectiveness of the module were analyzed separately, the mean effectiveness scores (ordinal) of the peer reviewers and student reviewers did not differ significantly ($p=0.8$; Mann-Whitney test). The mean score for the peer reviewers was 2.26 and for the student reviewers 2.24, with a maximum possible score of 3 (Figure 3.8).

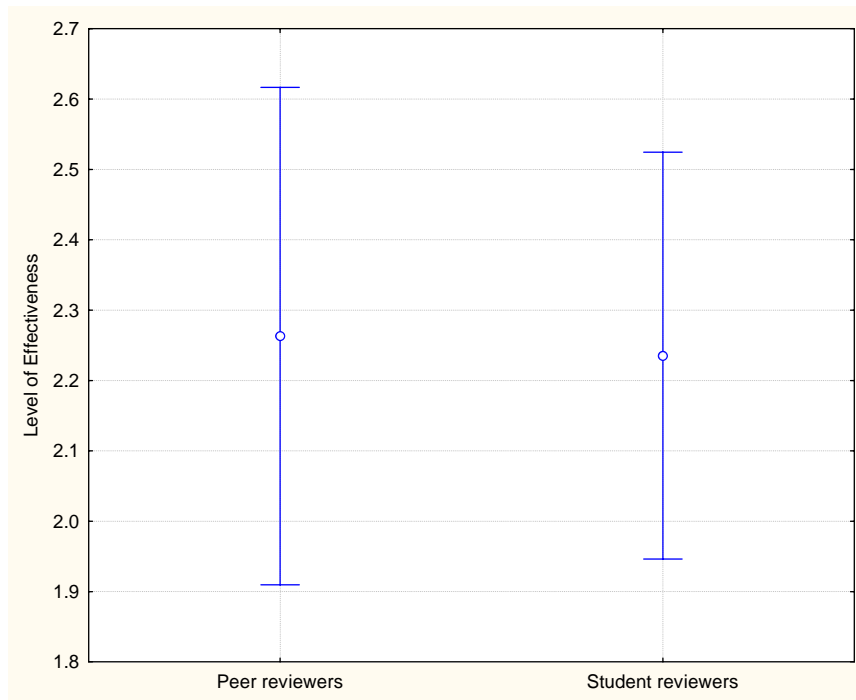


Figure 3.8: Plot of means and confidence intervals of rating of the level of effectiveness of the SA VTS breastfeeding training module by the peer reviewers and the student reviewers

All peer reviewers (100%, $n=18$), except one who did not answer the question, said that they would recommend the adapted module to other trainers. The answer was justified by stating that it was easy to use and suitable for distance education and self-education/study, thorough and complete, easy to follow and understand and provided all needed information in a comprehensive, concise format. It was stated that the recapping function and quiz sections reinforced knowledge learnt. A recommendation stated by 5 peer reviewers also emerged from this question, indicating that the adapted module could be used as a self-study module and could decrease training time for hospitals striving to become Baby Friendly.

All students (100%, n=17) indicated that they would recommend the adapted module to other students.

Most reviewers in the combined group (94%, n=34) indicated that they would recommend this mode of learning for other courses. Other courses that were indicated included: in-service training, all pre-graduate studies for health professionals and any course covering infant feeding. The two reviewers (6%, n=2) who indicated they would not recommend this mode of learning for other courses, were both student reviewers.

Ninety seven percent of the combined group (n=35) perceived the level of the adapted module to be appropriate and 3% (n=1) thought it was too basic. None said that it was too difficult.

Most reviewers of the combined group (97%, n=34) thought that the topic of breastfeeding was covered adequately. The peer reviewers suggested a few additional inclusions. These suggestions (Table 3.4) were incorporated in the module editing process. One peer reviewer (n=1, 3%) was of the opinion that the topic was not covered adequately. One student reviewer did not answer the question.

Table 3.4: Suggestions by peer reviewers of additional information that should be included in the SA VTS Breastfeeding training module to cover the topic of breastfeeding adequately

Positioning of baby could be explained better
Some revision of TB management needed
Diagrams of internal structure of breast needed
Non-timed non-scheduled feeds should be emphasized
Finish one breast before going to other should be stated
HIV breastfeeding module should be included in the training module

3.2.2 Content aspects of the adapted module

Eighty six percent (n=31) of the combined group indicated that the information in the adapted module was sufficient to enable the student to take necessary preventive/treatment action according to his/her profession or area of interest.

Fourteen percent ($n=5$) indicated that this was not the case. The 5 reviewers, who indicated that the information was insufficient, were all peer reviewers.

When the responses of the peer reviewers and student reviewers were analysed separately, the peer reviewers and student reviewers differed significantly ($p=0.0076$) over the question if the adapted module could be regarded as sufficient (Figure 3.9).

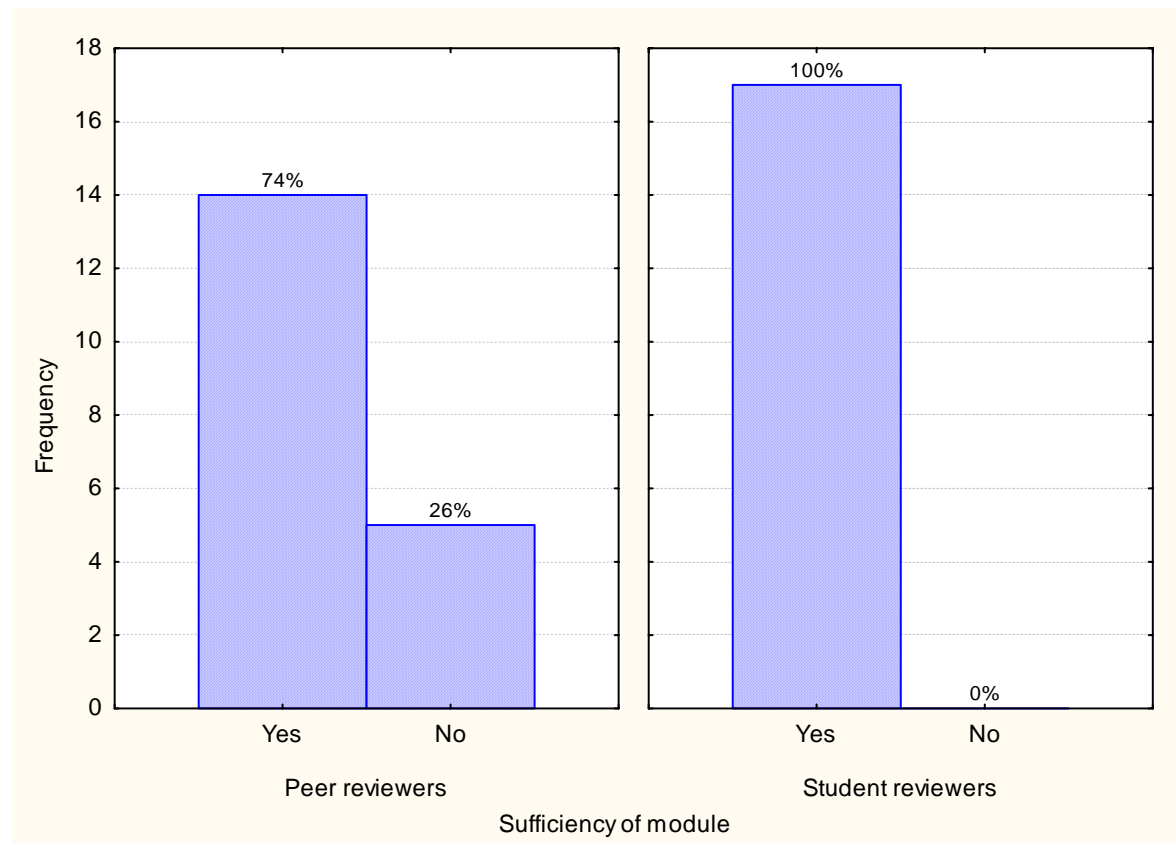


Figure 3.9: Categorical histograms of opinions of peer reviewers and student reviewers on sufficiency of the information in the SA VTS breastfeeding training module

Most reviewers of the combined group (91%, $n=32$) were of the opinion that the information in the adapted module was appropriate for the specific needs and cultural context in SA. Additional suggestions were made by the peer reviewers (Table 3.5) and these were incorporated through the module editing process.

Table 3.5: Suggestions by peer reviewers of additional topics that should be included in the SA VTS breastfeeding training module to cover more specific needs and cultural issues in SA

Breastfeeding by surrogate mothers
Common myths, e.g. burping on breast, sour milk
Food recommendations e.g. bread/maize instead of rice
Cultural beliefs influencing breastfeeding practices
Dutch medicines

Two peer reviewers in the combined group (9%, n=2) were of the opinion that the information in the adapted module was not appropriate for the specific needs and cultural context in SA, and stated that certain corrections (included in the Table 3.5) were needed in the text before it could be distributed. They further stated that a more comprehensive section on HIV should be incorporated in the adapted module (not only as a link to the SAFRITAN module on the VTS website as it appeared in the SA VTS breastfeeding training module), since it is such an important topic for SA. These suggestions will still be incorporated through the module editing process. One of the peer reviewers of the combined group did not answer the question.

All the peer reviewers (100%, n=19) indicated that questions in the quizzes were relevant and/or applicable. They commented that there was a need for more quiz questions as well as more difficult multiple choice questions. Explanations could be provided for incorrect answers. A suggestion was made that multiple choice answers should be included and not only true/false questions. These suggestions will be incorporated through a further module editing process. All the student reviewers indicated that they were able to answer the questions in the quizzes correctly.

Ninety four percent (n=16) of the peer reviewers thought that the case study was relevant and/or applicable. One peer reviewer (6%, n=1) thought that it was not relevant and/or applicable. No reasons were given and thus could not be addressed. Three peer reviewers did not answer the question. All the student reviewers (100%, n=17) indicated that they were able to work through the case study.

There was a wide range of answers from the peer reviewers to the question: "Which time in student's training would you consider to be appropriate to study the adapted module?" and included:

- MBChB: 3-6th year, Neonatology in late clinical rotation,
- Dietetics: 1st year, 2nd year (Nutrition in the life cycle), 3rd year and follow up in 4th year with more practical exposure, before practical exposure in PHC clinics/antenatal and pediatric wards in hospital
- Other: After 18 hour training by TOT

Ninety four percent (n=16) of the student reviewers felt that the third year was the appropriate time in their training to study the adapted module and 6% (n=1) felt differently. This one student recommended that the most suitable time would be in the second year of study.

Eighty one percent (n=14) of the student reviewers indicated that they had learnt something new about breastfeeding and 18% (n=3) did not think that they learnt anything new.

3.2.3 The mode of delivery of the adapted module

The reviewers had overwhelmingly positive attitudes towards certain statements regarding the aesthetics of the screens of the adapted module (Table 3.6).

Table 3.6: Attitudes of the combined group of reviewers to certain statements related to the aesthetics of the SA VTS breastfeeding training module

Statement (abbreviated)	Strongly agree	Agree	Disagree	Strongly Disagree	Did not answer
Window size optimal	23% (n=8)	71% (n=25)	6% (n=2)	0%	1
Icons familiar	25% (n=9)	67% (n=24)	8% (n=3)	0%	0
Colour scheme pleasing	22 (n=8)	69% (n=25)	8% (n=3)	0%	0

Reviewers were asked questions about their interaction with the material and seemed to find them easy and useful (Table 3.7).

Table 3.7: Responses of the combined group of reviewers on statements related to the interactivity aspects of the SA VTS breastfeeding training module

Statement	Yes	No	Did not answer [‡]
The following are easy to follow and use:			
Icons	94% (n=33)	6% (n=2)	1
Menu tabs	97% (n=35)	3% (n=1)	0
Indicate the links you used:			
Keywords	100% (n=36)	0%	0
Internal links	100% (n=36)	0%	0
External links	54% (n=15)	46% (n=13)	8
Did you find the internal links:			
Distractive	0%	100% (n=22)	14
Useful	100% (n=32)	0%	4
Time consuming	24% (n=6)	76% (n=19)	10
Did you find the external links:			
Distractive	0%	100% (n=14)	22
Useful	93% (n=26)	7% (n=2)	7
Time consuming	43% (n=6)	57% (n=8)	21
Costly	29% (n=4)	71% (n=10)	22
Could you relate to the visuals (video clips/sound/pictures) used?	91% (n=29)	9% (n=3)	4
Did the visuals contribute to enhancing/clear understanding?	88% (n=29)	12% (n=4)	3

Fourteen percent (n=5) of the combined group indicated that they clicked to see the definition of the keywords all of the time, 49% (n=17) clicked to see the definition of

[‡] The high non-response regarding the internal and external links is ascribed to reviewers indicating the most appropriate answer rather than responding to each aspect listed.

the keywords most of the time and 37% seldom clicked to see the definition of the keywords. One of the combined group did not answer this question.

