

CHAPTER 5

Conclusions and recommendations

5.1 Introduction

The motivation for this study, as outlined in chapter 1, section 1.3, is based on (1) what needs to be done to produce an effective interdisciplinary postgraduate distance education course in nutrition and HIV and AIDS aimed at adult learners from previously disadvantaged communities with limited nutrition knowledge and (2) to what extent e-learning can be used to address the limited nutrition knowledge of learners and to communicate knowledge about nutrition and HIV and AIDS while encouraging self-directed exploration knowledge formation. I then formulated the following research problem to reflect the motivation:

What factors and constraints need to be considered when designing, developing and implementing a distance education course comprising a combination of media and technologies for the effective teaching of nutrition and HIV and AIDS at a South African distance education university?

The research problem was then narrowed down to eight sub-questions in order to establish possible solutions. The study addressed each sub-question by means of an analysis of the published literature, by analysing how the findings of the project shed light on each research sub-question, and how each sub-question illuminated (in a wider sense) the remaining sub-questions, and the research question in general. The answers to the research sub-questions permitted the me to determine how the teaching of learners in the field of nutrition and HIV and AIDS could be made more effective by utilizing a distance education course that comprises a combination of media and technologies.

Chapter 2 comprises an analysis of the reported research relevant to each specific sub-question of the main research question. Chapter 3 answered sub-questions 2, 3, 4, 5, 7 and 8 by reporting on case studies drawn from learner involvement with the learning website. Chapter 4 drew together all the results from the statistical analysis in order to answer the research questions. Chapter 5 closes with concluding remarks about the study and recommendations for further research and development.

5.2 Findings and results collected from the research

What follows is a discussion and analysis of the data that I obtained from the research that I reported in chapters 2, 3 and 4. I answered each research question by analysing the data obtained from the literature study, questionnaires, observations, learner interviews, discussions, and the evaluation of the learning website.

5.2.1 Pressures on distance higher education

Research Question 1

What pressures are put on South African distance higher education institutions to provide postgraduate flexible learning to adult learners from previously disadvantaged communities?

The South African education system is currently challenged by an increasing demand for education. Higher education institutions need to provide alternative means of offering education by incorporating distance education and e-learning to increase access and meet adult learners learning needs within the framework of life-long learning (Charp, 2003:8; Bose, 2003:[Online]; Grooms, 2003:[Online]; Abouchedid & Eid, 2004:15; Ally, 2004:5; Zentel et al, 2004:237). There are researchers that are of the view that distance education and e-learning may be a more appropriate way of delivering education to groups of learners who come from different ethnic backgrounds, and whose needs and expectations, prior education and life experience, personal learning styles and abilities vary considerably (Mutula, 2002:99; Beller & Or, 2003:24). The results of this study as reported in chapters 3 and 4 on the learner profile indicate that the learners enrolled for the Social Behavioural Studies in HIV and AIDS Honours Programme fit this profile and that delivering their educational needs by means of distance education and e-learning will be more appropriate.

The most important role-players in the demand for more flexible and effective education are the learners themselves (Anon, 2001:[Online]). When the nutrition and HIV and AIDS course was designed and developed the needs and requirements of the adult learners mostly from previous disadvantaged communities were viewed as very important. The research results indicated that most of the learners conform to a distinctive profile with specific training needs and requirements. The adult learner profile, as reported in this research, coincides well that derived from the analysis of the literature.

Table 5.1 on the next page summarises the adult learner profile, and shows age, work status, gender, and personal circumstances reported (1) by the literature in chapter 2 and (2) by the results of this research in chapters 3 and 4.

Table 5.1: An integrated summary of the adult learner profile as reported by the literature and the results of this research

Classification	Literature analysis	Reported research
Age	Adults, older than 25 years	The majority of learners are older than 25 years (91,1%).
Work status	Working full time or part time	The majority of learners are working (78,8%).
Gender	A large number are female.	Most of the learners are female (71,75%).
Personal circumstances	Family commitments, women with children, single parents, financial constraints	Many learners indicated that they have family commitments, are women with children, are single parents, and that they have limited financial resources.

This table shows that the most of the learners are older, working adults. They are mainly females with children and family commitments, and have limited financial resources.

The needs and requirements identified by the management committee of the Social Behavioural Studies in HIV and AIDS Honours Programme, by the learners themselves, and by other role players, for the most part coincide with the findings that arise from a analysis of the reported research.

Table 5.2 on the next page is a summary of how the course met the distance education needs and requirements of the adult learners reported in chapters 3 and 4 by designing for them a combination of media and technology. The needs and requirements of learners (as identified from a analysis of the literature and the research itself) can be categorised under the headings of delivery options, course design, delivery, teaching approach, flexibility, presentation, course format, interaction and support.

Table 5.2: What the learners needed and required from distance education and how and to what extend the course met these needs and requirements

Needs and requirements	How and to what extend such needs and requirements were met by the course
Delivery options	The course incorporated a variety of delivery options, including paper format, the learning website, contact sessions, communication channels and video conferencing.
Course design	The course is well designed. It provides engaging and intellectually challenging activities, quizzes and assignments.
Delivery	Delivery did not proceed as seamlessly and reliably as was expected. Technical matters such as servers being down, limited bandwidth, accessibility, and the vagaries of the postal service, were major problems that need to be addressed.
Teaching approach	Because the course is outcomes-based, a learner-centred approach was followed.
Flexibility	The provision of two dates for submitting assignments to the lecturer created more flexibility.
Presentation	Interactive activities were incorporated where possible, and content was integrated with problem-based real-life situations.
Course format	The course is offered in a modularised format. This offers learners some flexibility.
Interaction	Assignments are formulated in such a manner that learners have to interact with the community that is affected by HIV and AIDS as well as their learning community and lecturers/facilitators.
Support	Although academic advisory and student support services were deficient, the degree management committee provides as much support as possible and the situation is improving.

The distance education course (as described in table 5.2) met the majority of identified needs and requirements. Compliance with some needs and requirements (such as delivery and support) are not satisfactory and need improvement.

5.2.2 The value that e-learning can add to a distance education course

Research Question 2

How can e-learning and the Internet be implemented in such a way so as to add value to a distance education postgraduate course in nutrition and HIV and AIDS?

After an analysis of the literature and the evaluation of the learning website, I concluded that e-learning can add value to this distance education course in nutrition and HIV and AIDS. The website offers learners the opportunity to access background knowledge and information on nutrition and HIV and AIDS which cannot be included in the printed format because of how the degree is structured and because of cost constraints. Utilizing e-learning as a means of training offers at least three distinctive advantages.

Firstly, learners are not “dumped” in cyberspace where they have to find their own way. Instead, they are immediately linked to appropriate websites and other documentation that provide them with immediately relevant knowledge and whatever information they may need. From these links they can venture out to other sites and resources.

Secondly, many learners are located in remote areas with very limited (if any) resources of the kind that we associate with an urban society. Learners often complain they cannot find information. Unfortunately, learners are usually unable to find the information they need because (1) they have not acquired the skill of tracking down information during their undergraduate studies, and (2) the information obtainable from Vista University relevant to this relatively new field (nutrition and HIV and AIDS) is limited. But the website provides learners with the means of finding at least *some* of the relevant information and knowledge that they need. The availability of the website as a component of the distance education course means that learners at least have a choice of either travelling (for many a long distance) to the VUDEC Library in the hope of finding some information on the subject, or of travelling a much shorter distance to the nearest Internet café or Vista University learner support centre to access the website there.

Thirdly, the website also reduces what learners have to pay on textbooks (which, even if not imported, can be very expensive indeed). In order to obtain merely adequate knowledge about the subject matter learners need to consult a number of textbooks. It is unfair to expect from learners to buy three to four textbooks that might contain (say) one or two chapters each that provide the knowledge that the learner is looking for. (There are no available textbooks that cover *only* the subject of HIV and AIDS nutrition.) Copyright laws and printing makes it very expensive (and legally difficult) to provide each learner with printed copies of the appropriate chapters. There are a number of websites and other forms of documentation on the website which provide similar information.

Learners can also access electronic journal data bases that provide access to many more academic journals that the Vista Library could offer in hardcopy form. As one learner put it: “I am prepared to spend my weekends in the library or any other place as long as I have access to information.”

Therefore, although there is no conclusive evidence from the literature that proves that any media used (including classroom training) display any distinctive or unique features that promote learning, e-learning offers *other features* that can assist learners to reach the outcomes of this course and programme. This is even more applicable in the context of a distance education outcomes-based format, which is the format in which this programme is offered.

After considering the results reported in chapters 3 and 4, I am of the opinion that utilizing e-learning as mode of training (provided that it is properly implemented and presented) for the course in nutrition and HIV and AIDS, helps learners to acquire the knowledge, critical skills and methodologies that are needed for independent, life-long learning. I found it awe-inspiring to observe how some of the learners grew and developed during the year. Their self-confidence grew exponentially as they mastered computer and other technologies, and it is encouraging to see that most of them are deeply aware of how vital it is to acquire these skills.

