

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

To function as competent nurses in the 21st century, nursing learners must be able to utilise and manage various forms of information-communication technologies including computer-based resources for information seeking, communication and clinical decision-making in a variety of health care settings (Noesgaard, Bayley, Blythe, Dzugan, Lunyk-Child, Royle & Valaitis 1999:231). These abilities need to be developed by means of nursing education programmes, and teaching strategies. Internationally, computer assisted instruction and computer-based learning are presently the features of many tertiary education curricula (Dewhurst, Macleod & Norris 2000:223). In the Republic of South Africa (RSA), there is a growing need to incorporate and develop the utilisation of information-communication technologies in class-room settings. Where computer assisted instruction and computer-based learning are applied, it is necessary to determine the nature of learners' exposure to these teaching strategies. It is also necessary to identify the problems that learners encounter, and the benefits that they derive from computer assisted instruction and computer-based learning.

This non-experimental, descriptive study, investigated nursing learners' exposure to computer assisted instruction and computer-based learning, the perceived benefits of this exposure, and the problems that they have encountered. This was done with the purpose of formulating guidelines for the expansion of existing computer assisted instruction and computer-based learning strategies, to optimise the utilisation of information-communication technologies and associated educational principles in nursing education.

The findings of this present study revealed that, most learners preferred computer assisted instruction more than traditional methods of facilitation. They benefited from technical and cognitive skills development. There is evidence that computer assisted instruction enhanced learners' learning, and they were able to remain up-to-date with the latest developments in their discipline. Because the learners were independent, motivated and actively involved, some basis for constructivist learning has been established.

The problems they have experienced are related to, insufficient exposure to the equipments, insufficient technological equipments and lack of, or insufficient knowledge of utilising the technological equipments.

1.2 BACKGROUND INFORMATION

1.2.1 Challenges inherent in a knowledge and technology driven world

The nursing education system is faced by the challenges to prepare learners for life and work in a technology driven world. Various social and healthcare realities necessitate that nurses be equipped with competencies and skills to work in a technologically advanced environment. It is the task of nurse educators to create opportunities for learners to develop the necessary competencies.

1.2.1.1 Social realities

Nurses, learners and nurse educators alike are faced with challenges of a post-industrial, information and communication technology driven world. The technological age is characterised by constant innovations and revolutionary changes due to scientific and technological explosions. In this fast changing world, people experience a contemporary crisis of knowledge, as simultaneous information overload and information poverty, fragmentation, multiplicity and disorganisation typify the times (Muddiman 1999:1). This pressurises nurses and nurse educators to adapt to constant change. They should be able to handle uncertainty and make sense of vast amounts of data, information and knowledge that are generated on a daily basis.

The explosion of a digital society has, to date, brought about transformations in the way people communicate, gain access to information and process information. The onslaught of technology and information has an impact on the daily lives of people. People increasingly rely on information-communication technologies to gain access to data and information, buy products, utilise services and engage in electronic communication. Technology even impacts upon how people socialise, as it is regarded to be quite normal to meet in virtual chat rooms. It is also possible to enrol for online educational programmes and to complete such programmes without leaving one's home to attend class or to collaborate with peers (Andrusyszyn, Iwasiw & Goldenberg 1999:272).

Andrews (1999:5) considered the multitude of computer-related advertising that crowd magazines, newspapers and even electronic media, to understand just how quickly advances in information-communication technologies were occurring. Ten years ago floppy disks stored what was considered to be a phenomenal amount of information. Now people are using zip-disks and flash-disks that store more information in a small amount of space. It was not long ago that computers were equipped with 64 megabytes of memory, now a computer memory is measured in terms of gigabytes. The advent of the Internet has expanded the use of computers exponentially.

The impetus for an accelerated access to and availability of information has been the development and introduction of the World Wide Web (WWW) into homes, offices, businesses and healthcare settings (Carty 2000:12). The WWW facilitated a change in the world in general, through speed in communication, innovation and technological advances. These rapid advances make it imperative for nurse educators to integrate information-communication technologies with nursing education.

Learners of nursing are social beings. They are recruited from society and are educated to serve societal healthcare needs and to cope with the challenges posed by the social context. It is therefore imperative that nurse educators respond to the challenges that were highlighted in this section, by offering relevant education in order to develop relevant competencies in learners. Malloy and DeNatale (2001:191) have expressed beliefs that new graduates must have the knowledge and learn computer skills in their academic preparation. The ability to recognise the potential application and value of technology results from a complex interplay of social forces, professional goals and clinical demands. In today's society, learners have numerous demands outside the educational environment. Nurse educators are encouraged to use information-communication technologies in education, and develop online courses to prepare learners to meet these demands.