It is interesting to note that four from the combined group that found the external links to be costly were all students.

All reviewers agreed that they enjoyed the presentation and delivery method of the adapted module of which 56% (n=20) felt strongly about it. It appeared that those who really enjoyed the adapted module were slightly younger than those who only enjoyed it, though this difference in age was not significant ($p=0.7$).

When the level of IT skills were compared to the level of enjoyment of the adapted module, the combined group with a higher self-rated level of IT skills tended to rate their enjoyment of the adapted module higher, but the difference was not significant ($p=0.06$) (Figure 3.10).

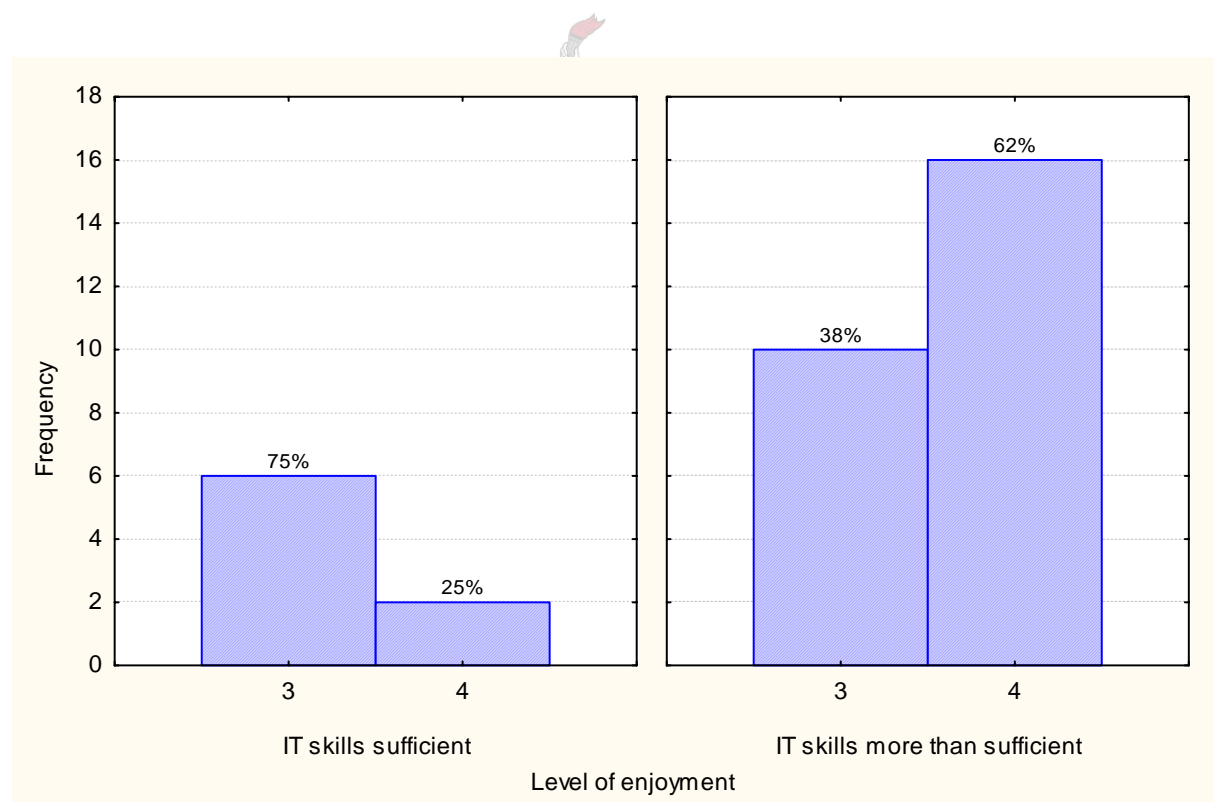


Figure 3.10: Categorical histograms of the level of IT skills of the combined group of reviewers compared to their level of enjoyment of the SA VTS breastfeeding training module

3.2.4 Perceived efficiency of the adapted module

The following section was answered by peer reviewers only.

Ninety five percent (n=18) of the peer reviewers indicated that they would include the adapted module as part of a formal course, whereas only one peer reviewer (5%, n=1) indicated that he/she would not include the module as part of a formal course. No reasons were given for this response. Two of the peer reviewers indicated that they would rather present it as part of a research project and two other would use it as extra course work revision.

Eighty one percent (n=13) of those who responded to the question, would reportedly use the adapted module for evaluation purposes and 19% (n=3) would not. Of those who indicated they would use it for evaluation purposes, 25% (n=4) indicated that they would use it to contribute to the final mark, 50% (n=8) would use it for assignments and 31% (n=5) would use it for tests/examination questions. One peer reviewer marked all 3 options and 3 did not answer the question.

Thirty three percent (n=6) of the peer reviewers, who responded to the question, said that they would recommend the adapted module as an exclusive learning experience in breastfeeding and 67% (n=12) would not make this recommendation. One peer reviewer did not answer the question.

Ninety four percent (n=16) of the peer reviewers, who responded to the question, indicated that the method of administration was appropriate for teaching the adapted module. One peer reviewer (6%, n=1) did not agree, but did not give reasons for this response. Two peer reviewers did not answer the question.

All the peer reviewers (100%, n=18) who responded to the question, would recommend the adapted module to other teachers and would also recommend the VTS delivery mode for the presentation of other courses (Table 3.8). One peer reviewer did not answer the question.

Table 3.8: Other courses that peer reviewers would recommend to be presented in the VTS delivery mode

Obstetrics and gynaecology
Introduction to hospitals for BFHI
Ethics, Nutrition education, Health Promotion
Medical, Occupational Therapy
HIV training programmes
Almost any course
18-hour peer counselor training
Clinical evaluation of patients
All courses for medical health professionals
MBChB undergraduates
Basic nutrition. Other life cycle modules
Most nutrition modules

Seventy six percent (n=13) of the peer reviewers, who responded to the question, indicated that it was very feasible/practical to administer and control/manage the mode of teaching and 24% (n=4) indicated that the feasibility was average. Two peer reviewers did not answer the question.

Ninety four percent (n=17) of the peer reviewers, who responded to the question, indicated that they had adequate IT facilities in their departments/institutions to administer such a module/course and 6% (n=1) indicated otherwise. One peer reviewer did not answer the question.

3.2.5 Focus group discussion with third year student reviewers

Themes identified from the comments on the student reviewers' questionnaires were used to design a topic discussion guide to be used for the focus group discussion. Emerging positive (Table 3.9) and negative statements (Table 3.10) from the third year students towards the adapted module and the delivery mode of the module were recorded and summarized during the focus group discussion.

These statements primarily related to the benefits and risks that the adapted module offered as a learning medium as well as comments on their enjoyment of it and the technical problems they encountered with the delivery medium.

Table 3.9: Emerging positive statements from 3rd year student reviewers towards the SA VTS breastfeeding training module and the delivery mode of the module

Themes	Summary discussion
The module is different/gives variation from normal lectures	Compact. Gives a lot of information, but it is easily accessible from the CD.
One can work at one's own pace	Mode of learning gives flexibility and is convenient. When lecturers explain difficult concepts in class, they move on and you do not necessarily stop them if you are not completely "with" them. With VTS, you repeat a section until you understand it.
Module is interactive	Stimulating, not boring. Interesting. You do more than you thought you would; i.e. use keywords, read more after using links.
Enjoyed the module	Well laid out. Logic structure. Enjoyed the module. It is a nice "helping tool"/add on. It enhances learning of the topic.

Table 3.10: Emerging negative statements from 3rd year student reviewers towards the SA VTS breastfeeding training module and the delivery mode of the module

Themes	Summary discussion
Need self-discipline to work through module on one's own	The lecturer takes a risk to rely on student's self-discipline to work through the module in their own time!
There is nobody to ask question to	Opposite from comment under "Positive": When lecturers explain difficult concepts in class you can stop them if you do not understand and then they can explain it in a different way or in different words. With VTS, you have to repeat the same section to try and understand. Would be nice if there was an e-mail link option, to e-mail the lecturer with questions or comments.
Difficult to remain focused and keep concentration	It is easier to listen to a lecturer for an hour, than to sit and read on your own for an hour.
Technical issues	<p>It is easier to read from printed material. Would like to have module in manual format to study from. It is easier to page to a place than to browse for a place in a module. One cannot make one's own notes on a PC – easier to highlight notes and write one's own comments on it.</p> <p>Internet access is a problem. If you are not online, you cannot access the external links. It is fine when you are on campus – computers are available, but not everyone has a computer at home. So some students are restricted to learn when they are on campus only.</p> <p>The programme makes the computer slow. When you have the programme open, you cannot work in other programmes.</p> <p>Students do not necessarily use links. If information is vital, put it IN the module, not as a link.</p>

The following additional comments/suggestions were made on the mode of the presentation of the adapted module:

1. When you use links to revise a section, you lose your place and have to find it again. There is no link back. It is also slow to go back.
2. To prevent information overload, or getting tired going through the whole module, the lecturer can instruct students to only study a certain part of the module, and then discuss it in class, until the module is done.
3. Important points should be bolded, especially on full pages. In general, the font size can be bigger.

The following additional statements were made on the content of the adapted module:

- There is a need for a comprehensive HIV section and case study in the module, not as an external link to the SAFRITAN module on HIV on the VTS website
- The module can be used for medical students and other health workers; maybe in a condensed format and not the complete module
- Consider including formula feeding
- The humour slides ("Take a break" cartoons) were very nice

In conclusion the following statements were made:

"It (CBL) is nice for one or two modules, but please do not turn everything electronic!"

This statement was echoed by the whole class.

"It should not be used as a self study tool to replace a lecture. It should be used as a tool for reinforcement and revision."

"We do a lot of work on the computer (tasks, case studies, presentations), specifically in the third year. We sit for long periods of time and it can be physically tiring. One can get info/electronic overload! We do not only want to learn through computer-based exercises. It should be used in combination with lectures."

When asked how they see the adapted module being incorporated into the SU, BSc Dietetics training, there was agreement from the class on the following format:

- 2nd year: Receive lectures on introduction and management of breastfeeding
- 3rd year: Receive lectures on promotion and protection of breastfeeding

- 4th year: Work through CD as a refresher course and for revision and attend an ARV and PMTCT tutorial and discussion. Receive at least 2 hours of practical exposure in the clinical skills lab before students are exposed to actual consultations of mothers in a clinic

3.3 Evaluation of Acquisition of Knowledge: Pre- and Post-knowledge Test

The pre- and post-knowledge test scores counted out of 63 marks. The mean pre-test score for the group (n=29) was 27.9 (SD 4.8) and the mean post-test score was 34.7 (SD 7.2). The mean increased by 6.8. The mean score for the pre-test at SU (n=14) was 30.6 (SD 4.7) and at UWC (n=15) 25.5 (SD 4.2). The mean score for the post-test was 39.3 (SD 12.2) at SU and 30.4 (SD 8.3) at UWC. The mean increased by 8.7 at SU and by 4.9 at UWC.

There was a significant increase in the pre- and post-knowledge test scores for both groups (SU $p < 0.0001$ and UWC $p < 0.00115$, Bonferroni multiple comparisons). The increase was significantly higher ($p = 0.03$) at SU compared to UWC (Figure 3.11).