5.2.3 Internet and e-learning constraints

Research Question 3

What constraints hinder the utilization of e-learning and the Internet in the distance education nutrition and HIV and AIDS course?

Numerous constraints affecting learners, staff, infrastructure and organisation were identified during the research. This coincides with what the literature reported. Many of the learner constraints could be overcome by providing learners with information about the availability of computer and Internet facilities at the VUDEC campus and at the tutor centres. In the case of the inadequacy of learners' computer experience, it is the view of the programme management committee of the Social Behavioural Studies in HIV and AIDS Honours Programme that learners at a postgraduate level *should* be computer literate. Just over 50 per cent of the learners view themselves computer literate. Many of the learners with few computer skills make a concerted attempt to acquire these skills, and, in such cases, their skills usually improve dramatically during the course of the year. Internet costs can become prohibitively high if learners have to access the Internet from home for long periods. However, some learners are allowed to access the Internet from work, and Vista University offers free Internet access to all postgraduate learners.

Constraints involving pedagogy that arose out of the use of various media were addressed by the incorporation of a combination of media and technology (while bearing in mind factors such as costs and other resources such as staff and the production of material). By implementing e-learning and encouraging learners to use the Internet, e-mail and discussion groups, and by offering face-to-face sessions twice a year, the facilitators attempted to dispel the feelings of loneliness and isolation experienced by some learners.

A major constraint that is endemic to printed study material is the problem of distribution. Learners are often issued with incorrect or incomplete study material, or else they receive the materials late (or sometimes not all). This constraint can be addressed by updating and publishing course content on the Internet or by issuing learners with an updated course content CD-Rom. This provides learners with an alternative source of content to work with while they wait for their printed material.

Table 5.3 on the next page list the constraints and the possible solutions that are applicable to the Nutrition and HIV and AIDS e-learning course (These constraints was identified in Table 2.11 of chapter 2 and possible solutions was identified in Table 3.6 of chapter 3 that dealt with a needs analysis and possible solutions to constraints that affected learners in an e-learning situation). The constraints include in Table 5.3 are, learners need computer and Internet access, learners' computer experience, learning environment and learner motivation.

Table 5.3: Learner constraints identified during the needs analysis and possible solutions concerning learner computer and technology needs

Constraint	Possible solution(s)
Learners need computer and Internet access	<p>Approximately 50 per cent of the learners indicated that they had computer and Internet access. Vista University has seven learner support centres around the country. These centres provide learners with computers and access to the Internet. The VUDEC campus in Pretoria has twenty Pentium4 computers that are used almost exclusively by postgraduate learners. Learners who have access at work might be able to apply for permission to use such facilities for study purposes. Learners can also make use of Internet cafés.</p> <p>The course can also be offered in a CD-Rom format. Such a format offers all the benefits inherent in CD-Rom use. Students will then only have to access the Internet when they want to view links to other websites.</p>
Learners' computer experience	<p>The programme management committee of the Social Behavioural Studies in HIV and AIDS Honours Programme believe that learners at a postgraduate level should be computer literate. In the programme's degree guidelines, it is stated that learners must be computer literate. Learners are also required to submit typed assignments.</p> <p>The target group analyses indicated that more than 40 per cent of learners viewed themselves as computer literate or are able to operate computers without assistance. Learner observations during the research period showed how quickly most computer illiterate learners picked up basic computer and Internet use. One student made the following remark after an introductory session on the Internet: "I cannot believe it. I can work on the Internet!"</p> <p>Most learners realise that they have to be computer literate, not only for study purposes, but also to compete in the job market. Some learners have taught themselves word processing and others have enrolled for computer training. Vista University offers an introductory course in computer use. Computer illiterate learners are strongly recommended to enrol in this course.</p>
Learning environment	<p>When one considers Vista University's facilities, one may rate the learning environment as acceptable to good. The needs analysis shows that less than 22 per cent of learners viewed their learning situation as "difficult".</p>
Learner motivation	<p>Many learners studying in the field of HIV and AIDS feel strongly motivated by this highly emotive issue. Facilitators also encourage learners to discuss their study problems with them.</p>

Table 5.3 lists the constraints concerning learners and staff identified during the needs analysis. Possible solution(s) were given to resolve these constraints in relation to the nutrition and HIV and AIDS e-learning course.

Table 5.4 on the next page lists the next number of constraints and the possible solutions that are applicable to the Nutrition and HIV and AIDS e-learning course (of which some were identified in

Table 2.11 of chapter 2 and possible solutions was identified in Table 3.6 of chapter 3 that dealt with a needs analysis and possible solutions to constraints that affected learners in an e-learning situation). The constraints include costs of Internet connection, pedagogy, pedagogy and the www, subject matter, printed study material, computers and Internet access for teaching staff and support for e-learning. Table 5.4 below list the next number of constraints that can have an influence on the effectiveness of e-learning and the Internet as part of a distance education course.

Table 5.4: Learner and staff constraints identified during the needs analysis and the possible solutions that can have an influence on the effectiveness of e-learning and the Internet as part of a distance education course.

Constraint	Possible solution(s)
Costs of Internet connection	If learners access the Internet for long periods from home, this can be extremely expensive. Connections after hours and over weekend are cheaper. Employers bear the costs when learners access websites from work. Internet assess is available from Vista University and is free of charge.
Pedagogy	To limit the constraints associated with various media, attempts are being made to incorporate alternative media that take costs and other resources into account. By implementing e-learning, and encouraging the use of the Internet, e-mail and discussion groups, attempts are being made to dispel the feelings of loneliness and isolation to which remote learners are especially prone. My co-workers and me also found that face-to-face sessions every three months greatly alleviate the sense of loneliness and isolation.
Pedagogy and the www	In order to assist learners to create order out of all the information to which they are exposed on the web, each unit contains literature and links to content that is associated with the subject matter that is covered in the unit.
Subject matter	Subject matter is suitable for online delivery. (As stated in Table 3.4.)
Printed study material	A major constraint that afflicts printed study material is the problem of distribution . The postage system is slow and unreliable, especially in remote and rural areas. Some learners receive their study material late and sometimes it gets lost in the post. The issuing of study materials can also generate problems. Learners are often issued with the wrong or incomplete study material. Learners realise this only after they have returned home or later in the year. Issuing materials later in the year is highly inconvenient and may cause delays in the submission of assignments. If updated course content is published on the Internet or if learners have been issued with a CD-Rom containing updated course content, they will have an alternative source of content to work with while they wait for their printed material.
Computers and Internet access for teaching staff	Staff who are involved with the course have computer and Internet access with ISDN connections.
Support for e-learning	Staff involved with the Social Behavioural Studies in HIV and AIDS Programme is supportive of e-learning. They are enthusiastic and willing to learn.

Table 5.4 lists the remaining constraints concerning learners and staff identified during the needs analysis. Possible solution(s) were given to resolve these constraints in relation to the nutrition and HIV and AIDS website. Table 5.5 list constraints associated with infrastructure and the organisation.

Table 5.5 below lists a number of constraints (from Table 2.12) concerning infrastructure and organisation that were identified during the needs analysis. The constraints include technology infrastructure, additional questions about technology infrastructure, organisation and organisational support.

Table 5.5: Infrastructure and organisational constraints identified during the needs analysis, and possible solutions concerning infrastructure and organisation

Constraint	Possible solution(s)
Technology infrastructure	The workstations at Vista University have the minimum-required operating system, disk storage space, and memory capacity built into them. These computers have the latest (or one later version) of Internet Explorer with support. The computers do not have sound cards or CD-Rom drives. Learners have access to a printer on a LAN within the building, often in the same room.
Additional questions about technology infrastructure	Personal computers are not frequently replaced at Vista University. This limits the utilisation of technologies such as sound and video. At the VUDEEC campus, the bandwidth can accommodate user demand. However, some of the other campuses and learner support centres have a limited bandwidth. This can become problematic at peak times and when large numbers of learners use the Internet simultaneously. At an earlier stage of this research, server availability was reliable. However, for the past six months reliability has become a problem. If this situation persists, the problem will have to be addressed.
Organisation	Vista University does not have a Learning Management System (LMS) or Learning Content Management System (LCMS) in place. Current learner numbers are manageable and the managerial processes are done manually and with existing facilities. Web authoring, graphics and animation software is available. No synchronous communication software has been installed.
Organisational support	The Department of Information Technology provides support. Funding for staff training is allocated from the programme budget.

Table 5.5 lists the constraints related to infrastructure and the organisation identified during the needs analysis. Possible solution(s) were given to resolve these constraints in relation to the Nutrition and HIV and AIDS website.

Computers and Internet access for teaching staff are not viewed as a constraint since all staff involved with the degree programme have access to computers and the Internet. In addition, university management and the staff who are involved with the Social Behavioural Studies in HIV and AIDS Honours Programme all support e-learning.

In spite of the fact that there are infrastructural and organisational constraints, there are also ways to address these problems. Although there are an insufficient number of computers available to accommodate all the learners, Vista University does provide technology infrastructure. The workstations are equipped with standard Pentium III computers with Internet access and printer facilities. Unfortunately, however, these computers are not installed with soundcards or CD-Rom drives. This limits the utilisation of technologies that use sound and video. At some of the university's campuses such as the VUDEC campus, the bandwidth can accommodate user demand. But otherwise server availability is unreliable, and servers are often out of disk space or else the server is down. These are constraints that need to be addressed by management.