1.2.1.2 Realities in the healthcare setting

Advances in the areas of science, knowledge generation and technological innovations changed the face of healthcare settings and healthcare delivery practices. Healthcare settings and delivery systems are increasingly technology-driven. Computers, computer networks, communication technologies and the information superhighway altered how providers and consumers of healthcare gain access to and disseminate data and information.

The integration of information-communication technologies led to the development of electronic health information systems that nurses are required to maintain and utilise. Practicing nurses are increasingly turning to health information systems to access databases and information, document care, manage care delivery and healthcare organisations, and consult and communicate with one another (Malloy & DeNatale 2001: 191).

The healthcare industry will be permanently affected as the online consumer healthcare market expands and electronic commerce (e-commerce) networks develop. Internet technology will continue to dominate the industry as its healthcare networks link caregivers and patients providing customised health tools and e-commerce to them. E-commerce enables individuals and communities to monitor their health status, report health data, access disease prevention resources, purchase healthcare products and influence health outcomes (Carty 2000: 2). This type of situation requires a health professional who has a technological mind, interest and abilities.

Healthcare is dominated by the emergence of enterprise systems and electronic communications including the electronic patient record. Bricks and mortar hospitals have been supplemented with virtual delivery systems (Carty 2000:2). The information systems allow for data transfer between nurses and health services that are linked to electronic networks. Electronic patient records allow for the rapid electronic updating of data. Patient information is captured electronically throughout his/her life span and throughout the continuum of healthcare delivery. Nurses have instant access to the health profile of clients, including the records of healthcare received in organisations other than the organisation in which the information is accessed at a particular point in time.

There is the existence of telemedicine in healthcare services and healthcare management. Telemedicine refers to the use of information-communication technologies to provide and support healthcare when the healthcare providers and recipients are geographically separated (Unisa. Only Study Guide 2001:108). It allows for consultations between healthcare professionals, including nurses. It also enables healthcare professionals to render health care to recipients in the absence of direct physical contact between those involved. This system allows diagnosing of health problems. Decision-making on care delivery is supported by electronic dissemination of data and information, as well as digital data transfer. Nurses and consumers alike utilise information-communication technologies to communicate via e-mail, video conferencing or electronic data transfer.

As information systems become more integrated and accessible via the WWW, and clients become knowledgeable about healthcare, nurses will have to deal with more informed and assertive clients. The paradigm shift towards an emphasis on consumer informatics, alters the way nurses interact with clients. The current emphasis on decision-making supported by computer-mediated technology provides a new window in which to view and examine the process of decision-making by consumers of healthcare. Armed with information obtained from digital consultants and networks, knowledgeable consumers are making informed decisions about their healthcare (Carty 2000:11). Consumer healthcare applications enable healthcare clients to obtain health information by utilising information-communication technologies. An example is health related web sites on the Internet. Information is delivered in static or interactive format. This empowers individuals and communities to take responsibility for their own health and make informed decisions about their health, healthcare and disease management (Carty 2000:11).

In addition to information-communication technologies, nurses are confronted with technologically sophisticated healthcare equipment for diagnosing and rendering care. Cardiac monitors, ventilators, and haemodialysis machines are some of the technological equipments used in the healthcare setting. In acute healthcare settings automatic electronic blood pressure, pulse and ECG monitoring apparatus, are connected to the computer. This reduces the need for manual performance and recording of routine tasks, as the computer does this. The electronic patient record is automatically updated after each measurement of vital statistics (Carty 2000:11).

The above discussions indicate that nurses are required to utilise and manage health information systems, operate in virtual reality and redefine the nature of health education. This implies that nurses ought to be equipped with the necessary competencies and skills to utilise technology optimally and effectively.

1.2.1.3 Abilities required from nurses to be able to work in technologically advanced healthcare settings

The integration of health information systems into nursing practice and processes involve many factors over and above installing information-communication technologies. New graduates must have the knowledge and skills, which would prepare them for working in the healthcare arena dominated by technology (Malloy & DeNatale 2001:191). It necessitates changes in attitudes,

cultures and healthcare practices. The utilisation of information-communication technologies and health information systems do not only involve hardware and software, but also people, organisational structures and processes that allow the collection, processing and utilisation of information (Filho 2001:98).