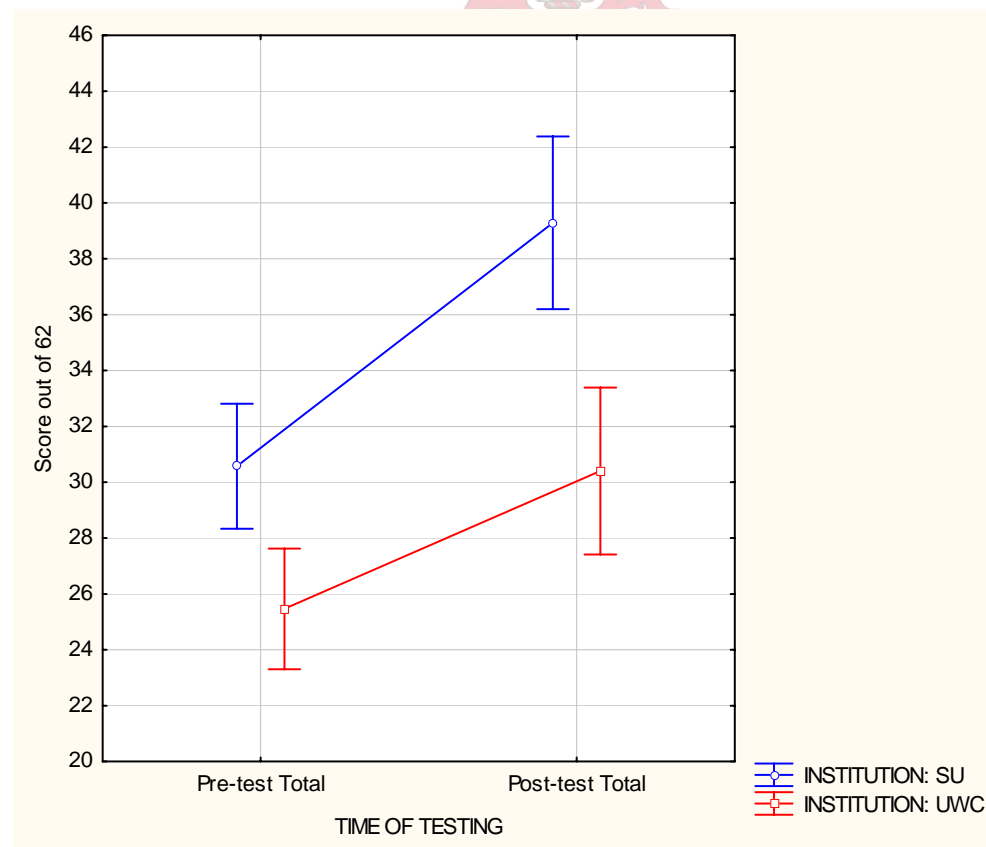


Figure 3.11: Plot of means and confidence intervals of pre- and post-knowledge test scores of second year students at SU and UWC

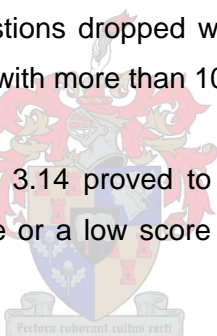
Table 3.11 indicates the number of questions in each quartile for correct answers in the pre- and post- knowledge tests, where it can be seen that there was a positive shift towards an increase in the number of correct answers.

Table 3.11: The number of questions in each quartile for correct answers in the pre- and post-knowledge tests

Correct answers	Pre-test	Post-test
<25%	7	3
26-74%	32	27
<75%	4	13
Total	43	43

Thirty three of the 43 questions (77%) showed an improvement in correct responses. Fourteen (33%) of these questions showed an improvement of 20% or more in correct responses. The score of ten questions dropped in the number of correct responses. The score of five questions dropped with 5% or more, but the score in only 2 of these questions dropped with more than 10% in correct responses.

Questions 1.1, 1.14, 2.2, 3.6 and 3.14 proved to be problematic questions, since there was a decrease in the score or a low score for these questions between the pre- to the post- knowledge test.



The pre-test score for Question 1.1, that described the central role players in the breastfeeding relationship, was 72% and the post-test score was 59%, which is a decrease in score of 13%.

1.1 The central role-players in the breastfeeding relationship are:

- a. The mother and baby
- b. The mother, baby and health worker
- c. The mother and health worker
- d. The mother and her support system

The pre-test score for Question 1.14, that stated the breastfeeding advice that should be given to HIV infected mothers, was 59% and the post-test score was 52%, which is a decrease in score of 7%.

1.14 Your advice to HIV infected mothers should be:

- a. The mother should always breastfeed her baby, as the chance of the baby dying of malnutrition and diarrhoea are far higher than those of becoming HIV-infected
- b. The feeding method depends on the mother's circumstances
- c. The feeding method is ultimately the mother's own choice, provided that she has sufficient information to make an informed choice
- d. Under no circumstances should the baby be breastfed, as the chances of the baby becoming HIV-infected are too high

The pre-test score for Question 2.2, relating to complementary/supplementary fluids to breastfed babies, was 3% and the post-test score was 14%. Although this is an increase in score of 11%, the overall score remained low.

2.2 A healthy full-term baby requires complementary or supplementary fluids:

- a. When he/she is jaundiced
- b. If the weather is very hot or humid
- c. After a long and strenuous labour
- d. When the mother is still recovering after a caesarian section ...

The pre-test score for Question 3.6, that stated a possible treatment for thrush on the nipples, was 28% and the post-test score was 21%, which is a decrease in score of 7%.

3.6 Sunlight on the nipples can be useful to treat thrush

The pre-test score for Question 3.14, relating to test weighing of the infant to determine breastmilk intake, was 10% and the post-test score was 0%, which is a decrease in score of 10%.

3.14 Test weighing is useful in the routine assessment of breastmilk intake by healthy infants

The students also offered additional comments on a section on the post- knowledge test. These were summarised (Table 3.12) and it primarily related to the difference and effectiveness that the adapted module offered as a learning medium as well as comments on their enjoyment of it and the format that was appealing to them.

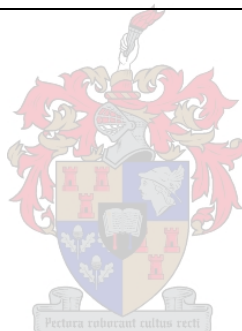
Table 3.12: Comments from 2nd year students on the SA VTS breastfeeding training module

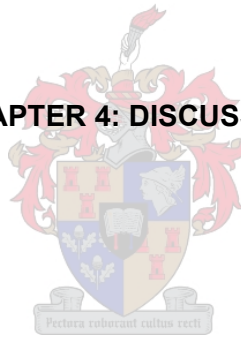
Theme and number of comments	Sample quotes
Different (9)	Programme nice, user-friendly Interactive Provides fun Makes learning easier and quicker Women who see this CD will want to BF their children Have the chance to work in own time
Enjoyed it (7)	Interesting and nice to work on Enjoyed the CD - Thanks for the initiative Much appreciated
Learning medium (18)	Learnt a lot - Very effective way of learning Visuals more stimulating than written text Good use of repetition helps to remember info Effective learning medium Very interesting and practical way of learning Helped to increase BF knowledge What I have learned will help me as a mother and help other mothers Info will be used in the future
Format (10)	Pretty and complete Well structured an easy to work with Very comprehensive information - Well laid out It was very interesting - Information was easily understandable

The students also made additional suggestions on the use of the adapted module (Table 3.13).

Table 3.13: Additional suggestions made by 2nd year students on the use of the SA VTS breastfeeding training module

The module should be used and discussed in a few class sessions (n=1)
There are too few diagrams on some pages which becomes frustrating (n=1)
There is a need for more information on breastfeeding statistics in SA and how these are applied by clinic personnel (n=1)
The CD should be used with practical exposure (n=1)
All women should use it, especially those that want children (n=1)
Would use it as an aid with notes as learning material, but the class is still needed for explanation of some issues (n=1)
How will the CD target mothers without computers? (n=1)
Needed more time to work through it (n=4)



CHAPTER 4: DISCUSSION

4.1 Discussion

In this study the majority of peer and students reviewers were of the opinion that their IT skills were sufficient to complete the adapted module. This finding is important, since it has been reported in the literature that CBL could deter students and teachers from the study course or material if they feel they are not equipped to master this form of technology.^{79,88,92}

Most of the peer reviewers indicated that they had adequate IT facilities in their departments/institutions and that it was feasible/practical to administer such a module/course. This is a positive point, since it could mean that the adapted module would be utilized, if made available to them. It also indicates that some barriers to effective e-learning e.g. infrastructure, support, funding and administration for the e-learning environment that have been described in the literature⁸⁸ to cause concern for managers, lecturers and students, have been addressed at the particular teaching facilities.

Although the difference was not significant, it was found that the students completed the adapted module in less time compared to the peer reviewers. It should however be taken into consideration that the peer reviewers' questionnaire contained more questions on aspects of content evaluation and perceived efficiency of the adapted module than that of the students' questionnaire. The peer reviewers could thus have spent more time perusing the adapted module and paying attention to the detail. This argument was strengthened during informal discussions with the 4th year students of 2007 (3rd year students of 2006 on which the module was tested for validity) where they reported that they spent 4-6 hours to complete the adapted module when they had to study the information as part of a revision exercise.

All reviewers of the combined group enjoyed the presentation and delivery method of the adapted module. It appeared that the reviewers who indicated that they "really enjoyed" the adapted module was slightly younger than those who indicated that they "enjoyed" it, though this difference in age was not significant.

It could be expected that those of the combined group with a higher level of IT skills would enjoy the adapted module more than those with a lower level of IT skills, since

the reviewers with a higher level of IT skills might have a higher comfort level with the technology. The difference shown in this study however was only modest.

One of the main advantages of CBL is said to be the flexible learning environment it creates where students can work at their own pace, repeat sections and can work in their own time.^{78,79,86,88,92} The students in this study also cited the flexibility of the adapted module as a positive attribute, but at the same time stated that self discipline was needed to work through the adapted module on their own and, it was difficult to remain focused and keep their concentration while working through it. The absence of a tutor or class interaction seemed to be problematic for them.

Students enjoyed the variation that the adapted module added from normal lectures and the interactivity it provided as well as the stimulating effect it had on them in wanting to learn more. These findings support previous research in this field.^{78,79,86,88,92}

The case study was found to be applicable, the visuals were stimulating and the keywords, internal and external links were found to be useful. A few of the reviewers found the links to be time consuming since they could not go back to the section where they left off. This “loosing of your place” when you click to view an internal or external link is indeed a limitation of the VTS programme, but the designers of the software have indicated that enabling this functionality would greatly increase the size of the programme, which is currently one of the benefits of the programme.

The majority of the combined group agreed that the size of the windows of the adapted module was optimal to view the content, the colour scheme was pleasing to the eye and the icons were easy to follow and familiar.

Technical problems with CBL have been shown to detract from the learning experience and cause frustration.^{88,92} This reflects findings in the present study where some of the technical problems mentioned were: that it was easier to read from printed material, internet access sometimes caused problems and not all students had access to a computer off campus.

Overall the adapted module was rated as being more effective (35%) or at least as effective (53%) as conventional lectures. The third year students concluded during

the focus group discussion that they were very satisfied with the delivery mode of the adapted VTS module, but since they do a lot of work on computers, CBL should not replace lectures but be used in combination with lectures. Similar remarks on CBL have also been documented in the literature.^{72,75,87,88}

All peer reviewers would recommend the mode of learning to other trainers/teachers and most would also recommend this teaching tool for the presentation of a host of other courses, indicating once more that CBL has an important part to play in the multimedia methods of teaching to enhance learning.⁷⁵

The majority of the combined group was of the opinion that the mode of delivery was appropriate for teaching the adapted module. This indicates that both peer reviewers and students feel that the mode of delivery has a role to play in enhancing learning in general, but also specifically in breastfeeding training.

The peer reviewers would all recommend the adapted module to other teachers. All the students would recommend the adapted module to other students. This demonstrates the recognition from both the peer reviewers and students that breastfeeding training is extremely important and should form a part of most undergraduate courses for HCWs. Furthermore, although the adapted module was initially intended for use by undergraduate nutrition students, the recommendation from the peer reviewer group that this tool could be used as a self-study module and could decrease training time for hospitals striving to become Baby Friendly, is very important. It broadens the potential application of the adapted module to include not only dietetic students or students of health care professions, but also health care workers.

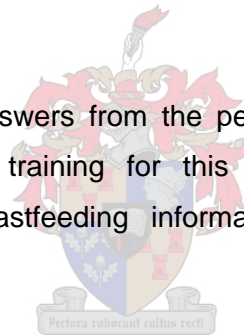
The majority of the peer reviewers would not recommend the adapted module as an exclusive learning experience in breastfeeding. This once again stresses the opinion that CBL should not be used as a sole source of teaching,⁷⁵ especially with a topic such as breastfeeding, where practical exposure and skills are of the essence.

The level of the adapted module was perceived to be appropriate and the topic of breastfeeding was found to be adequately covered. Although the majority of the combined group indicated that the information in the adapted module was sufficient to enable the student to take necessary preventive/treatment action according to

his/her profession or area of interest, the difference in opinion between peer reviewers and students was significant. This difference in opinion can be explained by the difference in the experience levels of peer reviewers and students. Students might think that the adapted module on its own is sufficient since they have not been in a position to take necessary preventative/treatment action, whereas the peer reviewers would know from experience that the adapted module might not cover each and every problem scenario.

Most of the combined group was of the opinion that the information in the adapted module was appropriate for the specific needs and cultural context in SA. This is reassuring, since it is extremely important that students are able to apply their knowledge and skills outside the tertiary institution and their immediate surrounding communities. It is further encouraging, since it broadens the possible application of this adapted module to beyond only the dietetic students at SU and UWC in the Western Cape to students of health care professions and HCWs in other provinces in the country.