Vista University does not have a Learning Management System (LMS) or Learning Content Management System (LCMS) in place. Current learner numbers are manageable and managerial and administrative processes are performed manually. However, there is a great demand for this degree – and learner numbers are on the increase. The university needs to address these management systems. Although management are in principle supportive of e-learning, no funds were made available to improve or expand facilities. Many of these constraints will be resolved after the incorporation of VUDEC into Unisa. Unfortunately I cannot say exactly how these constraints will be ameliorated by the merger since I have not yet worked in the Unisa environment for a sufficiently long period of time.

Although there will always be constraints that affect the presentation of an e-learning course, it is possible to overcome many of them – even if solutions are less than ideal and require the acceptance of some compromises on the part of learners and facilitators. With time and increased management support and funding, the constraints can be addressed and learners can be provided with better means and opportunities to access and utilize information.

5.2.4 Interface design

Research question 4

What interface design principles would best facilitate the communication of nutrition and HIV and AIDS knowledge to adult learners from previously disadvantaged communities?

The literature review confirmed and I experienced at first hand that the creation of an effective and efficient learning website is no small task. By designing and developing the website I attempted to address and eliminate (as far as possible) interface design features that gave learners a feeling of being lost or helpless, or that confused and frustrated them. I adopted a learner-centred design that recognised learners' needs, preferences and constraints (Padilla, 2003:1). After considering the literature and the research results, I identified five factors that needed to be taken into account when developing a learner-centred learning website for adult learners from previously disadvantaged communities who are studying nutrition and HIV and AIDS. I identified these factors by means of interviews and discussions with learners, usability testing, and by analysing learner questionnaires that I asked them to complete at various stages during the design, development and implementation of the learning website.

Table 5.6 on the next page list these five factors and gives an indication of how the information was collected. They are the extent to which learners will be involved, the extent to which one really knows and understands one's learners, the analysis of one's tasks and goals exploration, and repeated testing of usability. The implications of these five factors that I implemented during the design and development of the website are discussed below.

Table 5.6: Factors that need to be considered when developing user-centred learning websites

Factor that needs to be considered	Implications
The extent to which learners will be involved	The learners formed part of the design/development/ implementation process and provided their input in discussions, interviews and usability testing. Through talking to learners I established how learners viewed the navigation, orientation and overall design of the learning website. I observed learners during the contact sessions and analysed how they performed their tasks, channelled their work flow, and achieved their goals. Feedback was elicited by means of prototypes, discussions, think-aloud sessions, usability testing and questionnaires. These features were reported in chapter 3.
The extent to which one really knows and understands one's learners	A learner profile was compiled by means of a questionnaire that elucidated each learner's situation with regard to his or her access to computers and his or her level of computer and Internet literacy. These features were reported in detail in chapter 4.
The analysis of one's tasks and goals	I observed and interacted with learners during contact sessions. Learners were questioned about their studies, about what information they needed, and about how they had obtained that information. This was done by means of interviews, formal and informal discussion and observation. These features were reported in chapter 3.
Exploration	I explored different designs and approaches. I consulted various books on web design and visited numerous websites and looked at their designs and usability features before she embarked on the design of the website.
The repeated testing of usability	Usability testing by means of observations and questionnaires was conducted throughout the development, design and implementation cycles. These features were reported in chapter 3 and chapter 4.

Table 5.6 shows us that the application to a design process of a philosophy that is user-centred entails the involvement of the learners from an early stage. This involvement allowed me (the designer) to get to know the learners and to compile a profile of the learners who use the website.

By means of evaluation methods such as interviews, discussions, observations and usability testing, learners provided me with feedback about their views of, needs from, and expectations of the learning website.

During the design phase of the website, I paid close attention to interface design features such as consistency, simplicity, navigation, visual design, display issues and legibility – supported by features such as clarity of language, cognitive directness, human memory limitations, and the focussing of attention. These factors are as discussed in chapters 3 and 4.

I am in agreement with the literature (Bevan, 1999:1; Katz-Haas, 2001:[Online]; Kruse, 2000a:[Online]; Usability Evaluation 2002:[Online]) that in order to create and sustain an effective learning website, one needs to bear in mind the five user-centred factors, to pay careful attention to learners' needs from an early stage of the website's development, and to implement optimal interface design features. Well-designed, user-centred learning websites can motivate and help learners to acquire the knowledge and critical skills they need to achieve their personal and educational goals.

5.2.5 Web usability principles

Research Question 5

To what extent does general web usability principles contribute to the communication of nutrition and HIV and AIDS knowledge to adult learners from previously disadvantaged communities?

When one looks at the learner profile as depicted in Table 5.7 on the next page, and the reported findings from the interviews and discussion reported in chapter 3, one can see that these learners enrolled in the programme are *older* adults, from various provinces in the country who speak a variety of home languages and who are attempting to obtain new knowledge and skills or else enhance their existing knowledge and skills. Such people certainly do *not* want to experience problems as they try to access the study material or manipulate the online e-learning environment. It is thus of great importance that the website be designed clearly and plainly and in a manner that conforms closely to general web usability principles. Since no two websites or their target audiences are the same, the subject of each usability project should be treated as unique (Preston, No date:[Online]).

Table 5.7 on the next page reflects the personal and demographic information of the learners including sex, age, home language, province in which learner resides, and marital status.

Table 5.7: Personal and demographic information of learners

		2002	2003	
Characteristics		Percentage		Significance
Sex	Male	26,8	29,7	A huge majority of learners are female. Methods of approaching the programme should take into account the fact that most of the learners are female.
	Female	73,2	70,3	
Age	24 and under	6,7	11,1	There was an interesting difference between the two groups. In 2002, the majority of learners were in the age group 35-39, while in 2003 the majority were older and fell in the age group 40-44. There were increased enrolments in all the age groups except for the 35-39 group, which decreased notably. The majority of learners who enrolled for this programme are older, more mature learners.
	25-29	10,0	14,8	
	30-34	20,0	11,1	
	35-39	33,3	18,5	
	40-44	16,7	22,2	
	45-49	10,0	16,7	
Home language	50 and older	3,3	5,6	The majority of learners are Tswana and Xhosa speaking, with a very low number of English-speaking learners. The majority of learners at Vista University speak one of the African languages. This factor has always been considered when developing training material in the past and was therefore considered in the development of this training website. Because the learners speak a variety of languages, the medium of instruction of the programme is English.
	Afrikaans	4,9	0,0	
	English	4,9	1,6	
	Northern Sotho	14,6	17,5	
	South Sotho	9,8	8,0	
	Tswana	17,1	25,4	
	Venda	7,3	6,4	
	Xhosa	22,0	17,5	
	Zulu	14,6	11,1	
Tsonga	4,9	11,1		
Province where learner resides	Ndebele	0,0	1,6	The majority of learners reside in the northern part of the country. However, there are a notable number of learners from the Eastern Cape and North West Province. The contact sessions take place in Pretoria, which is accessible for most learners. When the need arises, contact sessions will be offered at other venues around the country. Video-conferencing is an alternative mode of facilitating contact with learners. Video-conferencing was used to make contact with learners from the Eastern Cape in 2002.
	Eastern Cape	7,5	10,5	
	Western Cape	7,5	0,0	
	Free State	12,5	6,3	
	Gauteng	37,5	43,8	
	KwaZulu Natal	10,0	4,7	
	Limpopo province	15,0	14,1	
	Mpumalanga	2,5	7,8	
Marital status	North West Province	7,5	12,5	In 2002, just more than half of the learners were married. In 2003 there were more unmarried learners. There are a number of women who experience domestic-related problems which impinge on their studies. Sometimes their partners do not approve of their studying. Such learners often become targets of domestic violence or other related incidences (angry partners, for example, may destroy their study material). Facilitators should be sensitive to these kinds of problems.
	Single	22,0	43,8	
	Married	53,7	35,9	
	Separated/ Divorced	17,1	14,1	
Widowed	7,3	6,3		

From Table 5.7 it can be seen that most of the learners enrolled for the Social Behavioural Studies in HIV and AIDS Programme are female and that the learners are older and more mature. A

possible reason for the higher female enrolment could be that the programme comprises of social issues concerning HIV and AIDS and that women are usually more involved in the community and concerned with the caring for the ill. Another reason could also be that due to personal and socio-economic factors many women need to improve the qualifications to be competitive in the marketplace.

The screen image below illustrates a page of unit one of the learning website. It indicates how the usability principles, as identified from the literature and the research as reported in chapters 3 and 4, were applied to the nutrition and HIV and AIDS website. The principles comprise minimalist design and consistency, organization and navigation, flexibility, efficiently performing web pages, accessibility, interactivity and resolution-independent design.