This present study focussed on the issue of people and specifically, the contribution of nursing education to prepare learners to cope with the challenges that would confront them in the healthcare setting. The researcher maintained that nurse educators should apply computer assisted instruction and computer-based learning as ways of ensuring that graduates optimally utilise health information systems and other technologies in the clinical settings.

Motaung (1997:1) stated that nursing graduates ought to be equipped with sufficient technical, social, and professional knowledge and skills to develop the flexibility and creativity required to initiate and cope with technological and scientific developments. They ought to be able to render quality care in an ever-changing environment, and to manage confusing situations. New graduates must be conversant with health informatics and be technologically literate (Malloy & De Natale 2001:191). There is a need to equip them with the competencies to utilise and manage information-communication technologies, as well as technologically advanced health equipment (Schoolcraft & Novotny 2000:161). They ought to be able to use technology as a tool to practice their profession, rather than practicing their profession to suit the needs of technology (Edwards & Drury 2000:49).

Constant knowledge generation and technological innovations necessitate the ability to learn independently. Independent learners are able to accept responsibility for their own learning and demonstrate initiative in meeting learning objectives aimed at remaining up to date with scientific and technological developments (Deloughery 1993:93). An independent learner has to maintain a systematic learning approach and demonstrate self-confidence and inner motivation. She/he has to be curious, flexible, persistent under stress, and open to experiments (Modly, Zanotti, Poletti & Fitzpatrick 1994: 136).

Cox, Harsanyi and Dean (1987:94) indicate that nurses require information management skills, which entail storing, manipulating and retrieving information. This will enable them to deal with vast amounts of information that are generated and disseminated daily, and utilise it to construct knowledge or make informed healthcare decisions. Nurses should possess basic and advanced cognitive skills. Skills such as comprehending and interpreting data and information enable an

individual to construct knowledge or engage in informed practice. Individuals, who possess higher cognitive skills, maintain a strategic approach to reasoning, critical thinking, problem solving and learning. They are able to classify, analyse and synthesise information. They have the ability to creatively combine information, knowledge and skills, and go beyond the given information to draw inferences about things yet to be encountered, and to connect and probe for connections (De Villiers 1998:205 & Fry 1992: IX; 3-7 cited by De Villiers 2001:33). This enhances the ability of an individual to make sense of, and manage challenging and changing circumstances. The aforementioned skill requirements allow a nurse to render high quality care.

Rendering high quality healthcare in complex healthcare settings, require collaboration between nurses and different healthcare sectors. Partnerships and collaboration between members of the multidisciplinary team, and between nurse educators and nurses are imperative (Welsh & Swann 2002:88). There is a need for equal partnerships amongst nurse educators, learners, health service providers and healthcare clients, to enhance the effectiveness of care delivery and learning. Collective action requires a shared mindset, and most importantly, collaboration. Collaboration requires an overlap in goals, and a commitment to work towards a common interest to achieve desired outcomes that are mutually beneficial (Modly et al. 1994:166). Communication is of importance during the collaboration process. Information-communication technologies support electronic communication and collaboration without the stakeholders being in geographic proximity of one another. With the advent of health information systems, communication and collaboration occur increasingly in electronic format.

Computer assisted instruction and learning contribute towards the development of a cooperative learning environment and learners' collaborative abilities, despite time and geographical constraints. Traditional face-to-face communication can be supplemented or replaced by communication through video conferencing, electronic mail (e-mail), bulletin boards or chat rooms (refer to sections 2.3.4.2 & 2.3.4.3). Online learning, by utilising virtual classrooms (refer to section 2.6.5), is creating a minor revolution in higher education. It improves the quality of higher education, provides interesting and enjoyable learning experiences and supports effective learning (Schulze 2000:25). According to Schulze (2000:25), learners who study via the Internet achieve higher grades than learners who do not study via the Internet.

1.2.1.4 Implications for nursing education

Traditionally, education has been dependent on time and space. Nursing education was educator centred and the lecture and demonstration methods were commonly used. Learners were typically gathered in a large classroom or lecture hall for lessons to be offered. The demonstration method was often applied for the purposes of clinical teaching. The educator and textbooks were important sources of knowledge and information. Learners were passive participants in the teaching-learning process. The utilisation of information-communication technologies was non-existent or limited. Where applicable, computer assisted instruction as a learning strategy was utilised for remedial purposes, for example to develop learners' reading skills where such skills were lacking (Modly et al. 1994:136).