There was a wide range of answers from the peer reviewers regarding the most appropriate time in students' training for this adapted module, stressing the importance of reinforcing breastfeeding information during different stages of students' training.



There was an improvement in the post-knowledge test scores for both SU and UWC students. Although it was not a major improvement, it does indicate that there was an increase in the knowledge from baseline. This shows that for students who have not had previous exposure to breastfeeding lectures, this module will lead to an increase in knowledge on the topic. As it is recommended that this module is not used as the sole source of instruction, but in conjunction with other learning modalities, the improvement in knowledge should be further enhanced.

A review of the literature on computer assisted learning from 1966-2002 by Chumley-Jones et al showed that in studies evaluating knowledge gains, the most common research design was a pre-test/post-test self-controlled study. The pre-test/post-test studies provided evidence that computer-based learning interventions resulted in knowledge gains on multiple-choice tests in medical students, practicing physicians and dentists, but it did not outperform other educational methods.⁸⁷

There might be explanations for the worsening of the scores for some of the questions in the post-knowledge tests. The correct answer to the question that described the central role players in the breastfeeding relationship should have been “the mother and baby”. This question could have shown a decrease in score due to the emphasis that was placed on the role of the health worker in the adapted module. The worsening of the score for the question to the breastfeeding advice that should be given to HIV infected mothers could be attributed to the fact that the comprehensive HIV module appeared as a link to the SAFRITAN website in the breastfeeding module and not as part of the breastfeeding module.

The decrease in score for the questions that stated a possible treatment for thrush on the nipples and test weighing of infants could be explained by the fact that not much emphasis was placed on these topics in the adapted module. The low pre- and post-test score for the question relating to complementary/supplementary fluids to breastfed babies could be explained by the fact that none of the stated answers were correct, but there was no option “none of the above” to tick. The question should thus have been left blank, which could have confused some students.

4.2 Limitations of the Study

A good response rate of 53% was reached from the peer reviewers with fair national representation. Notwithstanding repeated efforts to improve response rate it was unfortunate that no responses were received from the National Directorate and Provincial Sub-directorate of Nutrition, the Western Cape INP district dietitians, as well as NGO's involved in breastfeeding training. Only 3 of the 6 universities outside the Western Cape that offer a degree course in Human Nutrition/Dietetics responded.

The sample sizes for the students were small, but reflective of the average sizes of the SU dietetic student groups.

The pre- and post-knowledge questions had been previously validated for use in the Breastfeeding Education Programme. However, it transpired, following data analysis, that the emphases on some issues in the adapted module were not the same as in the Breastfeeding Education Programme, making answering some of the questions difficult for the second year students. This could be rectified in possible future studies by rephrasing these questions within the context of the learning material.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS



5.1 Conclusion

The findings of this study were consistent with much of the literature.

The study indicated that both peer reviewers and students felt that their IT skills were sufficient to complete the adapted module, that they had adequate IT facilities in their facilities and it was feasible to administer the module.

The peer reviewers and students enjoyed the presentation and delivery mode of the adapted module. The students did, however, indicate that they do not want all lectures in computer-based format.

The topic of breastfeeding was perceived to be covered adequately in the adapted module and the information and visuals it contained was found to be appropriate for the specific needs and the cultural context in SA.

The majority of the peer reviewers and students were of the opinion that the information in the adapted module was sufficient to enable the students to take the necessary preventive or treatment action.

CBL was perceived to be a more and equally effective learning medium compared to conventional lectures for the topic of breastfeeding and it was stated that this medium of training can be integrated effectively as part of multimedia methods to enhance breastfeeding teaching.

All peer reviewers would recommend the mode of learning to other trainers/teachers and most would recommend it for other courses.

The peer reviewers would all recommend the adapted module to other teachers and all the students would recommend it to other students.

For students with no previous exposure to breastfeeding lectures, the module led to an increase in knowledge on the topic.

This programme may contribute to the alleviation of the increasing pressures to introduce training courses and materials on IYCF into the curricula of pre-service

training institutions in order to increase the sustainability and coverage of HCWs and enhance the breastfeeding learning experience in the national and international strive to optimally promote, protect and support breastfeeding.



5.2 Recommendations

- 5.2.1 The adapted module can be utilized to complement and enhance lectures on breastfeeding for undergraduate dietetic students.
- 5.2.2 The adapted module can be considered for use in all undergraduate training for medical and para-medical professions.
- 5.2.3 Lecturers are cautioned to use discretion in the amount of study material that is presented in computer-based format, since students might experience “IT fatigue” if this medium is over emphasized. The use of multimedia methods of training is recommended.
- 5.2.4 The National DOH, Nutrition Directorate as well as the Provincial DOH, Nutrition Sub-Directorates could use the adapted module to complement and enhance lectures in BFHI training for HCWs and as a self-study tool for HCWs and staff in hospitals striving to become Baby Friendly, who cannot attend training sessions.
- 5.2.5 The VTS mode of learning is recommended for use in other courses, including: in-service training, all undergraduate studies for health professionals and any course covering infant feeding.

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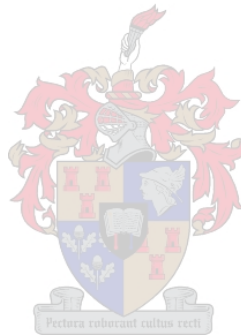
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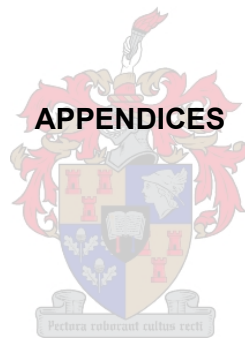
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Appendix 1

List of invited peer reviewers

1. **Nutrition Directorate and Sub-Directorate of DOH, SA**
 National Nutrition Directorate: Lynne Moeng, Hope Ntsabiso, Ann Behr
 Western Cape Provincial Nutrition Sub-directorate: Lulama Phillips
 Western Cape INP district dietitians: Petro Robertson, Gillian Marshall,
 Western Cape INP Hospital based dietitians: Luise Marino, Claudia Schübl,
 Elisna van Wyk
2. **SU, Division of Human Nutrition lecturers**
 Liesbet Koornhof
 Baheya Najaar
 Ronel Beukes
 Irene Labuschagne (NICUS)
3. **Sister departments at other Western Cape Universities:**
 University of Cape Town: Mrs Aila Meyer
 University of the Western Cape: Ms Ernie Kunneke
4. **Universities outside of the Western Cape:**
 University of Pretoria: Mrs Lizeke Napoles
 North West University: Mrs Avarelda van Graan
 University of KwaZulu Natal: Mrs Nazeeia Saeyed
 University of the Free State: Mrs Rozelle Oosthuizen
 University of Limpopo: Prof. Pauline Kuzwayo
5. **Other SU Departments**
 Dr Phillip Henning (Paediatrics)
 Dr Simon Schaaf (Paediatrics)
 Dr Gerhard Theron (Obstetrics and Gynecology)
 Sr Stephnie Van der Walt (Nursing)
6. **Non-governmental organisation involved in breastfeeding training**
 AED/Linkages: Phyllis Baxen, Nomajoni Mtombela, Penny Cambell
7. **Private practicing lactation consultants and breastfeeding counselors**
 Jeanne Viljoen, Dorothy van der Spuy, Nadia Bowley, Rosemary Gauld, Jean
 Ridler, Elaine Dawson
8. **Study leaders**
 Mrs Debbi Marias
 Prof Demetre Labadarios
 Prof Tejinder Singh

Appendix 2:

Dear Colleague

The Master of Nutrition programme of Stellenbosch University (M.Nutr, SU) requires a research project and thesis as partial fulfilment of the degree.

I am currently busy with the research module and the title of my chosen research topic is: “Computer-based Breastfeeding training for South African undergraduate dietetic students”.

This project forms part of the Indo-South African intergovernmental Science and Technology co-operation programme and focuses on collaboration on Web-based undergraduate Nutrition training modules.

There are a myriad of breastfeeding programmes and materials available, but despite the availability of materials, academics in low-income countries, tutoring future nutrition professionals, need new approaches to enable them to translate the scientific knowledge that is available today, into practical, locally feasible and sustainable nutrition actions.

The material uses Virtual Training Studio (VTS), a software tool supported by a web-platform, which is a free software tool for web-based learning. Key features of VTS are that it enables the creation of professional-looking, low-bandwidth interactive teaching material without extensive work or technical knowledge required by the lecturer. It enables material to be presented via the internet or from a CD, hard drive or Local Area Network (LAN) and opens up the possibility of sharing courses on the worldwide web. The most important aspect of this platform is that it was specifically designed for use in developing countries, therefore taking the unique situation and specific constraints of developing countries into account.

Prof Tejinder Singh (Professor and Vice Principal of the Department of Paediatrics, Christian Medical College, Ludhiana, India and co-study leader) has developed a computer-based breastfeeding training module for undergraduate students of health professions in India in the form of a Power point presentation with animation and interaction.

This Breastfeeding module will be assessed regarding acceptability and relevancy to the South African population and situation and adapted for use by South African undergraduate US Dietetic students **at an introduction to breastfeeding level**. Validation will be completed using a questionnaire with expert reviewers, lecturers and students.

The process of adaptation and validation will follow some of the “Key elements of successful large scale behaviour change programmes”, as described in WHO “Child and Adolescent Health Progress report 2000/2001”, namely that the development of interventions for the promotion of improved infant and young child feeding should include:

- Attention to policy analysis, reform and advocacy and
- Local adaptation of guidelines and approaches using formative research

This project further aims to show that this Breastfeeding module can be applied for acquisition of knowledge in undergraduate breastfeeding training in South Africa. It might prove to hold true to the following statement, also from the WHO “Child and Adolescent Health Progress report 2000/2001”: that “the introduction of training courses and materials on infant and young child feeding practices into the curricula of pre-service training institutions holds the promise of high sustainability and coverage of health workers.”

The module is at a point now where I am asking expert external reviewers to comment on the material. The external reviewers were selected according to their expertise in the specific area of breastfeeding training. If you accept the invitation and complete the questionnaire, you will be acknowledged in the thesis.

I hereby request your scrutiny and feedback on this module by 21 July 2006.

Kind regards,

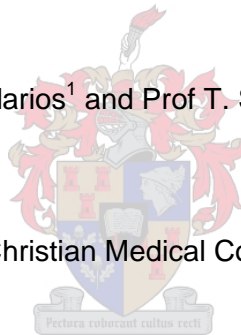
Lisanne du Plessis
M.Nutr Student (US)

Study Leader: Ms D. Marais¹

Co-study Leaders: Prof D. Labadarios¹ and Prof T. Singh²

Statistician: Prof D.G. Nel¹

University of Stellenbosch¹ and Christian Medical College, Ludhiana, India ²



Appendix 3

INTERACTIVE CD-ROM - BREASTFEEDING EVALUATION QUESTIONNAIRE - Experts

Section A: Personal Information

1 Age (Years)

2 Gender

3 Province in South Africa

Western Cape	Northern Cape	Eastern Cape	KZN	Gauteng
Limpopo	North West	Free State	Mpumalanga	

4 Position

5 Experience in Breastfeeding training

Trainer of trainers in Lactation Management 60 hour training	BFHI assessor
Undergraduate training in breastfeeding - minimum of 18 hours	Breastfeeding & HIV (PMTCT)

6 Other experience in breastfeeding training: _____

Section B: Administrative

1 Were the instructions in the preamble sufficient for you to complete the module?

2 My IT skills were sufficient to complete these modules.

Strongly Agree	Agree	Disagree	Strongly disagree
----------------	-------	----------	-------------------

3 In what format was the module administered (choose only 1)?

CD	online/internet	intranet	hard drive
----	-----------------	----------	------------

4 Where mostly did you complete the module(s)? (choose only 1)

Home	Classroom	Computer lab	Internet cafe	Library	Other
------	-----------	--------------	---------------	---------	-------

5 How much time did it take you to complete this module on average (choose only 1)?

< 1 hour	1-2 hours	2-3 hours	> 3 hours
----------	-----------	-----------	-----------

6a Compared to conventional lectures do you anticipate this mode of learning to be...

Less effective	Equally effective	More effective
----------------	-------------------	----------------

6b Explain why _____

7a Would you recommend this module to other trainers?

7b Please justify your answer _____

8a Would you recommend this mode of learning for other courses?