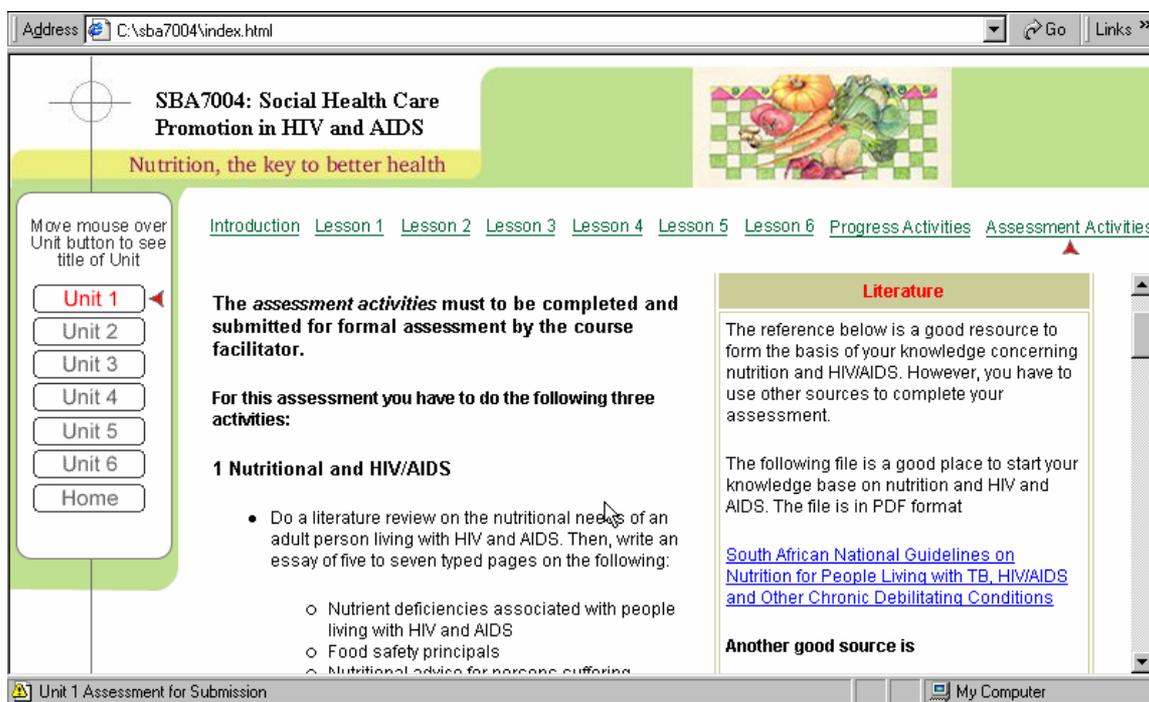


Figure 5.1: A page of the learning website

Figure 5.1 represents the assessment activities page (assignment page). The page provides links to relevant sources of topic information that learners can use to complete their assignment.

Table 5.8 on the next page summarises how usability principles, as identified from the literature and the research as reported in chapters 3 and 4, were applied to the nutrition and HIV and AIDS website. The principles comprise minimalist design and consistency, organization and navigation, error prevention, flexibility, efficiently performing web pages, accessibility, interactivity, instructor feedback, help support, speedy connection and downloads, and resolution-independent design.

Table 5.8: Usability principles and the implementation of such principles to the nutrition and HIV and AIDS learning website

Principle	Application
Minimalist design and consistency	The website's design is clear and unambiguous. Site elements are visible, obvious and intuitive. These features need to be addressed if usability is to be maximised. During the orientation session learners were given an overview of the website and its features and then they had the opportunity to use it themselves.
Organization/ navigation	The main menu (as a frame) was placed on the left-hand side of the web page and was visible on all pages. When the mouse pointer was moved over the main menu link, a description of what users would find if they clicked on the link, appeared at the top of the menu. A second menu was placed at the top of the pages. This menu had an additional function that showed learners which page they were on. The page link (where the learner is) turns red, and a red arrow below the link points to the link.
Error prevention	After numerous corrections, the website became error-free. Links were current and downloads such as PDF files loaded swiftly.
Flexible, efficient web pages	Web pages, graphics, and download files were kept as small as possible. Coloured text was used sparingly and only in predefined situations.
Accessibility	Content was "chunked" to make for easy access. It was structured into three levels to allow for skimming. Where appropriate, bulleted lists were used. Bolding, italics and blue and underlined hypertext provided emphasis.
Satisfaction	Learners indicated that they were satisfied with the look and feel of the website and that they enjoyed working with the website.
Interactivity	The website allowed for interactivity between learners and the course tools and content. The website allowed for interactivity between learners and other (non-course) websites. This ensured increased usability and learner satisfaction.
Instructor feedback	The facilitator provided timely feedback on assignments and other communications. She was accessible by means of e-mail and telephone, and was available during regular office hours.
Help support	Learners were provided with information on how and where to seek assistance.
Speedy connection and downloads	The website site used small and functional graphics. These enabled speedy connection and download.
Resolution-independent design	The website was designed with resolution-independent pages (layouts as percentages of the available space).

Table 5.8 shows that the incorporation of web usability elements into a learning website produces a functional website that is effective and user-friendly, and one that ensures learner satisfaction.

Results from the formative evaluation questionnaires on the nutrition and HIV and AIDS website as reported in chapter 4 are summarized in the section below.

Results indicated that learners were satisfied with the website and rated the usability **highly**. The majority of learners disagreed (64,16 per cent) with the statement “Learning to operate the website was difficult“. Nearly 24 per cent of the learners agreed with the statement, while 12,26 per cent rated the statement neutral. Nearly 90 per cent of the learners agreed that the website was user friendly. Although 66 per cent of the learners felt that the course addressed them personally, a large number of learners rated the statement neutral (25,96 per cent). When this website is further developed and revised, it should be written in a more personal manner.

The majority of learners navigated through the website with ease, although some of the computer illiterate learners took some time to master the navigation and work through the website. Less than seven per cent of the learners agreed with the statement that the navigation was unclear and inconsistent. Fourteen per cent of the learners rated the statement neutral.

The learners agreed that the screen display and design were uncluttered and consistent. Most learners rated the visual impression positively. The majority of learners (60,00 per cent) rated the visual presentation as excellent (See Figure 4.1). Very few learners were neutral towards the screen display, and less than three per cent disagreed with the statement that the screen display was excellent. Most of the learners did not view the screens as too full and overcrowded (39,42 per cent). Only a small number of learners (just over 8 per cent) rated the screen display as distracting, while 12,75 per cent were undecided.

The summative evaluation confirmed that the majority of learners viewed the website as a useful tool for accessing information. The majority of learners reacted positively to the statements concerning working with the website. The results were as follows:

- I enjoyed working with the website (92,45 per cent)
- I think I would make use of the website when studying (92,38 per cent)
- The online content will help me to understand the printed study material better (91,43 per cent)
- I found the activities in each unit useful (92,38 per cent)
- I was impressed with the website (90,56 per cent)
- The website was challenging (84,90 per cent)
- The website was stimulating (90,39 per cent)

Some learners in the interviews and discussions said that they found it more convenient to use the website as a means for accessing information than going to the library.

5.2.6 Theoretical perspectives and learner perceptions

Research Question 6

What theoretical perspectives and adult learner perceptions play a role in the acceptance and utilisation of the Internet and e-learning and as training tools?

If one wants to design a learning website that is intended for adult learners, one needs to have a clear idea of how to organise the instructional material in an optimal way. Since the user interface is the central locus of e-learning, an effective interface design enable the learning experience by allowing the learner to obtain knowledge and expertise that he or she retains (Vilamil-Casanova & Molina, 1996, in Deubel, 2003:[Online]). The design of this website interface was based on theories and learning principles that emphasise that learners should be presented with real-world situations from which they might construct new ideas on the basis of their own knowledge and life experience. Learners were encouraged to make their *own* discoveries and decisions and formulate their *own* views about the subject matter.

Table 5.9 on the next page indicates how three learning theories (Gagne's Conditions of Learning Theory, Bruner's Constructivist Theory, Bandura's Social Learning Theory, Carroll's Minimalist Theory, and Vygotsky's Theory of Social Cognitive Development) were applied to the website and course material so that the online and printed teaching and training materials could be improved.

Table 5.9: How the nutrition and HIV and AIDS course addressed the learning theories applicable to e-learning

Theory and Approach	Addressed by the distance education course
Gagne's Conditions of Learning Theory	
Provide a variety of learning activities	Addressed by assignment activities and a variety of sources
Cognitive domain	Addressed by printed study guide and website
Knowledge	Addressed by printed study guide and website
Comprehension	Addressed by printed study guide and website
Application	Addressed by printed study guide, hyperlinks on website and readers
Analysis	Addressed by printed study guide, hyperlinks on website and readers
Synthesis	Addressed by printed study guide, hyperlinks on website and readers
Evaluation	Addressed by printed study guide, hyperlinks on website and readers
Carroll's Minimalist Theory	
Provided learners immediately with the information that they want	Addressed by website and study guide
Limit cognitive overload	Addressed by website and study guide
Keep pages uncluttered	Addressed by website and study material
Vygotsky's Theory of Social Cognitive Development	
Simplify navigation	Addressed by website
Clearly identify content with appropriate headings and titles	Addressed by website and study guide
Place the most important information on the top-left	Addressed by website

As one can see from the table above, the website and/or the printed study material and (to a lesser extent) the facilitator together and in various ways addressed all the main features of each of the five learning theories.