Multiple social, economic, professional, and personal demands press on adult learners. This has led to their need for increased access to education, without having to interrupt their involvement in the workplace. The boundaries of traditional campus-based education are being challenged by greater utilisation of information-communication technologies, and competition among the educational institutions to attract learners. Virtual classrooms have contributed towards lessening the reliance on time and space. This shift in access is particularly important for working professionals who may now pursue their education through electronic means (Andrusyszyn et al. 1999:272).

Nursing education can no longer avoid the impact of the age of information-communication technologies. Nurse educators need to utilise information-communication technologies to render computer assisted instruction and computer-based learning. It is of importance that nurse educators utilise innovative teaching strategies that would foster the development of cognitive, independent learning, technical and social skills. They must have a clear understanding of technological developments and consider applying teaching strategies that support computer assisted instruction and computer-based learning (Edwards & Drury 2000:49).

Schoolcraft and Novotny (2000:161) state that there is a need to give learners the opportunity to work with information-communication technologies while they undergo their professional educational programme. Learners who are still technologically challenged need to be gradually introduced to information-communication technologies (Cobb 1999:89). Learning and mastery of information management skills, require that learners frequently utilise information-communication technologies while they engage in the core curriculum and in clinical practice

(Noesgaard et al. 1999:234). The researcher supported this stance and maintained that learners ought to be exposed to computer assisted instruction and computer-based learning, in order to prepare them to conquer the challenges posed by technology in education, healthcare and social life. The research under discussion was therefore grounded on this principle.

Nurse educators are pressurised to change their educational practices. Cox, Harsanyi and Dean (1987:94) indicate that the advent of information-communication technologies in nursing education has influenced the traditional posture of the nurse educator as the primary communicator of information. It is necessary that nurse educators adopt the role of facilitator, director and advisor in the learning process as opposed to expert conveyers of knowledge and skills. Dewhurst et al (2000:236) compared computer assisted instruction with a lecture method of instruction, involving a first year physiology module. The computer-based learning modules established a self-directed learning approach compared with an educator centred lecture. Post computer-based learning experience questionnaires were administered. The results were compared with baseline data on the learners' previous lecture-based learning experiences. The purpose was to assess whether learners' attitudes changed as a result of their engagement in computer-based learning. The researchers assessed how learners utilised the computer-based learning material and the effectiveness of computer-based instruction in promoting learning compared to the lecture method (Dewhurst et al. 2000:236). The results of this study indicated that the learners benefited from computer-based learning, as evidenced by the changes in attitude. Learners moved more towards agreeing with the proposition that computer-based learning would allow them to work at their own pace, perhaps favouring their own particular learning styles. They indicated that it offered greater flexibility than the lecture method, enabling them to choose where and when they would study. Learners were less likely to agree that learning with computers was boring after they have had the direct experience of the computer-based learning tutorials, than before this exposure. They expressed themselves more likely to seek out alternative sources of information to supplement their lecture notes and to be more likely to see information presented by a computer as a viable and acceptable alternative to that provided by the textbook (Dewhurst et al. 2000:240).

Nurse educators are being encouraged to use creative strategies that support independent learning and stimulate discovery learning, which require initiative and the use of higher order cognitive skills (Edwards & Drury 2000:49). Recent advances in information-communication technologies have enabled the development of computer-based learning packages that use complex scenarios, and that support the development of learners' clinical and problem solving

skills. The opportunity to apply computer assisted instruction and computer-based learning in the curriculum will grow as additional software programs become available, and as their impact is demonstrated through evaluation (Saucier, Stevens & Williams 2000:241). Existing evaluation research has revealed that the application of information-communication technologies in nursing education promotes active learner involvement and the utilisation of critical thinking skills (Malloy & DeNatale 2001:191). A study by Saucier et al (2000:241) indicated that computer assisted instruction foster the development of cognitive, independent learning and social skills. Another study by Myburgh, Poggenpoel, Ankiewicz and de Swardt (1999:41; 45) indicated that it was possible to create an environment conducive to learning in a technology laboratory. Learners indicated that they were empowered by computer assisted instruction and computer-based learning because they had to think outside their normal frame of reference. They also experienced a sense of achievement based on their capability to generate solutions to problems posed to them.