8b Please justify your answer _____

8c Do you perceive the level of this module... [choose only 1]

too basic	appropriate	too difficult
-----------	-------------	---------------

9a Was the topic covered?

inadequately	adequately	too much in depth
--------------	------------	-------------------

9b If not covered adequately, please indicate where inadequate and suggest relevant topics/references.

Section C: Content

1 Is the information in this module sufficient to enable the student to take necessary preventative/treatment action according to his/her profession or area of interest?

Yes	No
-----	----

2a Is the information in this module appropriate for the specific needs and cultural context in South Africa?

Yes	No
-----	----

2b If no, please indicate which country specific information or tools should be included and used to strengthen the module

3 Were the questions in the quizzes relevant/applicable?

Yes	No
-----	----

4 Did you think the recommended assignments were relevant/applicable?

Yes	No
-----	----

5 Did you think the case studies were relevant/applicable?

Yes	No
-----	----

6 Do you have any comments or suggestions regarding the quiz questions, assignments or case studies?

7 Which time in students' training would you consider to be appropriate to study this module?

8 The size of the window is optimal to view the content.

Strongly Agree	Agree	Disagree	Strongly disagree
----------------	-------	----------	-------------------

9 The following are easy to follow and use:

a. Icons	Yes	No
----------	-----	----

b. Menu tabs

Yes	No
-----	----

10 The icons were familiar to me.

Strongly Agree	Agree	Disagree	Strongly disagree
----------------	-------	----------	-------------------

Section D: Mode of Delivery

This course is delivered in Virtual Training Studio mode (VTS):

1 The colour scheme of the pages/slides was pleasing to the eye

Strongly Agree	Agree	Disagree	Strongly disagree
----------------	-------	----------	-------------------

2 Indicate the links you used?

a. Keywords	Yes	No
b. Internal links	Yes	No
c. External links	Yes	No

3 How useful were the links?

Not useful	Somewhat useful	Very useful
------------	-----------------	-------------

4 How often did you click to see the definition of the keywords?

Never	Seldom	Most of the time	Always
-------	--------	------------------	--------

5 If you used external links, how much time did you spend on that link?

Briefly and returned to active module	Continued in that link
---------------------------------------	------------------------

6 Did you find the internal links?

a. Distractive	Yes	No
b. Useful	Yes	No
c. Time consuming	Yes	No

7 Did you find the external links?

a. Distractive	Yes	No
b. Useful	Yes	No
c. Time consuming	Yes	No
d. Costly	Yes	No

8 Could you relate to the visuals (video clips/sound/pictures) used?

Yes	No
-----	----

9 Did the visuals contribute to enhancing/clear understanding?

Yes	No	Sometimes
-----	----	-----------

10 Did the visuals work?

Yes	No
-----	----

If not explain why _____

11 I enjoyed the presentation and delivery method of this module?

Strongly Agree	Agree	Disagree	Strongly disagree
----------------	-------	----------	-------------------

12 Would you include the modules as part of a formal course?

Yes	No
-----	----

13 If no, how would you present it to the students... [choose only 1?]

As part of this research project	Extra course work	Revision
----------------------------------	-------------------	----------

15 If yes, would the module be used for evaluation of learning results?

Yes	No
-----	----

Section E: Other

1 If used for evaluation purposes, what would it be used for [choose only 1?]

Contributes to the final mark	Assignments	Tests/ examination questions
-------------------------------	-------------	------------------------------

2a Would you recommend the course as an exclusive learning experience in Breastfeeding?

Yes	No
-----	----

2b Is the method of administration appropriate for teaching this Breastfeeding module?

Yes	No
-----	----

2c Would you recommend this Breastfeeding module to other teachers?

Yes	No
-----	----

2d Would you recommend this teaching tool for the presentation of other courses?

Yes	No
-----	----

If yes, indicate which course is: _____

3 How feasible was it for you to administer and control/manage this mode of teaching?

Very feasible	Average	Not feasible
	Yes	No

4 Do you have adequate IT facilities at your department /institution?

Appendix 4

INTERACTIVE CD-ROM - BREASTFEEDING EVALUATION QUESTIONNAIRE - Students					
Section A: Personal Information					
1	Age (Years)	<input style="width: 100%;" type="text"/>			
2	Gender	<input style="width: 45%;" type="text" value="Male"/>		<input style="width: 45%;" type="text" value="Female"/>	
3	Year of study	<input style="width: 20%;" type="text" value="1"/>	<input style="width: 20%;" type="text" value="2"/>	<input style="width: 20%;" type="text" value="3"/>	<input style="width: 20%;" type="text" value="4"/>
4	Were the instructions in the preamble sufficient for you to complete the module(s)?				<input style="width: 40%;" type="text" value="Yes"/> <input style="width: 40%;" type="text" value="No"/>
5	My IT skills were sufficient to complete these modules.				
	<input style="width: 20%;" type="text" value="Strongly Agree"/> <input style="width: 20%;" type="text" value="Agree"/> <input style="width: 20%;" type="text" value="Disagree"/> <input style="width: 20%;" type="text" value="Strongly disagree"/>				
6	In what format was the module administered [choose only 1]?				
	<input style="width: 20%;" type="text" value="CD"/> <input style="width: 20%;" type="text" value="online/internet"/> <input style="width: 20%;" type="text" value="intranet"/> <input style="width: 20%;" type="text" value="hard drive"/>				
Section B: Administrative					
1	Where mostly did you complete the module(s)? [choose only 1]				
	<input style="width: 20%;" type="text" value="Home"/> <input style="width: 20%;" type="text" value="Classroom"/> <input style="width: 20%;" type="text" value="Computer lab"/> <input style="width: 20%;" type="text" value="Internet café"/> <input style="width: 20%;" type="text" value="Library"/> <input style="width: 20%;" type="text" value="Other"/>				
2	When did you complete the module?				<input style="width: 40%;" type="text" value="During class time"/> <input style="width: 40%;" type="text" value="After hours"/>
3	If the modules were completed in class time, was a facilitator available?				<input style="width: 40%;" type="text" value="Yes"/> <input style="width: 40%;" type="text" value="No"/>
4	If yes was the facilitator				<input style="width: 20%;" type="text" value="Subject lecturer"/> <input style="width: 20%;" type="text" value="IT staff"/> <input style="width: 20%;" type="text" value="External facilitator"/> <input style="width: 20%;" type="text" value="Other"/>
5	How much time did it take you to complete a module on average [choose only 1]?				
	<input style="width: 20%;" type="text" value="≤ 1 hour"/> <input style="width: 20%;" type="text" value="1-2 hours"/> <input style="width: 20%;" type="text" value="2-3 hours"/> <input style="width: 20%;" type="text" value="≥ 3 hours"/>				
6a	Compared to conventional lectures did you find this mode of learning				
	<input style="width: 20%;" type="text" value="Less effective"/> <input style="width: 20%;" type="text" value="Equally effective"/> <input style="width: 20%;" type="text" value="More effective"/>				
6b	Explain why _____ _____				
7a	Would you recommend this BF module to other students?				<input style="width: 40%;" type="text" value="Yes"/> <input style="width: 40%;" type="text" value="No"/>
7b	Please justify your answer _____ _____				
8a	Would you recommend this mode of learning for other courses?				<input style="width: 40%;" type="text" value="Yes"/> <input style="width: 40%;" type="text" value="No"/>
8b	Please justify your answer _____ _____				

Student 1

9a Considering your year of study, was the level of this module (choose 1 only)?

too basic	appropriate	too difficult
-----------	-------------	---------------

9b Was the topic covered?

inadequately	adequately	too much in depth
--------------	------------	-------------------

9c If not covered adequately, please indicate where inadequate and suggest relevant topics/references.

10a Is the information in this module sufficient to enable you to take necessary preventative/treatment action according to your profession or area of interest?

Yes	No
-----	----

10b Is the information in this module appropriate for the specific needs and cultural context in South Africa?

Yes	No
-----	----

10c If no, please indicate which country specific information or tools should be included and used to strengthen the module

Section C: Content

1 Were you able to answer the questions in the quizzes correctly?

Yes	No
-----	----

2a Were you able to complete the recommended assignments?

Yes	No
-----	----

2b Were you able to work through the case studies?

Yes	No
-----	----

3 Was this the appropriate time in your training to study this module?

Yes	No
-----	----

4 If not, please recommend when it would be the most suitable time?

--	--	--	--	--	--	--	--

5 Did you learn something new about breastfeeding?

Yes	No
-----	----

6 The size of the window was optimal to view the content.

Strongly Agree	Agree	Disagree	Strongly disagree
----------------	-------	----------	-------------------

7 The following are easy to follow and use:

a. Icons	Yes	No
b. Menu tabs	Yes	No

8a The icons were familiar to me.

Strongly Agree	Agree	Disagree	Strongly disagree
----------------	-------	----------	-------------------

8b The colour scheme of the pages/slides was pleasing to the eye

Strongly Agree	Agree	Disagree	Strongly disagree
----------------	-------	----------	-------------------

9 Indicate the links you used?

a. Keywords	Yes	No
b. Internal links	Yes	No
c. External links	Yes	No

Section D: Mode of Delivery

1 How useful were the links?

Not useful	Somewhat useful	Very useful
------------	-----------------	-------------

2 How often did you click to see the definition of the keywords?

Never	Seldom	Most of the time	Always
-------	--------	------------------	--------

3 If you used external links, how much time did you spend on that link?

Briefly and returned to active module	Continued in that link
---------------------------------------	------------------------

4 Did you find the internal links?

a. Distractive	Yes	No
b. Useful	Yes	No
c. Time consuming	Yes	No

5 Did you find the external links?

a. Distractive	Yes	No
b. Useful	Yes	No
c. Time consuming	Yes	No
d. Costly	Yes	No

6a Could you relate to the visuals (photos/pictures) used?

Yes	No
-----	----

6b If not explain why _____

7 Did the visuals contribute to enhancing/clear understanding?

Yes	No
-----	----

8 Statement: I enjoyed the presentation and delivery method of this module

Strongly Agree	Agree	Disagree	Strongly disagree
----------------	-------	----------	-------------------

Appendix 5

Themes:

Section B: Administrative

Q 6:

Compared to conventional lectures do you anticipate this mode of learning to be:

- **Less effective**
- **Equally effective**
- **More effective**

Explain why:

Less effective = 3 experts, 1 student

Equally effective = 8 experts, 11 students

More effective = 5 experts, 5 students

Reasons:

Less effective:

Summary: Personal contact necessary to teach and explain bf concepts and clinical skills

E:

Impossible to teach clinical skills like position without visuals and hands-on learning. When a student struggles to grasp concept nothing is as effective as personal contact

Although nice to have it written. Understanding may be better in person (hands-on experience and learning)

S:

Not interactive. Loose concentration

Equally effective

Summary: Both lectures and computer training have Pro's and Con's Best used along with conventional methods

E:

Both lectures and computer training have Pro's and Con's

Often difficult to reach all staff at MOU's etc. This resource could overcome this.

More effective for those with little/no baseline BF

Students complete it at leisure

Not enough interaction. Student can browse through pages and not understand content. A lot like handouts

If student has continuous access to module then it is easy to return to info.

Need to have discussion session after completion of module to clear up questions and consolidate knowledge

Depends on type learner. Suits motivated/selflearners vs. those needing interaction and immediate feedback. Best used along with conventional methods

S:

Omdat dit interaktief is. Maklik verstaanbaar-kan teruggaan as jy wil recap
Something different and interactive. Can go though work at own pace. Change from listening to lecturer. Interactive means of self-sudy

Concept explained as if a person telling me about BF rather than reading from textbook

As jy iets hoor en sien versterk dit wat jy geleer het

Could go back and look at diagrams. Terms were explained but there was no one to ask questions or get input from

Very hands-on. Allows you to go back and revise. Sometimes in lecture limited time allocated does not allow this

Can recall and stop CD-not possible in conventional lectures. Can work at own pace

Information is very clear. Recaps and quizzes help important issues to stick without studying

Lecturing gives more practical examples, CD gives illustrational examples

It explains all the terms and gives case studies for examples

More effective

Summary: Very user friendly, Visual. Own pace. Own time. Recap and quizzes aids concentration.

E:

Time to ponder aspects you want to know more about and skip what you already understand

Can pace yourself and recap if unsure. Relaxed atmosphere

Very user friendly. Info divided into Modules-you never feel overwhelmed. Info is practical with sound scientific basis

Interactive, learner/self-controlled - timewise/pace; visual therefore learn more

I concentrated better. Quizzes helped concentration

Very user friendly. Don't sit with a lot of books/documents to page. Very well explained

Own pace. Own time. Recap

Comprehensive new technology used. Not necessary for multiple tools to teach BF as done currently

S:

Visual aids and easy to follow layout; can follow own pace; vividly explains BF

You can set your own pace. Can spend more time on certain module you regard as difficult or new info.