I proposed a model that links various aspects of users' perception of web technology as a training tool. The model reviews users' attitudes toward web-based environments in a way that integrates the Technology Acceptance Model (TAM), Social Cognitive Theory (SCT), motivational perspective, a self-efficacy perspective and an attitude perspective. The model provides insight into why some learners will more readily accept the Internet and computer technology as a training tool than others.

5.2.7 Delivering distance education by means of a combination of media and technology

Research Question 7

What media and technology are best suited for delivering distance education and what are the advantages and limitations of these modes for the delivery of distance education to adult learners from previous disadvantaged communities in the field of nutrition and HIV and AIDS?

There is a whole range of media and technology that can be used to deliver distance education. However, each of these modes has its own advantages and limitations which need to be considered before an informed decision can be made about what media and technology may be best suited to deliver distance education to adult learners from previously disadvantaged communities studying nutrition and HIV and AIDS. Below is a summary of the advantages and limitations of using a combination of media and technology – as reported by the literature and obtained from an evaluation of the course.

□ Advantages

The advantages of using a combination of media and technology as reported in the literature, and chapters 3 and 4 are summarized loosely into four groups namely, learning experience, access to information, instruction delivery and feedback.

▪ Learning experience

The following advantages of using a combination of media and technology for delivering a distance education course in nutrition and HIV and AIDS were arrived at after studying the literature, and the reported discussions and interviews.

- A combination of electronic media and technologies and printed materials allow for more flexible learning. Learners are able to take control of the learning process while proceeding at their own pace and adhering to their own self-directed study and learning needs.
- A combination of electronic media and technologies and printed materials offers learners learning experiences whenever and wherever they want them – irrespective of geographical location or time.
- Electronic media and technologies alleviate the social isolation associated with distance education by providing group activities such as discussion forums, mail lists, and chat sessions and using e-mail to communicate. The contact sessions every three months greatly alleviate the sense of loneliness and isolation.
- Electronic media and technologies accommodate verbal, visual, and aural learning styles equally by offering information and activities through different media and technology.

Because of the diverse background of the adult learners in this study, a combination of media and technology is a more appropriate means to meet learners' needs and offer learners learning experiences whenever and wherever they want them.

▪ **Access to information**

The following advantages of using a combination of media and technology for delivering a distance education course in nutrition and HIV and AIDS were arrived at after studying the literature, and the reported discussions and interviews.

- Electronic media and technologies permit the course to be supplemented and strengthened by data obtained from related websites in other parts of the world.
- Electronic media and technologies provide access to more sources of information and assistance than the course alone would be able to provide.
- Electronic media and technologies provide logical “chunks” of information as and when they are needed. One may compare this to paper-based formats that are predetermined with regard to quantity (number of pages), format (style of publication), and availability (publication date).
- Electronic media and technologies pose challenges because learners have to be actively engaged with the website. They have to select, respond, reject, and in other ways navigate through the content in order to make progress.
- Electronic media and technologies are more enjoyable because they give learners a sense of being in control. Learners enjoy interacting with the information and exercises that are presented.
- Providing learners with a combination of media and technology gives them a greater scope to access course content, knowledge and information.

▪ **Instruction delivery**

The following advantages of using a combination of media and technology for delivering a distance education course in nutrition and HIV and AIDS were arrived at after studying the literature, and the reported discussions and interviews.

- Electronic media and technologies permit certain instructional elements to be delivered asynchronously (learners do not need to be online at the same time).
- Electronic media and technologies permit activities to be offered synchronously. Thus, the facilitator and learners can have group discussions in real-time at prearranged dates and times.
- Electronic media and technologies permit learners to participate in online groups and exchange experience and materials.
- Using different means to deliver instruction and participate in learning activities offers learners

more flexibility in their approach to their studies.

▪ **Feedback**

The following advantages of using a combination of media and technology for delivering a distance education course in nutrition and HIV and AIDS were arrived at after studying the literature, and the reported discussions and interviews.

- Electronic media and technologies allow learners to receive immediate responses to their e-mail enquiries and test results. Test results can be delivered to learners within seconds once they have completed an automatically scored test.
- Electronic media and technologies enable learners to submit assignments by e-mail. This eliminates the problems that arise when assignments get lost in the post.
- Electronic media and technologies such as e-mail allow learners to submit assignments by e-mail. Such assignments will have a shorter turnaround time because the facilitator can perform assessment on the computer and assignments can be returned to learners very quickly.
- Electronic media and technologies permit the facilitator, to some extent, to adapt material to learners' needs and to remedy deficiencies.
- By giving learners with an alternative means to submit their assignments and by providing prompt feedback, the learning experience is enhanced.

□ **Limitations**

The limitations of using a combination of media and technology as reported in the literature, and chapters 3 and 4 are summarized below.

- Using electronic media and technologies for studies is a new concept for many learners.
- Using the Internet for long periods of time can be expensive.
- Many learners have little or no experience in the use of electronic media and technologies.
- Because some learners may regard the process of mastering technology as time-consuming and involving too much trouble, they may refrain from using it.
- Bandwidth limitations may restrict the downloading of instructional media.
- Some learners have difficulty in accessing appropriate hardware and/or software.
- The use of electronic media presupposes the availability of extensive technical and administrative support.
- The Internet can easily distract learners. Undisciplined learners can get sidetracked into checking their e-mail or browsing the web to look for sites that contribute little or nothing to the goals of the course.

Using a combination of media and technology to teach distance education learners has many advantages but it also has its limitations. I am of the opinion using a combination of media and technology to teach distance education learners is a good alternative to using printed materials alone. A combination of media and technology makes learning more interesting and challenging and it exposes learners to more sources of information and real-world data.

5.2.8 Design and development of a distance education course

Research Question 8

How should a distance education course that comprises a combination of media and technology be designed and developed so that it will be effective in training adult learners from previously disadvantaged communities?

To answer this question, I considered all the factors that were addressed in the previous research questions as well in as the findings of the reported research.

❑ Features of a nutrition and HIV and AIDS course comprising a combination of media and technology

The distance education course should be designed in such a manner that it utilizes a variety of media and technology. Such variety will accommodate a greater diversity of learning styles and eliminate (or at least decrease) the monotony of traditional one dimensional, linear, black and white, printed materials. The media and technology identified as suitable to accommodate the needs of the distance education course for nutrition and HIV and AIDS is summarized on the next page in Table 5.10. The media found to be most suited for used in the nutrition and HIV and AIDS course were printed material, a website, contact sessions, communication channels and video conferencing. A brief summary of how each of these media and technologies were implemented and used to facilitate the learning experience of the nutrition HIV and AIDS course is also given.

Table 5.10: The features of the combination of media and technology used in the nutrition and HIV and AIDS distance education course.

	Printed material	Website	Contact sessions	Communication channels	Video conferencing
Feature	Comprises a study guide with activities and assignments and additional literature compiled in the format of Readings. The study guide covered the course content and the descriptions of activities and assignments.	Covers course guide content in chunked format. Hyperlinks to relevant websites and additional documentation. Provides background information not covered by printed materials.	Three one-week sessions per year. Interaction with fellow learners and facilitator. Facilitation and problem solving activities, academic and administrative.	Telephone, facsimile, e-mail and personal appointments are used for communication between facilitator and fellow learners to communicate content-related issues, ideas and activities.	Visual and audio contact with fellow learners and facilitator. Substitute contact sessions to accommodate learners unable to attend due to distance, time and cost constraints.
Means of facilitating learning process	Aims and outcomes for the course. Learning outcomes for each unit. Clearly stated criteria for each assignment	Use of colour and graphics to attract attention and maintain interest. Interactivity involves learners and uses alternative means to familiarise them with the content. Expose learners to all relevant issues related to the HIV and AIDS and how these play a role in the health and well-being of PLWHA.	These are learner-focused. Sessions are focused on learner needs. Lecturer facilitates process. No formal lectures.	Provide means of communication. Alleviate feelings of being isolated. Provide the facilitator with a means of giving support and encouragement.	Learner focused. Sessions are focused on learner needs. Lecturer facilitates process.

Table 5.10 shows how various kinds of media and technology can be used to facilitate the learning process in distance education. These media and technologies provide a more efficient way of

solving distance education learners' academic and administrative problems and of alleviating their feelings of social and academic isolation than do traditional methods.

5.3 Discussion

This section reviews (in the form of methodological, substantive and scientific reflections) what I learned from my research.