Recently, information-communication technologies have liberated teaching and learning from the constraints of time and space (Papo 2001:96). Learners are empowered to set the setting, time and pace for learning. Learning can occur, at a convenient time, at home or any media centre that is equipped with the necessary information-communication technologies for online or off-line learning. Online learning refers to teaching and learning mainly via the WWW supplemented by an Internet service, creating a virtual classroom. Off-line learning entails learning which occurs when the learner utilises information-communication technologies for learning purposes without being constantly logged on to the Internet (Reader's Digest 1999: 54). Learners can set their own pace of learning and any given topic can be worked though repeatedly until they gain the required understanding. The integration of information-communication technologies into educational activities seem to correspond to the declared aim of putting learners at the centre of the educational venture while applying the principles of constructivism (Guihot 2000:134).

There has been a growth in the number and quality of available software packages for nursing education (Papo 2001:96). These packages can be loaded onto a home computer, utilised in an educational media-centre or accessed through the Internet. Computer assisted instruction and computer-based learning can be either entirely technologically based or applied supplementary to traditional teaching (Polyakov, Palmer, Devitt & Coventry 2000:91). In addition to traditional teaching and learning activities, the educator refers learners to information-communication technologies like multimedia learning packages and the Internet. These would enable them to

discover information independently or to electronically work through selected topics. Alternatively learners independently achieve learning objectives on selected topics, by working through specially prepared educational software packages, which can be utilised online or off-line. Another option is to offer complete educational programmes in electronic format, which can be followed using either online or off-line options, or a combination of online and off-line learning (Edwards & Drury 2000: 49-56) (refer to section 2.6).

1.2.2 The South African response

Schulze (2000:25) cites Sedibe (1998) as saying the need to improve the quality of higher education is a world-wide phenomenon and one of the most important challenges facing the government of South Africa. The legislative changes in South Africa affecting education resulted in an increased emphasis on the importance of enhancing learners' critical and active participation in the learning process to enhance their personal development and to prepare them to contribute to the social and economic development of the Nation at large (South Africa 1995:5). The strategic objective stated in the National Plan for Higher Education is to produce graduates with the skills and competencies to meet the human resources needs of the country (Asmal 2001: 4). Furthermore, the National Plan for Higher Education proposes that all graduates should be equipped with the skills and competencies necessary to function in a modern society. Computer literacy, information management, and communication and analytical skills, have been specifically specified as important skills to develop in learners (Asmal 2001:2).

In line with the National Plan for Higher Education, Asmal (2001:5) maintains that "the production, acquisition and application of new knowledge, national growth and competitiveness are dependent on continuous technological improvement and innovation, driven by a well organised, vibrant research and development system, which integrates the research and training capacity of higher education with the needs of industry and of social construction". It is therefore important for higher education institutions to respond to this by increasingly utilising information-communication technologies in education.

South African educators in general and nurse educators in particular, are faced with the challenges of promoting the utilisation of computer assisted instruction to facilitate computer-based learning in the classroom setting. Nurse educators could respond to these challenges by introducing computer assisted instruction and computer-based learning, or by contributing to further developments where these educational strategies have already been introduced. This is to

meet challenges brought about by scientific and technological advances in society, and the stipulations of the National Plan for Higher Education. It is therefore necessary for nurse educators to make a paradigm shift, by shifting emphasis from traditional methods of instruction to computer assisted instruction and computer-based learning. This would necessitate establishing short courses for nurse educators on how to utilise information-communication technologies, and supporting learning theories, in the educational setting (Schulze 2000:25-26; South Africa 1995:5).

The South African Qualification Authority developed critical cross-field outcomes for the personal development of the learner and the society at large. Critical cross-field outcomes are broad generic and cross curriculum outcomes (Van der Horst & McDonald 1997:49). The critical-cross field outcomes state that learners should be able to:

- manage themselves and their activities responsibly and effectively
- be aware of the importance of a variety of strategies to learn more effectively
- understand the world as related systems by recognising that problem-solving contexts do not exist in isolation
- use science and technology effectively
- critically show responsibility towards the environment and the health of others
- organise, collect, analyse and critically evaluate information
- identify and solve problems by using critical and creative thinking skills
- work effectively with others as a member of a team, group organisation or community.
- communicate effectively using visual and language skills in the modes of oral and visual presentation
- participate as responsible citizens in the life of all the communities

(Van der Horst & McDonald 1997:49).