Gives info and then recaps. Quizzes retest your knowledge in interactive way.

There were visual pictures, recaps, quizzes and if you forget something you can go back and look it up again

After each section you can recap and quiz yourself on what you have learned.

Q 7

Would you recommend this module to other trainers?**Easy to use and suitable for distance education and self-education/study.****Provides all needed info in comprehensive, concise format.** Can be useful in hospitals wanting to become baby friendly, as self study to decrease lecture time

Justify:

Suitable for distance education and self-education

Comprehensive, more detail needed on some aspects. TB management incorrect according to NTB policy.

Some info needs to be updated/corrected

Practical, usual, time-saving, effective, Trainers do not always have time to repeat same training over and over

Valuable self study tool. Needs to be accompanied by personal interaction (conventional lectures)

Can be useful in hospitals wanting to become baby friendly to decrease lecture time

Information is good and complete. V. good to expand knowledge.

Excellent for small group work and individual BFHI training

Provides all needed info in comprehensive, concise manner with good scientific basis.

Easy to use. Does not require continuous supervision

Great tool to be completed in spare time. Easy and good format

Visual, effective

Informative, standardized information

Can be useful as self-study.

An innovative way to introduce BF

Convenience, practical, comprehensive

Saves contact time. Suits students who like to learn at own pace.

Summary: Thorough and complete. Easy to follow and understand. Recap and quiz sections reinforce knowledge learnt

Saam met ons klasse oor borsveeding is dit regtig 'n goeie voorbereidingd "tool"

Thorough and complete. I would take it one module at a time otherwise info overload for students.

Easy to follow and understand. Recap and quiz sections reinforce knowlegde learnt

Good way of learning about BF and reinforces what you learn in class.

Baie volledig en eenvoudig, veral diagramme, quizzes, recap gedeeltes. Maklik om te verstaan.

Very informative

Easy to follow; provides clear step by step descriptions of BF, effective to understand BF; Especially benefits to mom and child

Easy to understand, very complete and interactive

Verduidelik op manier wat maklik is om te verstaan. Prentjies sal help om te leer (See what you learn)

Interactive, informative, well-explained also with diagrams. Allows you to revise everything at your own pace.

Easy to use. I like the links to extra details/visuals. It enhances learning. Quizzes are useful way to check knowledge.

Very self-explanatory and user friendly.

It is very clear and you could go at own pace. Contains all important info you need to know.

Requires discipline to work through on own. If students have discipline can do it in free time.

Easy to go through & helps to recap knowledge already there

Very helpful and handy to study from

Complete and very interactive. All health professionals can use it.

Q 8:

Would you recommend this mode of learning for other courses?

E: In-service training. All pregraduate studies for health professionals

In-service training

Comprehensive, more detail needed on some aspects

Curriculae of other disciplines

Teaching basics as self-study leaves more time on the practice & application in advanced training.

All pregraduate studies for health professionals. Can be used for in-service training

Electronic media is way of future. Good mode of learning. Students will print it out anyway like handouts.

Well presented. Covers basics on which updates can be built.

Medical students (pediatrics) and paramedical (e.g student dietitians and nurses working in pediatrics)

Good way to present basic to in-depth info.

Effective in addition to hands-learning

No matter what the subject it can be made visual and interactive

Self study

The mode of learning will be enjoyed by students. Interactive

As long as module is comprehensive and doesn't leave many gaps that need to be addressed with other tools.

S: Any course covering infant feeding

Hierdie is kennis wat almal moet weet. Ek dink almal kan daarby bevoordeel word
Something different-need to work through it on own and not just listen. Quizzes = good way to reinforce knowledge

Essential to know about BF and is a good way to see it and how it is done correctly

There wasn't a section in the case if mother was HIV infected. Focus is on BF in general

Dit vat baie tyd en is nogal moeilik om selfdisipline toe te pas om alles deur te kyk
learner has opportunity to read content carefully and discovering things on own level
(Learning more)

Follow up session should be conducted to evaluate learning

Would be nice to have after block of lectures (practical aspects of particular subject).

Medical students would benefit as they get little practical training on BF

Allows you to go at your own pace

Any course covering infant feeding. It is practical and covers infant feeding in detail
Very informative

Would be easy to understand even if you don't study dietetics

BF plays important role in every paediatric module and is of grave importance. Can be used as revision tool

Could be done in own time. Should rather be used as recap of knowledge gained in class

Would create good awareness of BF in other courses
 Can work through CD on your own, at your pace. New stimulating way of learning.
 Recap section and quiz is very helpful

Q 9

Was the topic covered adequately?

Yes

Positioning of baby could be explained better.

Need some revision of TB management

Need diagrams of internal structure of breast. Liked the cartoons

Time BF-too long/too short-but variable:misleading Emphasize non-timed non-scheduled feeds. Finish 1 breast before going to other.

Would a link to breastfeeding.com be possible? Great videos on latching and feeding positions

Should have HIV breastfeeding module

No

Jean Ridler Letter

Section C – Content

Q 1

Is the information in this module appropriate for the specific needs and cultural context in SA?

Yes, but

Give warning about BF by surrogate mothers

Need to address common myths,e.g. burping on breast, sour milk

Could elaborate on Dutch medicines

Practical experience

Could look at food recommendations e.g. bread/maize instead of rice

Maybe a section about cultural beliefs influencing BF practices can be included

Session about cultural beliefs about BF would be good but not essential

Would be great if HIV section included info on DOH BF and HIV. Additional reading

If No:

Certain corrections needed in text before distribution

Incorporate HIV-very NB for South Africa

Q 6

Comments/Suggestions regarding quizzes, assignments or case studies

Could be expanded to >6 questions per unit

Ask the participant to choose answers in case study. More complex situation to bring different aspects together

Not specific. We could just have a letter explaining limitations of the resource-need real life practicals

Need more questions. More difficult multi-choice questions needed
 More quiz questions needed. More opportunity for interaction: ask questions, give task. Video clips would be useful and photos of BF/nipple probs. Photos could be better quality
 When student gives incorrect answer in quiz, explanation of correct answer could be given
 At the quiz questions add an explanation
 More questions could be included
 More questions-How do you know student completed the module
 Maybe include a variety of answers (multiple choice) and not only true/false
 More quiz questions
 Base the case study on specific learning outcomes

Q 7

Which time in student's training would you consider to be appropriate to study this module?

Neonatology in late clinical rotation
 Medical students 4th year and Dietetic students 3rd year
 First year
 Nutrition in the Lifecycle 2nd year
 2nd/3rd year
 2nd year
 3rd year, follow up in 4th year with more practical exp
 At the start and then later again
 Before practical exposure to working in PHC clinics/antenatal and pediatric wards in hospital
 2nd or 3rd year
 After 18 hour training by TOT
 Additional to practical BF training and discussion
 Community Nutrition/Health. 2nd/3rd year?
 4th year (beginning) or 3rd year end
 MBChB 3-6; Nurses
 2nd year: Introductory courses to nutrition through the lifecycle
 Coincide with nutrition in the lifecycle.

Section E – Other

Q2d Would you recommend this teaching tool for the presentation of other courses?

Obstetrics and gynaecology
 Introduction to hospitals for BFHI
 Ethics, Nutrition education, Health Promotion
 Medical, OT

HIV training programmes
Almost any course
18 hour peer counsellor training
Clinical evaluation of pts
All medical health professionals
18 hours for HCW (could elaborate)
MBChB undergraduates
Basic nutrition. Other lifecycle modules
Most nutrition modules



Appendix 6

BREASTFEEDING MODULE

OPENING QUESTIONNAIRE

SECTION 1: PERSONAL DETAILS

INSTRUCTIONS: Please place a cross "X" in the box next to the **ONE CORRECT** answer to the following questions. *Please answer ALL the questions.*

Student number:	CHOICE	ADMIN
1.1 Indicate your year of study:	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 1
1.2 Indicate your home language: a. Afrikaans b. English c. Xhosa d. Other-please specify:	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 2
1.3 Indicate your ethnic group: a. Asian b. Black c. Coloured c. White	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 3
1.4 Indicate your age: a. Younger than 19 years b. Between 19 and 21 years c. Between 21 and 23 years d. Older than 23 years	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 4
1.5 Indicate your gender: a. Female b. Male	<input type="checkbox"/> 1 <input type="checkbox"/> 2	<input type="checkbox"/> 5

SECTION 2:

INSTRUCTIONS: Please place a cross "X" in the box next to the **ONE MOST CORRECT** answer to the following questions. *Please read ALL the possible answers before deciding on the best choice. Please answer ALL questions.*

Example: The "Ten Steps to Successful Breastfeeding" recommend that mothers initiate breastfeeding:

- a. Within an hour of the birth of the baby ☐
- b. As soon as possible after the birth of the baby ☐
- c. Within half an hour of the birth of the baby ☒

	CHOICE	ADMIN
2.1 The central role-players in the breastfeeding relationship are: a. The mother and baby b. The mother, baby and health worker c. The mother and health worker d. The mother and her support system	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 6
2.2 The Innocenti Declaration and the World Health Assembly Resolution 47.5 state that: a. All babies should be breastfed for about six months before being weaned b. All babies should be breastfed for the first two years of life and beyond c. All babies should be exclusively breastfed for four to six months, thereafter breastfeeding should continue for two years and beyond d. All babies should be given solid food at four months of age	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 7
2.3 One of the main reasons why mothers stop breastfeeding is: a. They lack knowledge and confidence in their own abilities to breastfeed b. They do not listen to the nursing staff's advice c. They are malnourished d. They have flat nipples	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 8
2.4 The amount of prolactin secreted is influenced by various factors. In the early stages of breastfeeding, the factor that has the most important influence is: a. Sucking or other nipple stimulation b. Genetic factors in the mother c. Rest and sleep d. The size of the mother's breasts	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 9
2.5 The nutritional value of 5 ml of colostrum is equivalent to: a. 250 ml mature breastmilk b. 5 ml mature breastmilk c. 30 ml mature breastmilk d. 1 ml mature breastmilk	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 10

		CHOICE	POINTS
2.6	The most common cause of sore nipples is:		
a.	Tongue thrusting by the baby	<input type="checkbox"/> 1	<input type="checkbox"/> 11
b.	Engorgement	<input type="checkbox"/> 2	
c.	Short frenulum (tongue tie)	<input type="checkbox"/> 3	
d.	Incorrect breastfeeding position	<input type="checkbox"/> 4	
2.7	A mother with inverted nipples needs to know:		
a.	That she will not be able to breastfeed	<input type="checkbox"/> 1	<input type="checkbox"/> 12
b.	That it is essential to prepare her breasts during pregnancy using Hoffman's techniques	<input type="checkbox"/> 2	
c.	That with practice and persistence most babies will be able to breastfeed no matter what type of nipple she has	<input type="checkbox"/> 3	
d.	That she must use nipple shields during breastfeeds	<input type="checkbox"/> 4	
2.8	The main cause for a mother not having enough milk is:		
a.	Engorgement	<input type="checkbox"/> 1	<input type="checkbox"/> 13
b.	The breast is not stimulated regularly	<input type="checkbox"/> 2	
c.	The mother does not drink enough fluids	<input type="checkbox"/> 3	
d.	Genetic factors in the mother	<input type="checkbox"/> 4	
e.	Breastfeeding too often	<input type="checkbox"/> 5	
2.9	If mothers ask how often babies should breastfeed, your reply should be:		
a.	"Every four hours"	<input type="checkbox"/> 1	<input type="checkbox"/> 14
b.	"Let's discuss supply and demand, and how the breasts work" ..	<input type="checkbox"/> 2	
c.	"No more than five hours between feeds"	<input type="checkbox"/> 3	
d.	"When your breasts become full and uncomfortable"	<input type="checkbox"/> 4	
2.10	The baby's sucking reflex is the strongest:		
a.	During the first 60-120 minutes after birth	<input type="checkbox"/> 1	<input type="checkbox"/> 15
b.	During the first 30-40 minutes after birth	<input type="checkbox"/> 2	
c.	During the first 24 hours after birth	<input type="checkbox"/> 3	
d.	During the first 3 days after birth	<input type="checkbox"/> 4	
2.11	The most helpful information you can give to mothers about their diet during breastfeeding is:		
a.	Avoid spicy foods and curries	<input type="checkbox"/> 1	<input type="checkbox"/> 16
b.	Drink 7 litres of fluids per day	<input type="checkbox"/> 2	
c.	Eat a variety of foods - everything in moderation	<input type="checkbox"/> 3	
d.	Avoid foods such as cabbages, tomatoes, pineapple and garlic ..	<input type="checkbox"/> 4	
2.12	The best way of feeding a baby whose mother works is:		
a.	Infant formula from a bottle	<input type="checkbox"/> 1	<input type="checkbox"/> 17
b.	Expressed breastmilk from a bottle	<input type="checkbox"/> 2	
c.	Infant formula from a cup or spoon	<input type="checkbox"/> 3	
d.	Expressed breastmilk from a cup or spoon	<input type="checkbox"/> 4	

	CHOICE	ADMIN
2.13 The golden rule of breastfeeding is: a. The more often the baby sucks at the breast the more milk will be produced b. Babies need to be fed two and a half to three hourly c. Mothers need good food and adequate rest d. Babies need to be held close	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 18
2.14 Your advice to HIV infected mothers should be: a. The mother should always breastfeed her baby, as the chance of the baby dying of malnutrition and diarrhoea are far higher than those of becoming HIV infected b. The feeding method depends on the mother's circumstances .. c. The feeding method is ultimately the mother's own choice, provided that she has sufficient information to make an informed choice d. Under no circumstances should the baby be breastfed, as the chances of the baby becoming HIV infected are too high	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 19

SECTION 3:

INSTRUCTIONS: Please place a cross "X" in the box/es next to all the statements which you AGREE with. You may agree with MORE THAN ONE of the answers per question. Please answer ALL questions.

