Developing clinical skill competency of undergraduate Nursing students utilising a simulated psychomotor skill laboratory and model of self-directed learning: An Evaluation research study

A thesis presented in partial fulfilment of the requirements for the degree of

Master of Philosophy

in

Nursing

Massey University, Turitea, Palmerston North,
New Zealand.

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2003

ABSTRACT

Nursing education today emphasises higher-level thought processes than in the past. The requirement for Bachelor of Nursing students to also demonstrate competence in the core clinical skills is critical for safe professional practice. Balancing curricular emphases on technical knowledge, clinical and interpersonal skills, ethical decision-making, and other critical thinking skills is becoming increasingly difficult for nurse educators.

Changes in the health sector have resulted in increased complexity of care, reduced numbers of venues for clinical practicum experiences, and increased financial costs associated with student practicum. The commitment to ensure that students have requisite clinical skills appropriate to each stage of their programme, prior to their clinical practicum involves curricular, pedagogical and financial considerations. Drawing on international literature and a Faculty committed to the development of nursing knowledge and skill, discovery, reflection and self-directed learning, the Eastern Institute of Technology (EIT) implemented the use of the Clinical Arts and Technology Centre and a cooperative model of self-directed learning into the Bachelor of Nursing curriculum in January 2000. The Clinical Arts and Technology Centre is an "enhanced" clinical simulation laboratory that provides students with the facilities and resources to support and enhance their knowledge and skills in preparation for clinical practicum.

This Evaluation Research study explores and determines the effectiveness of the Clinical Arts and Technology Centre and the cooperative model of self-directed learning in terms of student clinical competency outcomes, and student satisfaction with the facility and model of self-directed learning. An extensive review of literature was undertaken in relation to the development and use of clinical simulation laboratories, clinical simulation, and models of self-directed learning in nursing education. A combination of qualitative and quantitative data collection methods were used including a pre piloted research questionnaire and a collation of student competency assessment outcomes. One hundred and fifty-six EIT Bachelor of Nursing students participated in the study. Statistical research findings and themes that emerged demonstrated a high level of overall student satisfaction with the facility resources and model of learning and

provide direction for future facility and resource development, and ongoing quality improvement initiatives.

ACKNOWLEDGEMENTS

Undertaking and completing this thesis has been an interesting and rewarding process. Whilst at times life has been fraught it is heartening to see the information, which was gained from this research being used to inform ongoing development of the Clinical Arts and Technology Centre.

I would like to thank and acknowledge the support and patience of my husband Malcolm and sons Adam, Calum and Blain, who at times have felt they have taken second place to my work and study.

To my research supervisor Dr Cheryl Benn, thank you for your advice, patience and support throughout this exercise.

To my work colleagues and friends, you have kept me on track and I have appreciated your support and ongoing encouragement. In particular I would like to thank Dr Art Thomas, Research Manager of Business and Computing, EIT Hawke's Bay who spent time assisting me to use, navigate and interpret SPSS and Dr Bob Marshall, Research Professor, Faculty of Health and Sport Science, EIT Hawke's Bay for his editorial assistance and support in my final stages of compiling this document.

Finally I would like to acknowledge the financial support I have received from EIT Hawke's Bay and from Massey University whilst undertaking this study.

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CHAPTER 1.0 ORIENTATION TO THE STUDY

1.1 Introduction

It is acknowledged that nursing education today emphasises higher-level thought processes than in the past. The requirement for students to also demonstrate competence in core clinical skills is critical for safe professional practice. Balancing curricular emphases on technical knowledge, clinical and interpersonal skills, ethical decision-making and other critical thinking skills is becoming increasingly difficult for nurse educators. The Faculty of Health and Sport Science at the Eastern Institute of Technology developed and implemented the Clinical Arts and Technology Centre and a model of teaching and learning which was designed to address some of these difficulties, which were impacting on the Bachelor of Nursing programme.

This thesis describes an Evaluation research study which was undertaken at the Faculty of Health and Sport Science at the Eastern Institute of Technology. The study is a component of the Faculty's overall evaluation of the Clinical Arts and Technology Centre, and the associated "co-operative model" of self directed learning which are imbedded in the Eastern Institute of Technology undergraduate Bachelor of Nursing programme.

This chapter provides a background to the development of the initial Clinical Arts and Technology Centre concept and implementation of the facility. The researcher's interest, the significance of this study, and the research logic are outlined. The chapter concludes with a brief description of the overall thesis structure.