The researcher anticipated that utilising computer assisted instruction to expose learners to computer-based learning would contribute towards achieving the critical cross-field outcomes with respect to:

- preparing learners to independently and responsibly manage their own learning progress by utilising the educational management capabilities of computer assisted instruction
- developing learners' abilities towards discovery learning through utilisation of, amongst others, electronic information resources

- developing learners' information management and critical thinking skills by teaching them how to make sense of vast amounts of information
- maintaining a holistic approach towards learning and solving problems encountered through problem-based learning, by encouraging learners to utilise a variety of electronic information and communication resources
- collaborating in virtual reality through electronic modes of communication
- disseminating the results of learners' learning (such as their completed assignments) through electronic means of communication.

The South African educational system is based on the principles of outcomes-based education. Outcomes-based education implies that educators facilitate learners' progress towards the achievement of the learning outcomes, rather than act as presenters or conveyers of knowledge. The learner should be an active and interested participant in the learning process (Van der Horst & McDonald 1997:13). Computer assisted instruction supports self-directed and discovery learning, and is therefore compatible with outcomes-based education.

1.2.3 Resistance with regard to incorporating computer assisted instruction in nursing education

Internationally, the introduction of information-communication technologies into the nursing profession has been relatively slow. The initial developments entailed the introduction of various types of continuing education programmes to promote computer literacy among nurses (Saba & McCormick 1986:13). Recent trends are to utilise computer assisted instruction and computer-based learning in professional educational programmes, complementary to traditional teaching strategies, and to provide online learning options. However, there is an apparent resistance among nurse educators in South Africa to incorporate computer assisted instruction in nursing education (Papo 2001: 95). Nurse educators appear to be reluctant to embrace technology as a way of improving teaching and learning (Papo 2001: 95). Although the new technologies support greater educator effectiveness, some educators at higher education institutions may be reluctant to utilise such technologies optimally in developing new methods of instruction.

This resistance may firstly be partly due to outdated views on education. For instance, there appears to be a belief that disseminating factual information can be achieved more efficiently by a lecture format and skills are best taught through the demonstration method. However, lecturers commonly encounter problems with learners who fall behind due to an inability to assimilate

difficult information quickly during the course of a lecture. The volume of material delivered by means of lectures may overwhelm learners. Lecturers also dictate the speed of delivery of information and allow little flexibility for the wide range of learners' abilities within groups (Lowry & Johnson 1999:522). A study was conducted, at a United Kingdom university, on the potential to replace the traditional lecture method with a computer assisted instruction strategy to teach learners about the anatomy of the cardiovascular system. The results indicated that undergraduate learners, who followed a specifically designed computer-based learning package, and those who attended lectures, demonstrated equivalent learning. The study also revealed that learners demonstrated a positive attitude towards computer assisted instruction after having experienced computer-based learning (Dewhurst et al. 2000:239).

Research suggests that unwillingness to adopt technology is closely tied to the educators' attitudes. Nurse educators appear to perceive technological changes as a threat to their traditional accepted role. This is based on a belief that the educator's status will be lowered because technology transfers power from the educator to the learner. Technology is also viewed as interfering with the educator-learner relationship and with the personal attention that learners receive. Excitement surrounding computer technology is also perceived to pose an unwanted distraction to learners, interfering with the achievement of learning objectives (Lewis & Watson 1997: 71).

A lack of adequate preparation remains a significant barrier to the adoption of technical innovations in nursing education (Lewis & Watson 1997: 71). Systems are being installed without offering the necessary training to nurse educators. They need to be prepared to effectively utilise information-communication technologies, as well as on the educational principles and methods that underlie computer assisted instruction and computer-based learning. Too often the improvement of technical equipment and facilities are funded without establishing the resources necessary to help educators make significant changes in the courseware and their teaching methods (Lewis & Watson 1997: 71). Furthermore, nurse educators and learners lack knowledge and experience in online learning. Thus training and support of educators and learners need to be addressed (Computers... 2001:3).

Being exposed to inappropriate educational packages may contribute to resistance. The researcher attended a Services Sector Education and Training Authority conference, which was held at Caesars Convention Centre, Johannesburg, during October 2001. Delegates sought ways to introduce relevant computer assisted instruction into the South African market to make

learning more accessible, flexible and individualised. Delegates commented on the fact that most computer-based learning materials and courses have been designed in either the United States of America (USA) or United Kingdom (UK), and are not in line with the South African demands. South Africa, with specific reference to nursing education need to close this gap or deficiency of being slow in introducing computer assisted instruction and computer-based learning materials in the educational setting.