Example: Health workers can give the mother confidence by:

- a. Showing her respect ☒
 b. Giving her plenty of advice ☐
 c. Showing her that you are the expert ☐
 d. Giving her positive reinforcements ☒

	CHOICE	ADMIN
3.1 The following points are important in assessing whether the baby is correctly positioned at the breast: a. The mother should be comfortable b. The baby's nose is away from the breast in order to allow the baby to breathe easily c. The mother should use the "C" hold and not the "scissor" hold .. d. The baby should be facing the breast - "tummy to tummy"	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23
3.2 A healthy full-term baby requires complementary or supplementary fluids: a. When he/she is jaundiced b. If the weather is very hot or humid c. After a long and strenuous labour d. When the mother is still recovering after a caesarian section ...	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> 24 <input type="checkbox"/> 25 <input type="checkbox"/> 26 <input type="checkbox"/> 27

		CHOICE	ADDED
3.3	You can enable mothers to continue exclusive breastfeeding for the recommended time by:		
a.	Providing mothers with the necessary support and correct information	<input type="checkbox"/>	<input type="checkbox"/> 28
b.	Having a written breastfeeding policy	<input type="checkbox"/>	<input type="checkbox"/> 29
c.	Helping mothers initiate breastfeeding within half an hour of birth	<input type="checkbox"/>	<input type="checkbox"/> 30
d.	Encouraging formula companies to follow the "Code for the Marketing of Breastmilk Substitutes"	<input type="checkbox"/>	<input type="checkbox"/> 31
3.4	The benefits of rooming-in are:		
a.	The mother gets the most rest	<input type="checkbox"/>	<input type="checkbox"/> 32
b.	The mother learns to respond to her baby's needs	<input type="checkbox"/>	<input type="checkbox"/> 33
c.	The baby receives better general care	<input type="checkbox"/>	<input type="checkbox"/> 34
d.	The staff have more time for effective mother/baby care	<input type="checkbox"/>	<input type="checkbox"/> 35
3.5	The following can be used to assess the Baby-Friendliness of a maternity unit		
a.	The "Ten Steps to Successful Breastfeeding"	<input type="checkbox"/>	<input type="checkbox"/> 36
b.	A survey of mothers breastfeeding after delivery and discharge ..	<input type="checkbox"/>	<input type="checkbox"/> 37
c.	Checklist for promoting breastfeeding	<input type="checkbox"/>	<input type="checkbox"/> 38
d.	The opinion of the Matron-in-charge	<input type="checkbox"/>	<input type="checkbox"/> 39
3.6	The main practices in maternity units which could discourage breastfeeding are:		
a.	Late first feeds	<input type="checkbox"/>	<input type="checkbox"/> 40
b.	Separating the mother and baby	<input type="checkbox"/>	<input type="checkbox"/> 41
c.	Complementary and supplementary feeds	<input type="checkbox"/>	<input type="checkbox"/> 42
d.	Conflicting advice from the staff	<input type="checkbox"/>	<input type="checkbox"/> 43
3.7	The following are signs of a thrush-infection:		
a.	Nipples become itchy and the surrounding area painful or tender	<input type="checkbox"/>	<input type="checkbox"/> 44
b.	No changes in colour are seen around the nipple	<input type="checkbox"/>	<input type="checkbox"/> 45
c.	The baby may have a nappy rash	<input type="checkbox"/>	<input type="checkbox"/> 46
d.	Red spots appear in the baby's mouth	<input type="checkbox"/>	<input type="checkbox"/> 47
3.8	Engorgement is best treated by:		
a.	Using a breast pump	<input type="checkbox"/>	<input type="checkbox"/> 48
b.	Gentle massage by the mother in a warm bath or shower	<input type="checkbox"/>	<input type="checkbox"/> 49
c.	Avoiding breastfeeding on the affected side	<input type="checkbox"/>	<input type="checkbox"/> 50
d.	Frequent breastfeeding, as long and as often as necessary to satisfy the baby	<input type="checkbox"/>	<input type="checkbox"/> 51

	CHOICE	ADMIN
3.9 The following may cause mastitis:		
a. Engorgement	<input type="checkbox"/>	<input type="checkbox"/> 52
b. Breastfeeding too often	<input type="checkbox"/>	<input type="checkbox"/> 53
c. Incorrect positioning of the baby at the breast	<input type="checkbox"/>	<input type="checkbox"/> 54
d. Ill-fitting bra	<input type="checkbox"/>	<input type="checkbox"/> 55
3.10 The following conditions are acceptable medical reasons for using supplementary feeds:		
a. Galactosaemia	<input type="checkbox"/>	<input type="checkbox"/> 56
b. Jaundice	<input type="checkbox"/>	<input type="checkbox"/> 57
c. Active herpes lesions on both of the mother's breasts	<input type="checkbox"/>	<input type="checkbox"/> 58
d. Malnourished mother	<input type="checkbox"/>	<input type="checkbox"/> 59

SECTION 4:

INSTRUCTIONS: Please place a cross "X" in the **ONE** box which reflects your choice best, by using the scale below. *Please answer ALL questions.*

	CHOICE	ADMIN
SCALE: 5 = Strongly agree 4 = Agree 3 = Neither agree nor disagree 2 = Disagree 1 = Strongly disagree 0 = Cannot answer <div style="text-align: center;"> </div>		
4.1 Health workers are the most influential people in determining the breastfeeding patterns of South African mothers	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	<input type="checkbox"/> 60
4.2 South Africa follows the world-wide trend in the decline in the duration of breastfeeding	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	<input type="checkbox"/> 61
4.3 The breastfeeding success rate increases where staff receive regular in-service training	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	<input type="checkbox"/> 62
4.4 Health services often introduce routines and procedures that interfere with the success of breastfeeding	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	<input type="checkbox"/> 63
4.5 It is still possible for a mother with flat and inverted nipples to successfully breastfeed	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	<input type="checkbox"/> 64
4.6 Sunlight on the nipples can be useful to treat thrush	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	<input type="checkbox"/> 65
4.7 A breast abscess will develop if mastitis is not treated	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	<input type="checkbox"/> 66
4.8 A mother must stop breastfeeding if she develops thrush, mastitis, breast abscess and repeated breast infections	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	<input type="checkbox"/> 67
4.9 Where the safe use of alternatives is not possible, breastfeeding by the biological mother should continue to be the feeding method of choice, irrespective of her HIV-infection status	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	<input type="checkbox"/> 68

	CHOICE	ADMIN
4.10 Premature babies benefit from breastfeeding	<input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/>	<input type="checkbox"/> 69
4.11 Restricted feeding times prevent sore nipples from developing ..	<input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/>	<input type="checkbox"/> 70
4.12 Babies at risk for hypoglycaemia benefit from immediate breastfeeding	<input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/>	<input type="checkbox"/> 71
4.13 Complementing or supplementing colostrum with fluids can interfere with the milk ejection reflex	<input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/>	<input type="checkbox"/> 72
4.14 Test weighing is useful in the routine assessment of breastmilk intake by healthy infants	<input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/>	<input type="checkbox"/> 73
4.15 Supplementing the malnourished mother's diet is more effective and healthier than supplementing the baby's diet	<input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/>	<input type="checkbox"/> 74
4.16 Mothers need to supplement their babies' feeds when they go through growth spurts at about 10 days, 6 weeks and 3 months	<input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/>	<input type="checkbox"/> 75
4.17 Breastfed babies have softer stools than those fed on an infant formula	<input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/>	<input type="checkbox"/> 76
4.18 Health workers need to set an example to the community by choosing to breastfeed their own babies	<input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/>	<input type="checkbox"/> 77
4.19 Health workers' attitudes to breastfeeding influence mothers' decisions regarding the feeding of their babies	<input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/>	<input type="checkbox"/> 78

THANK YOU! YOUR CO-OPERATION IS MUCH APPRECIATED!

Appendix 7

BREASTFEEDING MODULE

FINAL QUESTIONNAIRE

SECTION 1:

INSTRUCTIONS: Please place a cross "X" in the box next to the **ONE MOST CORRECT** answer to the following questions. *Please read ALL the possible answers before deciding on the best choice. Please answer ALL questions.*

Example: The "Ten Steps to Successful Breastfeeding" recommend that mothers initiate breastfeeding:

- a. Within an hour of the birth of the baby ☐
- b. As soon as possible after the birth of the baby ☐
- c. Within half an hour of the birth of the baby ☒

Student number:		CHOICE	ADMIN
		ID number	<input type="text"/> <input type="text"/> <input type="text"/>
1.1	The central role-players in the breastfeeding relationship are:		
a.	The mother and baby	<input type="checkbox"/> 1	<input type="checkbox"/> 1
b.	The mother, baby and health worker	<input type="checkbox"/> 2	
c.	The mother and health worker	<input type="checkbox"/> 3	
d.	The mother and her support system	<input type="checkbox"/> 4	
1.2	The Innocenti Declaration and the World Health Assembly Resolution 47.5 state that:		
a.	All babies should be breastfed for about six months before being weaned	<input type="checkbox"/> 1	<input type="checkbox"/> 2
b.	All babies should be breastfed for the first two years of life and beyond	<input type="checkbox"/> 2	
c.	All babies should be exclusively breastfed for four to six months, thereafter breastfeeding should continue for two years and beyond	<input type="checkbox"/> 3	
d.	All babies should be given solid food at four months of age ...	<input type="checkbox"/> 4	
1.3	One of the main reasons why mothers stop breastfeeding is:		
a.	They lack knowledge and confidence in their own abilities to breastfeed	<input type="checkbox"/> 1	<input type="checkbox"/> 3
b.	They do not listen to the nursing staff's advice	<input type="checkbox"/> 2	
c.	They are malnourished	<input type="checkbox"/> 3	
d.	They have flat nipples	<input type="checkbox"/> 4	

	CHOICE	ADMIN
1.4 The amount of prolactin secreted is influenced by various factors. In the early stages of breastfeeding, the factor that has the most important influence is: a. Sucking or other nipple stimulation b. Genetic factors in the mother c. Rest and sleep d. The size of the mother's breasts	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 4
1.5 The nutritional value of 5 ml of colostrum is equivalent to: a. 250 ml mature breastmilk b. 5 ml mature breastmilk c. 30 ml mature breastmilk d. 1 ml mature breastmilk	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 5
1.6 The most common cause of sore nipples is: a. Tongue thrusting by the baby b. Engorgement c. Short frenulum (tongue tie) d. Incorrect breastfeeding position	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 6
1.7 A mother with inverted nipples needs to know: a. That she will not be able to breastfeed b. That it is essential to prepare her breasts during pregnancy using Hoffman's techniques c. That with practice and persistence most babies will be able to breastfeed no matter what type of nipple she has d. That she must use nipple shields during breastfeeds	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 7
1.8 The main cause for a mother not having enough milk is: a. Engorgement b. The breast is not stimulated regularly c. The mother does not drink enough fluids d. Genetic factors in the mother e. Breastfeeding too often	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	<input type="checkbox"/> 8
1.9 If mothers ask how often babies should breastfeed, your reply should be: a. "Every four hours" b. "Let's discuss supply and demand, and how the breasts work" c. "No more than five hours between feeds" d. "When your breasts become full and uncomfortable"	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 9

	CHOICE	ADMIN
1.10 The baby's sucking reflex is the strongest: a. During the first 60-120 minutes after birth b. During the first 30-40 minutes after birth c. During the first 24 hours after birth d. During the first 3 days after birth	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 10
1.11 The most helpful information you can give to mothers about their diet during breastfeeding is: a. Avoid spicy foods and curries b. Drink 7 litres of fluids per day c. Eat a variety of foods - everything in moderation d. Avoid foods such as cabbages, tomatoes, pineapple and garlic ...	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 11
1.12 The best way of feeding a baby whose mother works is: a. Infant formula from a bottle b. Expressed breastmilk from a bottle c. Infant formula from a cup or spoon d. Expressed breastmilk from a cup or spoon	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 12
1.13 The golden rule of breastfeeding is: a. The more often the baby sucks at the breast the more milk will be produced b. Babies need to be fed two and a half to three hourly c. Mothers need good food and adequate rest d. Babies need to be held close	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 13
1.14 Your advice to HIV infected mothers should be: a. The mother should always breastfeed her baby, as the chance of the baby dying of malnutrition and diarrhoea are far higher than those of becoming HIV-infected b. The feeding method depends on the mother's circumstances c. The feeding method is ultimately the mother's own choice, provided that she has sufficient information to make an informed choice d. Under no circumstances should the baby be breastfed, as the chances of the baby becoming HIV-infected are too high	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	<input type="checkbox"/> 14

Questionnaire continues on next page...