5.3.1 Methodological reflection

I examined in depth the processes involved in implementing e-learning as a part of a distance education course. I used the prototype of a model to understand (1) what both the facilitator and the learner need in a distance education course, and (2) how to develop an effective course that accommodates these needs and helps learners to construct their own knowledge. The methodology used in this study was formative and summative evaluation. I discussed these methodologies and data collection instruments in chapter 3. A detailed description was given of how each of these data collection instruments was applied in the study. Multiple sources of evidence were used during the research process to minimize bias on the part of myself or any other persons or circumstances. To achieve consistency in results, the research was conducted over two years with a number of participants, and it used a variety of forms of data obtained from these participants.

It was encouraging to observe that the data collected from the face-to-face interviews and the discussions supported the findings obtained from using the questionnaires. During the interviews, I refrained from giving my opinion or from directing the interview into particular directions by keeping to the interview questions. When I had to respond to a statement or a question from the interviewee, I kept the response as short as possible and avoided making any leading remarks. It must be said that I did not always find it easy to refrain from giving an opinion or drawing attention to a point that had not been explored.

The usability testing gave me new insight into how the learners approached and operated the website. Some learners experienced difficulties where I never anticipated that a problem might occur. In other cases, some learners suddenly seemed to become overwhelmed and had no idea what to do next, although they had been navigating the website quite successfully up to that point. At times like these I found it difficult not to intervene or give guiding prompts. These learners then usually asked one of the other learners for help and, after getting instructions in their mother tongue, they were able to continue. I noted these and other such difficulties that the learners experienced. After such sessions, I looked into the problems thus revealed and made suitable adjustments. The

think-aloud sessions also helped me to obtain insight into how learners experience working with the website and the thought processes they use to accomplish a task.

After the novelty of working on the Internet had worn off and the learners had become familiar with the website, they began to suggest various possible improvements to the website. They showed me where they felt instructions and sections needed more clarification, pointed out a few spelling mistakes, and indicated where the design of the main menu needed adjustments to make it more user-friendly. They also felt that a more comprehensive Help file that contained FAQs (frequently asked questions) should be developed. The learners' demonstrated remarkable insight into what additional tools were needed to support their printed study material and they made some useful contributions. It took numerous sessions of working with the website before most of the navigational, instructional and technical problems could be corrected.

I also asked subject and education experts to review the website. The approach that the experts used to review the website was totally different approach from that of the learners. They focused more on educational practices – and I gained valuable information from their feedback. Their comments were noted and their suggestions were incorporated into the website wherever applicable.

In reflecting on the methodological process, I came to the realization that when one develops a distance education course, one needs to consult widely. All the role players concerned with such a course can make a valuable contribution to the development of a functional and user-friendly course.

5.3.2 Substantive reflection

Adult learners are often impeded by obstacles and obligations such as family commitments, schedule conflicts, and geographical and economic constraints. Traditional face-to-face classes offer learners very limited possibilities for coping with such barriers to learning (Hijazi, 2003:35). We live in a world where there is an increasing demand for alternative means of education, and it is evident from the literature that higher education institutions are progressively incorporating distance education and e-learning to increase access and meet adult learners learning needs within the framework of life-long learning (Charp, 2003:8; Bose, 2003:[Online]; Grooms, 2003:[Online]; Abouchdid & Eid, 2004:15; Ally, 2004:5; Zentel et al, 2004:237).

Anderson and Elloumi express the following opinion about the benefits of education:

We believe that education is one of the few sustainable means to equip humans around the globe with skills and resources to confront the challenges of ignorance, poverty, war, and environmental degradation. Distance education is perhaps the most powerful means of extending this resource and making it accessible to all (Anderson & Elloumi 2004:16).

I endorse this statement. This statement may appropriately be applied to the HIV and AIDS pandemic in South Africa and the high rate of infection in other parts of Africa. The FAO (No date:[Online]) states that people, especially people in rural areas, have no access to information and are therefore ignorant about how to protect themselves from HIV and how to take care of those who do fall ill. Hand in hand with ignorance go severe poverty, social breakdown and hunger. The question is: How can we educate and inform these people and alleviate their problems in a sustainable way?

I regard distance education and e-learning as one of the primary means at our disposal of addressing the problem. By using distance education and e-learning, those who are in the forefront of the struggle to cope in communities, people such as community workers, teachers, nurses and social workers, can be educated and trained to do what they have to. They in turn can educate and train others in their own communities. Thus we train people to become trainers who can train new trainers, and so on. Distance education and e-learning may also be a more appropriate way of delivering education to groups of learners who come from different ethnic backgrounds, and whose needs and expectations, prior education and life experience, personal learning styles and abilities vary considerably (Mutula, 2002:99; Beller & Or, 2003:24). The results of this research show that learners are indeed extremely diverse.

I concur with the statement of president and chief executive officer (CEO) of Cisco Systems, John Chambers, (2004:[Online]): "I truly believe that the Internet and education are the two great equalizers in life, levelling the playing field for people, companies, and countries worldwide. By providing greater access to educational opportunities through the Internet, students are able to learn more."

While it is one thing to deliver the content, *how* the content is delivered is crucial to the effectiveness of delivery. The study by Lindh and Soames (2004:133) reported that: "The various levels of computer skills and technical knowledge may affect the success of following through the course. The delivery platform therefore should be easy to use, reliable and support the learning".

Results from this study confirm the views of Lindh and Soames (2004:133). Learners possess varied levels of technical knowledge and computer skills. This study revealed that some learners had no technical knowledge and such limited computer skills that even using the mouse was a

challenge. Others were technically more skilled and completely computer literate, and had no problems navigating through the learning website. Although the nutrition and HIV and AIDS course is not totally dependent on computers and the Internet to meet its objectives, one must keep in mind that the perseverance and success of the learners who are not computer literate will be affected by their deficits. The study results also show that learners experienced the website as easy and enjoyable to use, and that they would use it for their studies.

The website was developed as part of the Nutrition and HIV and AIDS course to function as a tool that can provide learners with access to information, challenge them with real life situations, motivate them to explore and construct their own knowledge through the use of technology, and instil in them a greater sense of responsibility towards their work. Mutula (2002:105) also noted these features as reasons for incorporating information and communication technologies at universities.

During the development of the course and website I used a combination of learning theories to accommodate the needs of this course and website, facilitate the growth and development of the learner. Ally has the following view on using a combination of learning theories:

As there is no single learning theory to follow, one can use a combination of theories to develop online learning materials. The online developer must know the different approaches to learning in order to select the most appropriate instructional strategies. Learning strategies should be selected to motivate learners, facilitate deep processing, build the whole person, cater for individual differences, promote meaningful learning, encourage interaction, provide feedback, facilitate contextual learning, and provide support during the learning process (Ally 2004:6).

While attempting to include all the above features, I also assumed the role of facilitator – as described by Beller and Or (2003:27), “The teacher should be more of a collaborator, mediator and facilitator in the learning process and less the sole source of knowledge, with the students actively shaping their own learning, and the teachers directing, promoting and facilitating the process.” With such vast quantities of information available in all areas of study, it is simply not possible for one person to possess all knowledge relevant to a discipline. Learners have to go out and “shape their own knowledge” and challenge their facilitators and peers with what they have gained, thereby promoting collaboration and debate.

At VUDEC the subject content was predominantly offered in the printed format. By incorporating additional media and technology, I aimed to reduce the monotony of the black and white printed materials and make the learning experience more interesting and enjoyable. The literature listed typical media and technology that are used in distance education (Cloete et al., 2003:232; Shih et al., 2003:1; Van Brakel & Chisenga, 2003:479; Wang & Liu 2003). These are listed in Table 5.11 below.

If we compare the nutrition and HIV and AIDS course to the examples listed below, it becomes apparent that I utilized the available media and technology to establish a course that comprises a combination of media and technology. Table 5.11 below lists typical media and technology used for distance education. These media include the printed media, the computer and other telecommunications-dependent media, and human-based media. (The media and technology used in the nutrition and HIV and AIDS course are indicated by the symbol (✓), and those that are not used are indicated by the symbol (×).

Table 5.11: Typical media and technology used in distance education

Media	Technology	This study
Print-based	Study guides	✓
	Readings/Course notes	✓
	Text books	✓
	Assignments	✓
Computer-based	Compact disk (CD)	✓
	Stiffy disk	✓
Computer communication	E-mail	✓
	Internet	✓
	Online documentation	✓
	Online learning	✓
	Intranet training	×
Telecommunication-based	Virtual educational networks	×
	Telephone	✓
	Facsimile	✓
Telecommunication-based	Satellite-delivered learning	×
	Video-conferencing	✓
Audio-visual based	Videotape	×
	Film	×
Audio-based	Audio-cassette tapes	×
Visual-based	Graphs, graphics, illustrations	✓
	Photographs, slides	×
Human-based	Lecturer/ facilitator	✓
	Face-to-face contact	✓
	Mentor	×

From Table 5.11 it can be seen that media and technology from all the major categories, namely printed media, computer and telecommunication-related media, and human-based media, were included in this study.

Although I could not find any reported literature on the implementation of e-learning as part of a postgraduate distance education course in public nutrition, a study reporting on the exploratory evaluation of four newly developed online modules for post-registration nurses (Wilkinson et al., 2004:421) confirmed both the positive and negative aspects of what I had found in this study and was reported in chapters 3 and 4.