Resistance may be due to inadequate or unreliable infrastructures and resources. Nurse educators experience frustrations with the delivery and setting up of equipment each time they want to use it. Additional frustrations are related to a lack of up to date, high quality hardware and software, inadequate resources and inadequate technical support. Schulze (2000:25) conducted a survey which revealed that learners' limited access to the necessary hardware and software can present a major problem since less than 50% have Internet connection or CD ROM at their disposal. However, many are willing to purchase the necessary hard and software. To increase learner access, more academic Internet centres and support services need to be established.

1.3 RESEARCH PROBLEM

A research problem is defined as a situation involving a conflict condition that can be investigated through disciplined enquiry (Polit & Beck 2004:731). Nursing education is in a transitional period in that it is responding to changes and challenges of an ever-changing world in terms of proliferation of technological innovations, knowledge generation and social change (De Villiers 2005:56-57). Information-communication technologies are an essential part of the context in which education and healthcare is rendered (Lyttle 2000:374). Current legislation and policies support computer assisted education and computer-based learning. There is a need to shift nursing education from a traditional, to a technology-based teaching and learning approach. This is to enhance the quality of education, and to equip learners to work in a technologically advanced environment.

The development of information management skills and critical thinking abilities, is a prerequisite for the competent practice of nursing, given the nature of professional practice and the context in which healthcare is rendered (Saucier et al. 2000:241). Cox, Harsanyi and Dean (1987:94) state that nursing education has explored the arena of information-communication technologies, in order to cope with information overload. The authors state that computer assisted instruction and computer-based learning promote the development of information

management skills in learners, which enable them to cope with the onslaught of vast amounts of information. However, in many instances in South Africa, nursing education continues to be educator-centred despite criticisms that didactic instruction does not assist the learner to learn how to gather, analyse, synthesise and evaluate information. They are also not adequately prepared to apply information and knowledge gained appropriately.

Initially nurse educators abroad, who introduced computer assisted instruction in nursing education, utilised it complementary to traditional teaching strategies. According to Lowry and Johnson (1999:522) computer-based learning was introduced into the health science component of the pre-registration undergraduate-nursing programme at Leeds Metropolitan University in 1990. At that time, computer-based learning was grounded on the principles of programmed learning, and the educator was the initiator and director of the teaching and learning process. Recent advances in information-communication technologies support constructivist learning (refer to section 2.7.4.2), and learners are increasingly being exposed to multimedia educational packages, and online and off-line computer assisted instruction.

In the nursing college where this South African study was conducted, computer assisted instruction was mainly utilised in conjunction with traditional teaching methods at the time of data collection. The researcher observed that this educational strategy was applied on a limited basis, and that its applications were not in accordance with recent trends. There was a need to further develop computer assisted instruction. The researcher recognised the necessity to establish the nature of the learners' exposure to aspects related to this educational strategy, to explicate its benefits for the learners, and to identify the problems encountered by the learners. During this present research study, the researcher obtained the views of learners who have been exposed to computer assisted instruction in the selected nursing college. This information was required to enable the researcher to formulate guidelines on how to improve the implementation of this educational strategy, and to ensure that its future application is in accordance with modern international trends. In view of the above discussion the problem statement (which was stated in interrogative format) for this research was:

What is the nature of the learners' exposure to computer assisted instruction, how do they benefit and what problems do they experience during computer-based learning?

1.4 SIGNIFICANCE OF THE STUDY

The learner, the educator and nursing education benefited from this present study because it contributed towards the development of guidelines on how to further develop computer assisted instruction and computer-based learning strategies. This present study further indicated how the utilisation of information-communication technologies and associated educational principles could be incorporated and optimised in nursing education. This can be done by building on the perceived benefits and minimising the problems that emerged from the study.

1.5 AIMS OF THE STUDY

1.5.1 Research purpose

The purpose of the study was to formulate guidelines for the expansion of existing computer assisted instruction and computer-based learning strategies, to optimise the utilisation of information-communication technologies and associated educational principles in nursing education.

1.5.2 Research objectives

The research objectives were to determine:

- how computer assisted instruction was applied at the time of data collection
- the benefits of computer assisted instruction and computer-based learning for the learners
- the problems that the learners encountered during computer-based learning.

1.6 DEFINITIONS OF CONCEPTS

In this section the major concepts of the study are defined.