SECTION 2:

INSTRUCTIONS: Please place a cross "X" in the box/es next to all the statements which you AGREE with. You may agree with MORE THAN ONE of the statements per question. Please answer ALL questions.

Example: Health workers can give the mother confidence by:

- a. Showing her respect ☒
- b. Giving her plenty of advice ☐
- c. Showing her that you are the expert ☐
- d. Giving her positive reinforcements ☒

	CHOICE	ADMIN
2.1 The following points are important in assessing whether the baby is correctly positioned at the breast:		
a. The mother should be comfortable	<input type="checkbox"/>	<input type="checkbox"/> 15
b. The baby's nose is away from the breast in order to allow the baby to breathe easily	<input type="checkbox"/>	<input type="checkbox"/> 16
c. The mother should use the "C" hold and not the "scissor" hold ..	<input type="checkbox"/>	<input type="checkbox"/> 17
d. The baby should be facing the breast - "tummy to tummy"	<input type="checkbox"/>	<input type="checkbox"/> 18
2.2 A healthy full-term baby requires complementary or supplementary fluids:		
a. When he/she is jaundiced	<input type="checkbox"/>	<input type="checkbox"/> 19
b. If the weather is very hot or humid	<input type="checkbox"/>	<input type="checkbox"/> 20
c. After a long and strenuous labour	<input type="checkbox"/>	<input type="checkbox"/> 21
d. When the mother is still recovering after a caesarian section ...	<input type="checkbox"/>	<input type="checkbox"/> 22
2.3 You can enable mothers to continue exclusive breastfeeding for the recommended time by:		
a. Providing mothers with the necessary support and correct information	<input type="checkbox"/>	<input type="checkbox"/> 23
b. Having a written breastfeeding policy	<input type="checkbox"/>	<input type="checkbox"/> 24
c. Helping mothers initiate breastfeeding within half an hour of birth	<input type="checkbox"/>	<input type="checkbox"/> 25
d. Encouraging formula companies to follow the "Code for the Marketing of Breastmilk Substitutes"	<input type="checkbox"/>	<input type="checkbox"/> 26
2.4 The benefits of rooming-in are:		
a. The mother gets the most rest	<input type="checkbox"/>	<input type="checkbox"/> 27
b. The mother learns to respond to her baby's needs	<input type="checkbox"/>	<input type="checkbox"/> 28
c. The baby receives better general care	<input type="checkbox"/>	<input type="checkbox"/> 29
d. The staff have more time for effective mother/baby care	<input type="checkbox"/>	<input type="checkbox"/> 30
2.5 The following can be used to assess the Baby-Friendliness of a maternity unit:		
a. The "Ten Steps to Successful Breastfeeding"	<input type="checkbox"/>	<input type="checkbox"/> 31
b. A survey of mothers breastfeeding after delivery and discharge	<input type="checkbox"/>	<input type="checkbox"/> 32
c. Checklist for promoting breastfeeding	<input type="checkbox"/>	<input type="checkbox"/> 33
d. The opinion of the Matron-in-charge	<input type="checkbox"/>	<input type="checkbox"/> 34

	CHOICE	ADMIN
2.6 The main practices in maternity units which could discourage breastfeeding are: a. Late first feeds b. Separating the mother and baby c. Complementary and supplementary feeds d. Conflicting advice from the staff	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> 35 <input type="checkbox"/> 36 <input type="checkbox"/> 37 <input type="checkbox"/> 38
2.7 The following are signs of a thrush-infection: a. Nipples become itchy and the surrounding area painful or tender b. No changes in colour are seen around the nipple c. The baby may have a nappy rash d. Red spots appear in the baby's mouth	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> 39 <input type="checkbox"/> 40 <input type="checkbox"/> 41 <input type="checkbox"/> 42
2.8 Engorgement is best treated by: a. Using a breast pump b. Gentle massage by the mother in a warm bath or shower c. Avoiding breastfeeding on the affected side d. Frequent breastfeeding, as long and as often as necessary to satisfy the baby	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> 43 <input type="checkbox"/> 44 <input type="checkbox"/> 45 <input type="checkbox"/> 46
2.9 The following may cause mastitis: a. Engorgement b. Breastfeeding too often c. Incorrect positioning of the baby at the breast d. Ill-fitting bra	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> 47 <input type="checkbox"/> 48 <input type="checkbox"/> 49 <input type="checkbox"/> 50
2.10 The following conditions are acceptable medical reasons for using supplementary feeds: a. Galactosaemia b. Jaundice c. Active herpes lesions on both of the mother's breasts d. Malnourished mother	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> 51 <input type="checkbox"/> 52 <input type="checkbox"/> 53 <input type="checkbox"/> 54

Questionnaire continues on next page...

SECTION 3:

INSTRUCTIONS: Please place a cross "X" in the **ONE** box which reflects your choice best, by using the scale below. *Please answer ALL questions.*

SCALE:		CHOICE	ADMIN
5 = Strongly agree 4 = Agree 3 = Neither agree nor disagree 2 = Disagree 1 = Strongly disagree 0 = Cannot answer			
3.1	Health workers are the most influential people in determining the breastfeeding patterns of South African mothers	0 1 2 3 4 5	<input type="checkbox"/> 55
3.2	South Africa follows the world-wide trend in the decline in the duration of breastfeeding	0 1 2 3 4 5	<input type="checkbox"/> 56
3.3	The breastfeeding success rate increases where staff receive regular in-service training	0 1 2 3 4 5	<input type="checkbox"/> 57
3.4	Health services often introduce routines and procedures that interfere with the success of breastfeeding	0 1 2 3 4 5	<input type="checkbox"/> 58
3.5	It is still possible for a mother with flat and inverted nipples to successfully breastfeed	0 1 2 3 4 5	<input type="checkbox"/> 59
3.6	Sunlight on the nipples can be useful to treat thrush	0 1 2 3 4 5	<input type="checkbox"/> 60
3.7	A breast abscess will develop if mastitis is not treated	0 1 2 3 4 5	<input type="checkbox"/> 61
3.8	A mother must stop breastfeeding if she develops thrush, mastitis, breast abscess and repeated breast infections	0 1 2 3 4 5	<input type="checkbox"/> 62
3.9	Where the safe use of alternatives is not possible, breastfeeding by the biological mother should continue to be the feeding method of choice, irrespective of her HIV-infection status	0 1 2 3 4 5	<input type="checkbox"/> 63
3.10	Premature babies benefit from breastfeeding	0 1 2 3 4 5	<input type="checkbox"/> 64
3.11	Restricted feeding times prevent sore nipples from developing ..	0 1 2 3 4 5	<input type="checkbox"/> 65
3.12	Babies at risk for hypoglycaemia benefit from immediate breastfeeding	0 1 2 3 4 5	<input type="checkbox"/> 66
3.13	Complementing or supplementing colostrum with fluids can interfere with the milk ejection reflex	0 1 2 3 4 5	<input type="checkbox"/> 67
3.14	Test weighing is useful in the routine assessment of breastmilk intake by healthy infants	0 1 2 3 4 5	<input type="checkbox"/> 68
3.15	Supplementing the malnourished mother's diet is more effective and healthier than supplementing the baby's diet	0 1 2 3 4 5	<input type="checkbox"/> 69
3.16	Mothers need to supplement their babies' feeds when they go through growth spurts at about 10 days, 6 weeks and 3 months	0 1 2 3 4 5	<input type="checkbox"/> 70
3.17	Breastfed babies have softer stools than those fed on an infant formula	0 1 2 3 4 5	<input type="checkbox"/> 71
3.18	Health workers need to set an example to the community by choosing to breastfeed their own babies	0 1 2 3 4 5	<input type="checkbox"/> 72
3.19	Health workers' attitudes to breastfeeding influence mothers' decisions regarding the feeding of their babies	0 1 2 3 4 5	<input type="checkbox"/> 73

1

Should you wish to add any comments, please feel free to do so:

This image shows a full page of primary-ruled paper. It features ten sets of horizontal lines, each consisting of a solid top line, a dashed middle line, and a solid bottom line. The lines are evenly spaced across the entire page, providing a guide for letter height and placement. There are no margins, text, or other markings on the paper.

THANK YOU! YOUR CO-OPERATION IS MUCH APPRECIATED!

Appendix 8

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM

TITLE OF THE RESEARCH PROJECT:

Computer-based Breastfeeding training for South African undergraduate dietetic students

REFERENCE NUMBER: NO6/06/114

PRINCIPLE INVESTIGATOR: Mrs. LM du Plessis

ADDRESS: Department of Human Nutrition, PO Box 19063, Tygerberg, 7505

CONTACT NUMBER: (021) 938 9175

You are invited to take part in a research project. Please take some time to read this information, which explains the details of this project. Please ask the investigator any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied and that you clearly understand what this research study aims to achieve as well as how you could be involved. Your participation is **entirely voluntary** and you are free to decline to participate. If you decline participation, it will not affect you negatively in any way whatsoever and you will continue receiving teaching at this institution, as before, without any detriment to you. You are also free to withdraw from the study at any point, even if you do initially agree to take part. The study leader also reserves the right to withdraw you from the study should it be necessary.

This study has been approved by the Committee for Human Research at Stellenbosch University and will be conducted according to the ethics guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethics Guidelines for Research.

What is this research study all about?

The objectives of this study is:

1. To adapt and validate an Indian computer-based undergraduate breastfeeding training module intended for use by South African undergraduate dietetic students
2. To evaluate the impact of a computer-based breastfeeding training module on knowledge acquisition in South African undergraduate Dietetic students from US and UWC

I hope that the evaluation will identify training opportunities in current breastfeeding training and the recommendation which will be made will lead to the strengthening and improvements of such programmes.

Why have you been invited to participate?

- All second and third year US and second year UWC Dietetic students will be invited to participate.

What will your responsibilities be?

- You should answer the questions as clearly as possible once only. You are welcome to ask any questions if there is something that you do not understand.

Will you benefit from taking part in this research?

It is envisaged that your participation in this research will lead to the acquisition of knowledge in breastfeeding, a fundamental topic in public health nutrition in South Africa and the world.

Are there any risks involved in taking part in this research?

- There are no risks involved for you by participating in the study.

What will happen in the unlikely event of you getting injured in any way, as a direct result of taking part in this research study?

- You will be expected to answer some questions only. So there are no dangers of any type that you will be exposed to by participating in the study.

Will you be paid to take part in this study and are there any costs involved?

- No, you will not be paid to take part in the study. There will be no costs involved for you.

Is there anything else that you should know or do?

- You can contact the Department of Human Nutrition at 021-938 9259 if you have any concerns or complaints that have not been adequately addressed by the research personnel.
- You will receive a copy of this information and consent form for your own records.

By signing below, I (**name**)..... agree to take part in a research study entitled:- Computer-based Breastfeeding training for South African undergraduate dietetic students

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*).....on (*date*) 2006

.....
Signature

.....
Signature of Witness.

Declaration by Investigator



I (name)declare that:-

- I explained the information in this document to
- I encouraged him/her/they to ask questions and took adequate time to answer them.
- I am satisfied that he/she/they adequately understand all aspects of the research, as discussed above
- I did not use an interpreter

Signed at (*place*).....on (*date*) 2006

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Signature of Investigator

.....
Signature of Witness