These positive aspects and negative aspects, as reported by Wilkinson et al. (2004:421), are tabulated below. In each instance (if relevant) I comment on the similarities or differences in this study when compared to those reported by Wilkinson et al. (2004:421).

Table 5.12 below lists and describes the positive aspects of using e-learning courses for the training of nurses compared to using a website as part of a distance education course in nutrition and HIV and AIDS.

Table 5.12: Positive aspects of e-learning courses

Positive aspects (Nursing study)	Positive aspects (Nutrition and HIV and AIDS study)
Linked theory to practice	Learners demonstrated their ability to link theory to practice in their assignments
Increased clinical confidence and skills	Increased skills
Relevance to practice	Relevance to practice
Improved IT skills	Improved IT skills
Highlighted accountability	Highlighted accountability
Enjoyed time out to learn	Not applicable
Enjoyed networking	Enjoyed networking
Enjoyed web materials	Enjoyed web materials
Flexibility	Flexibility
Improved theoretical knowledge	Improved theoretical knowledge
Emphasized patient perspective	Learners become more aware of community-related issues
Lots of information	Lots of information
Enjoyed links to other resources	Enjoyed links to other resources

Table 5.12 shows that both studies made similar positive findings about the use of e-learning modules to train and educate learners.

Table 5.13 below lists the negative aspects of using e-learning modules for the training of nurses and compares them to the negative aspects of using a website as part of a distance education course in nutrition and HIV and AIDS.

Table 5.13: Negative aspects of e-learning modules

Negative aspects (Nursing study)	Negative aspects (Nutrition and HIV and AIDS study)
Induction day too overwhelming	Introduction to the website as part of the course was done in one-hour sessions over two days. This made the experience less overwhelming.
Time management needs to be more disciplined.	Time management needs to be more disciplined. Learners do not know how to manage their time.
Problems accessing the web	The problems that learners had accessing the web were related to the time of day when they attempted to do so or they did not have the means to access the Internet.
Problems with passwords	Although the website is currently not password-protected, it will be in the near future.
Shortage of IT skills	Shortage of IT skills
Need for clarification of outcomes	Not applicable. Outcomes were clearly outlined.
Practice supervision difficult to find	Not applicable.
Lacked human interaction (isolating)	To some extent, this was also true. To counteract this, contact sessions were introduced to facilitate interaction. Learners often dropped in at the offices of facilitators to say "hello".
Prefer more group interaction (seminars)	Learners preferred to have more contact with facilitators. Contact sessions were therefore introduced.
Needed more study leave	Although learners were not asked directly, some of them complained that they did not have enough time to study.
WebBoard was confusing	Not applicable (No integrated system available)
Overwhelmed by the information	Initially some learners felt overwhelmed because the subject content was unfamiliar to most of them. But over time and because they worked systematically through the content, they managed to cope. The content was also offered in a "chunked" format in the website to prevent this problem.

Table 5.13 shows that both studies reported some similar negative aspects of using e-learning modules in their respective disciplines. Some of the negative aspects noted in the nursing study had already been addressed in the nutrition and HIV and AIDS course and website.

As indicated in this study and other studies, there are a number of constraints associated with the implementation of e-learning in higher education institutions. The literature indicates that lecturers/facilitators at other sub-Saharan Africa institutions have similar constraints with which to deal (Mutula, 2002; Axmann et al., 2002:272; van Brakel & Chisenga, 2003:479; Dutton, 2004:77).

Some of these most pressing constraints are listed below:

- Access to personal computers and the Internet
- Learners' limited computer skills
- Dial-up connections from home
- Limited bandwidth
- Cost of Internet access and telephone lines
- Limited resources and infrastructure
- Technical and telecommunication problems
- Maintenance and technical support
- Learner and staff development and training
- Funding

I acknowledge that there are numerous obstacles that impede the implementation of e-learning in distance education situations. Potential ways to overcome or limit the impact of some of these constraints were discussed in chapter 2 of this study. I have identified a number of problems that confront me, co-workers and learners alike. These include:

- The high cost of textbooks
- Bookstores being reluctant to stock academic books that are not "bestsellers"
- Learners from small towns or villages being unable to buy academic books locally
- Copyright issues that affect the reproduction of sections of textbooks
- Costs of printing and reproduction
- The logistics involved in updating printed study material, the costs of doing so, and the vast amount of material that needs to be reproduced at distance education institutions limits updating and reproduction to every third year.
- Research and knowledge into specialised areas such as nutrition and HIV and AIDS only emerge later in the progression of the disease. Information on these issues in current textbooks is often limited, and then often only cover small sections. It is therefore not cost effective to buy these textbooks.
- Reputable organisations such as the WHO and the FAO are constantly publishing new research and information about health and related issues on the Internet. Sometimes these publications are

also available in printed format. While the printed format may be available, learners might have difficulty in obtaining it – for reasons mentioned above.

If one considers these problems, one can see that e-learning is a more viable option in a distance education situation. Chambers (2004:149) concurs with this view: "While daunting logistical challenges still remain ... making life saving information available in real time, to anyone worldwide, is within our reach."

One has to explore new possibilities. Making e-learning available in spite of all constraints allows learners to use these facilities and make improvements and adjustments as they arise. The literature show that various authors view e-learning as a viable means of distributing and delivering educational material at distance and residential institutions (Geueke, & Stausberg, 2002:197; Beller & Or, 2003:24; Chan & Welebir, 2003:196; Katz, & Yablon, 2003:48 – 49; Rubenstein, 2003:28; van Brakel & Chisenga, 2003:478 -479).

Some of the most important features of e-learning are:

- It gives more people access to education.
- It theoretically allows access to content anywhere and at any time.
- It permits convenient and flexible learning.
- Learners may study at their own pace.
- It gives access to the latest information worldwide.
- Its content is more interactive and engaging.
- Learners are not dependent on lecturers to deliver content.
- It reduced distribution costs.

In their thought-provoking article on the impact of ICT-based distance learning on sub-Saharan Africa, Van Brakel and Chisenga have the following to say:

It is clear that the transformation of the distance learning landscape in sub-Saharan Africa is being driven by a number of economic, technological and social trends. Probably the most important trend is the phenomenal increase in the demand for higher education. This has been addressed by the fact that ICT-based distance learning techniques are in a far better situation than residential teaching to increase the annual number of graduates (Van Brakel & Chisenga 2003:485).

5.4 Scientific reflection

From the reported results concerning the eight research sub-questions, I drew certain conclusions about what was learned from the study and what constraints needed to be taken into account when designing an effective distance education course.

5.4.1 What I learned from the study

What I have learned from the study is summarized under the categories incorporation of media and technology into distance education courses, gaining information and skills, use of media and technology, contact sessions and feedback, facilitator, learners and their studies, technology and infrastructure and general.

▪ **Incorporation of media and technology into distance education courses**

The incorporation of media and technology to train distance education learners is a viable route to follow but the following factors need to be considered:

- No advantage accrues from merely placing an existing study guide on the Internet. An e-learning course is fundamentally different in the advantages it offers from a printed study guide and notes.
- Chunk” work into sections or themes. This allows learners with the appropriate background knowledge to skip those sections with which they are familiar and to focus instead on new and unfamiliar work.
- The application and operation of media and technology in a distance education course should be simple and easy to use. If learners experience too many problems, they will not use it.

▪ **Gaining information and skills**

By using a combination of media and technologies in teaching a distance education course learners are able to access a number of sources for information while gaining new skills. The following features were identified:

- Learners are exposed to more sources of information and one places them in a position in which they are required critically to evaluate their sources and substantiate their choices.
- Learners are exposed to a wider range of current information from a range of sources.
- Learners realised that computer and Internet literacy was a skill they needed to enhance their studies and to be competitive in the job market. Although mastering these skills can be time-consuming, they persevered and succeeded.
- Learners improve their writing and reasoning skills.
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▪ **Use of media and technology**

When using a combination of media and technologies in teaching a distance education course the following was identified concerning the learners:

Learners display a positive attitude towards using computers and other technologies for their studies.

- Learners need clear guidance if they are to change their attitudes towards the use of technology to assist them in their studies.
- Learners will only use media and technology to the extent to which they will help them to achieve their goals, which are usually to complete and pass their assignments and examinations.
- One should provide the essential and core components such as the study guide and assignments in printed *and* electronic format. If learners have problems accessing the electronic format, they still have the printed version.

▪ **Contact sessions and feedback**

When using a combination of media and technologies in teaching a distance education course the following was identified concerning the contact sessions and feedback:

“Face-to-face contact between learners and facilitator is an important feature for a distance education programme. Learners need to see their facilitators face-to-face. In our experience with postgraduates, there should be at least two contact sessions per year. One of these contact sessions should be early in the year so that learners can be given the opportunity to orientate and familiarise themselves with the setting and form a mental map of essential campus features such as where staff offices and other facilities are.