1.6.1 Computer assisted instruction

A *computer* is referred to as an electronic device for storing and processing data according to instructions given to it in a variable program (Reader's Digest Complete Wordfinder 1996: 293). *Instruction* refers to a direction or order in teaching and education (Reader's Digest Oxford Complete Wordfinder 1996: 789). *Computer assisted instruction* is referred to as an

individualised method of self-study using information-communication technologies, of which the computer is an essential part, to deliver an educational activity (Bastable 1997:275).

1.6.2 Computer-based learning

Computer-based learning is the term used to encompass both the expositive and experiential uses of information-communication technologies, of which the computer is an essential part, as a teaching tool (Conrick 1998:1).

1.6.3 Learner

Learning is defined as gaining knowledge or skill by study, experience, or being taught (Reader's Digest Oxford Complete Wordfinder 1996: 867). A *learner* refers to a person who is learning a subject or skill (Reader's Digest Oxford Complete Wordfinder 1996: 868). For the purpose of this present study a learner is referred to as a nursing student registered for the Programme Leading to Registration as a Nurse (General, Psychiatric Community) and Midwife (SANC 1985), who has been exposed to computer assisted instruction and computer-based learning.

1.6.4 Nursing education

Nursing education is referred to as a process of guiding changes in attitude, behaviour and personal philosophy while imparting information about the art and science of caring for human kind, within the performance level dictated by the legal scope of practice (Meiner 1999:223).

1.6.5 View

A *view* is referred to as an opinion, a manner of considering a thing (Reader's Digest Oxford Complete Wordfinder 1996:1752). Within the context of this present study, a view refers to opinions of learners, who have been exposed to computer assisted instruction and computer-based learning.

1.7 FOUNDATION OF THE STUDY

This present study was based on two assumptions. Polit and Hungler (1999:695) define assumptions as basic principles that are accepted as being true, on the basis of logic or reason, without proof or verification. The assumptions for this present study were:

- Nursing education is aimed at socialising nurses, who would be able to render healthcare in an information-communication technology driven environment.
- Computer assisted instruction and computer-based learning could support the development, in learners, of the competencies required to function in a technologically advanced healthcare environment.

1.8 RESEARCH DESIGN AND METHOD

A quantitative, descriptive research was conducted to address the research problem. In this population study, the researcher involved second and third year nursing learners following the Diploma Programme Leading to Registration as a Nurse (General, Psychiatric and Community) and Midwife (SANC 1985) at a nursing college in the Gauteng Province of South Africa. All respondents had previously been exposed to computer assisted instruction during the course of their studies. A structured data collection approach, utilising a structured questionnaire, was used to address the research problem and achieve the research objectives (refer to sections 1.3 and 1.5.2). Data collection elicited descriptive data. The data obtained were submitted to descriptive data-analysis, and some comparisons were made between the responses of the second year and the third year respondents.

1.9 SCOPE OF THE STUDY

The study was conducted in one nursing college in the Gauteng Province of the RSA. The findings of the study are therefore relevant to this college. The findings and recommendations of this research study could however assist educators in other nursing colleges to either establish or to improve computer assisted instruction.

1.10 STRUCTURE OF THE DISSERTATION

The structure of the dissertation is indicated in table 1.1.

Table 1.1 Structure of the dissertation

CHAPTER	CHAPTER HEADING	CHAPTER OVERVIEW
1	Orientation to the study	The research problem and purpose, and the significance of the study are discussed. A brief summary of the research design and method are also included.
2	Literature review	The researcher covers aspects related to information-communication technologies, computer assisted instruction and learning theories.
3	Research design and method	The research design and method are discussed. Strategies to enhance data quality and the ethical principles, on which the study was based, are outlined.
4	Analysis, presentation and description of the research findings	The research findings are discussed
5	Conclusions and recommendations	The research results and conclusions are summarised. The limitations of the study, the implications of the findings and recommendation for future research are outlined.

1.11 CONCLUSION

In chapter one the researcher maintained that the nursing education system prepares learners for the life of work in technologically advanced health care settings, which are constantly changing. The utilisation of information-communication technologies is becoming essential in rendering healthcare and nursing education. The application of computer assisted instruction would equip the learners with the competencies required to function in modern clinical settings. This quantitative, descriptive study contributes towards improving the application of computer assisted instruction by determining the nature of the learners' exposure to this educational approach, the problems that they experienced and the benefits that they enjoyed. The researcher envisaged that this information was required to develop recommendations on how to further develop this educational innovation in nursing education. Chapter two reviews aspects related to computers and computer assisted instruction. The researcher discusses developments, teaching strategies and learning theories, which are relevant to computer assisted instruction.