- Contact sessions should be used to inform, interact, discuss, present and facilitate. Formal lecturers should be limited to the minimum.
- During contact sessions, read through the assignments with the learners. Although the assignments are clear and detailed, the learners still need the facilitator to *tell* them what is expected from them in the assignment. This reassures them.
- If learners need to give feedback, present clear, step-by-step procedures. Learners do not assume the obvious – and have difficulty in applying written information in practice.
- Learners value the immediate feedback they receive in assignment assessment and in answer to e-mail enquiries. Learners also enjoy the computer-based quizzes and the immediate automated feedback that gives them their scores.

▪ **Facilitator**

When teaching a post-graduate, outcomes-based, distance education course the following need to be considered:

- The lecturer functions as a *facilitator* in the true sense of the word. The facilitator facilitates the learning process by providing guidance where it is needed and by encouraging critical thinking and problem solving skills.
- Facilitators should be available and accessible to learners. Learners should have the assurance the facilitator is there for them. Encourage learners to communicate with their facilitator if their personal circumstances are hampering their studies. Adult learners, especially women, often have to deal with family-related and other problems that are beyond their control.

▪ **Learners and their studies**

When using a combination of media and technologies in teaching a distance education course the following was identified concerning learners and their studies:

In many cases, distance education is the only viable option for learners because most of the Vista University learners cannot afford to attend a residential university.

- Learners can be successful in their studies through distance education. With perseverance and commitment from the learner, and support and motivation from the facilitator, learners do succeed.
- The outcome-based approach provides learners with the opportunity to construct their own knowledge and apply this acquired knowledge to real-life situations.
- Outcomes-based distance education requires a lot of input and dedication from the facilitator. Because of this, the number of learners should accordingly be limited. Do not make any assumptions about learners.
- Do not assume that they have a certain level of background knowledge, experience or skills. The more diverse (culturally and in other ways) the learner population is, the less one may assume anything about the learners concerned.
- Explain every feature of the study material and content clearly and in detail, especially if learners are unfamiliar with the distance education mode.
- Learners are uninformed about how e-learning can be used as a tool to assist them in finding information for their studies.

I identified the following constraints that impeded the incorporation of a combination of media and technology in a distance education course.

▪ **Technology and infrastructure**

- The waste of time and money caused by technological constraints such as difficulty in downloading information, slow connectivity, and servers being down is a cause of frustration.
- Servers cannot accommodate a large number of workstations. Servers often went down if too many learners accessed the Internet at once.
- Sometimes Internet and telephone connections were broken because of the theft of Telkom's (copper) telephone lines (a common crime in South Africa).
- Dial-up connections from home were slow because of limited bandwidth.
- Internet access via telephone lines becomes very costly if learners spend more than three hours on the Internet three or more times per week.
- Technical and telecommunication problems.
- Technology infrastructure. Old and outdated PCs.
- Technical support. Support staff were not always available to attend to urgent problems.
- Maintenance of equipment. Limited maintenance was carried out.
- PC availability. There was a limited number of PCs available for learners to work on. Sometimes learners had to wait in turn to access a computer.

▪ **General**

- The university management provided the minimum in the way of support and facilities.
- Many of the learners had limited or no computer skills.
- The need for learner and staff development and training.
- Funding for improvement or updating of equipment was limited.

After I had considered the literature and evaluated the course, I formulated the strategies given in the next section to guide the design and development of a distance education course that consists of a combination of media and technology.

5.4.2 Strategies for the design and development of a distance education course using a combination of media and technology

The following strategies need to be considered when designing and developing a distance education course using a combination of media and technology. The strategies are grouped loosely into factors concerning the design and development of a learning website and factors related to the offering of a distance education course to adult learners from developing countries.

▪ **The design and development of a learning website**

- The web design should adhere to usability principles, and be clear, simple and easy to use.
- Website navigation should be clear and intuitive.
- Visual design should be interesting but simple. Use visual features such as colour and graphics sparingly and functionally.
- Make use of “chunking” and hyperlinks. “Chunked” content with appropriate headings and bulleted sections provide learners with manageable pieces of content that can be covered in a short period of time. Provide hyperlinks to the latest and additional information or other relevant documentation.
- Consider possible constraints and devise means to reduce their impact – or else eliminate them completely.
- Anticipate technical problems and provide learners with a printed and online FAQ (frequently asked questions) document that deals with technical issues. Provide support such as a help-line to which learners can turn for assistance.
- Make use of electronic scored quizzes or tests that provide immediate automated feedback. Embed clues that prompt the correct answers in the quiz in those cases where the answers are wrong. This allows learners to revise the quiz and make corrections while the quiz is still fresh in their memory.

▪ **Offering of a distance education course**

- Create a standard look and feel for the entire course.
- Know who the learners are. Compile a learner profile that accommodates unique features such as ethnic diversity, the incidence of older learners, and levels of computer skills.
- Provide an introductory section that states the aims and objectives of the course, and shows how to integrate the various media and technology that support the course. Provide printed and online instructions on how, for instance, the website works and what it has to offer.
- Provide learners with swift feedback to their enquiries and assignments. This confirms that the facilitator is “out there” and is aware of (and cares about) learners and their needs.
- Activities should be learner-centred and should allow for individual and group work while promoting skills development.
- Promote learner and facilitator interaction by means of communication channels such as telephone, fax, e-mail and discussion groups. Constantly remind learners of these channels.
- Organise face-to-face contact sessions for learners as a group. Although not all the learners feel the need for such contact, the majority of learners have a need to interact with their peers and facilitators and to reduce their feelings of social isolation.

5.5 Recommendations

5.5.1 Recommendations for introducing policy and practice

It becomes obvious when one surveys the increased demand for quality distance education that higher education institutions should take cognisance of the inherent advantages and limitations that accompany the utilization of a combination of media and technology in the offering of distance education courses. E-learning will increasingly form a substantial part of the media and technology used for the successful delivery of distance education. This study has indicated that such a mode of delivery, notwithstanding the constraints, can be successfully implemented. Institutions that use this mode of delivery should identify the optimal capabilities of the selected instructional media and technologies and utilize them effectively and efficiently. Strategies should also be formulated to ensure adequate, dependable delivery and facilitate ease of use for learners as well as for staff.

On a tactical level, this study could be used to support the reasons for implementing e-learning as a part of a distance education delivery mode in departments or faculties.

On an operational level, the study identified and described factors and constraints that need to be considered when utilizing a combination of media and technology for distance education. On the one hand, higher education institutions may need to revise their policies on education course and programme development, presentation, management, and assessment. On the other hand, coherent policies are needed in the following areas: the ability of staff to deliver academic content, issues about delivery pedagogy, and the availability of media and technology to staff and learners.

Academic staff either need training – or else they need to demonstrate conclusively that they are competent to teach effectively by means of distance learning using a combination of media and technology. Academic staff also need to be actively involved in the design and development of such study materials. Media and technology should be made available to learners through on-campus and tutor centres. Learners need to be motivated to master new electronic media. Institutions should provide them with facilities, support and assistance that will enable them to utilize these media and technologies effectively.

Although it will take some time for academic staff and learners to master e-learning skills fully, e-learning is a viable option with endless opportunities to provide effective and efficient life-long learning for adult learners.

5.5.2 Recommendations for further research

This study, like all other research, needs to be independently verified. Future research on this subject should entail an equivalent study that is based on a similar (or the same) environment and resource, but that uses a larger and more diverse learner population (sample) so that the generalization of the data can be applied more accurately. Such a reproduction would also enhance the validity of the questions that are used in the survey.

Recommendations for further research include:

- establishing how the advancement of new communication and information technologies will affect the delivery of effective learning and information to developing communities. Constraints associated with these technologies should be identified and possible solutions should be formulated and tested in experimental conditions.
- developing innovative ways of using technology in distance education to increase learner participation and improve the quality of the education provided.
- identifying what kinds of instructional designs are effective for just-in-time, place-independent, on-demand learning.
- evaluating how non-linear or linear navigation represented in a textual, symbolic or auditory mode affects learning.
- further applied research to explore the use of cellular telephone technology to remind learners of imminent due dates, to make announcements, and to inform learners about updates on the course's website.
- further research into the production of videotapes that will clarify and expand upon the content of the printed text and of the website itself.

5.5.3 Recommendations for further development

Further development in the establishment of a database that consists of case studies related to the field of study taken from real life situations is needed. Such case studies can then be used to teach learners how to apply their knowledge to real life situations. In such circumstances, learners would be required to assess the situation and suggest possible solutions and actions that would resolve the issues presented in the case study. Further development is also needed into the establishment of online collaborative projects and interactive educational games. Coincident with these developments, terms of reference and methodologies should be put in place for developing and managing the utilization of various media and technology in distance higher education.

5.6 Conclusion

There is an increased worldwide interest in the application of e-learning in tertiary distance education institutions. If this trend is to be implemented, availability and access to appropriate technology that meets the needs of learners and teaching staff are essential. Strategies should be put in place to support the application of technology and the successful delivery of learning solutions. Consideration should also be given to critical success factors such as establishing a culture of support for ongoing learning and ensuring such support from management. The potential benefits of e-learning as part of a distance education course comprising combination of media and technology will only materialize when the constraints are acknowledged and strategic solutions are introduced as part of a well-planned and properly supported education/training environment.