1.2 Background

Changes in the health sector nationally and internationally have resulted in increased complexity of care, reduced numbers of venues for clinical practicum experiences, and increased financial costs associated with student practicum (D'A Slevin & Lavery, 1991; Nolan & Nolan, 1997a; Bjork, 1997; Morton, 1997; Knight, 1998a; Knight & Mowforth, 1998; Vernon, 2000). Therefore, fulfilling the clinical practicum component of undergraduate nursing education and facilitating the development of undergraduate nurses has become a major challenge of creativity and innovation. The commitment to

ensure that students have requisite clinical skills appropriate to each stage of their programme, prior to their clinical practicum involves curricular, pedagogical and financial considerations. Whilst these concerns may appear relatively new to nursing education in New Zealand, appearing in the literature toward the latter end of the 1990s, international literature suggests nurse educators in North America, Europe and more recently the United Kingdom have been working to address similar issues since the early 1990s (Studdy, Nicol, & Fox-Hiley, 1994; Morton, 1997; Nolan & Nolan, 1997a & 1997b; Knight, 1998a; Knight & Mowforth, 1998).

In 1998, drawing on national and international literature and a Faculty committed to the development of nursing knowledge/skill, discovery, reflection and self directed learning, the Faculty of Health and Sport Science at the Eastern Institute of Technology initiated a project team to investigate the feasibility of implementing an alternative model of "clinical skill" teaching and learning for undergraduate student nurses. As a result the concept of developing a multifunctional clinical simulation (psychomotor skill) laboratory was born. Recommendations made by the project team resulted in the development and resourcing of a "pilot" simulation laboratory in July 1999, followed by an eight-week trial of the psychomotor skill laboratory concept with student volunteers from the undergraduate Bachelor of Nursing programme. In January 2000 the simulation laboratory, then named the Clinical Arts and Technology Centre at the Eastern Institute of Technology was officially opened and the associated model of cooperative self directed learning was embedded and implemented throughout the undergraduate Bachelor of Nursing curriculum.

The Clinical Arts and Technology Centre is a "virtual" simulation environment that provides students with access to a facility and resources designed to support and enhance assimilation of theoretical and clinical knowledge, whilst providing them with an opportunity to prepare for practicum experiences in a safe and supportive environment. The Clinical Arts and Technology Centre builds upon the traditional clinical simulation (psychomotor) laboratory concept to include a fully equipped, simulated hospital environment, with a combination of learning aids such as video taping/recording facilities, interactive computer assisted learning packages, and self-directed learning modules. In parallel with the development of the Clinical Arts and Technology Centre and critical to the implementation of the facility, was a need to

develop and embrace a philosophy of teaching, which supported student-centred learning and discovery. Following an extensive review of literature and investigation of a variety of theories related to teaching and learning of clinical skills a "co-operative model of self directed learning" (Nolan & Nolan, 1997b, p. 103) was adopted and implemented. This model complemented the overall philosophy of self-directed learning and discovery within the Faculty of Health and Sport Science and the Bachelor of Nursing programme.

1.3 The Researcher's Interest

My interest as the researcher has grown from my involvement as project coordinator at the inception of the Clinical Arts and Technology Centre project, and throughout the ongoing planning, development and implementation of what is now the Clinical Arts and Technology Centre at the Eastern Institute of Technology. However, I believe working with undergraduate Bachelor of Nursing students both as an educator and clinician over a number of years, has contributed to my interest and provided me with valuable insight into the issues which educators, clinicians, and ultimately nursing students face when trying to balance the need for appropriate supportive practicum experiences with the rapidly changing and financially constrained health and education environment.

In my current role as Section Manager / Head of the Department of Nursing I have a particular interest in improving nursing students' opportunities to access quality 'practicum' learning experiences. Due to a number of reasons, none more so than current regional and national economic constraints within the education and the health sectors, the opportunity for students to access consistent and appropriate practicum learning environments which support and enhance the acquisition and development of undergraduate nursing knowledge and skill have become limited. This situation has provided the opportunity for nurse educators within the faculty to take a more strategic and innovative approach to the provision of undergraduate nursing education and efficient utilisation of the available resources.

1.4 The Significance of this Study

In order for the Faculty of Health and Sport Science at the Eastern Institute of Technology, to make informed quality decisions and improvements regarding ongoing programme and facility developments and/or necessary programme and facility changes it is important to ascertain the students' perception of the effectiveness of the Clinical Arts and Technology (CAT) Centre facility, resources, and the associated cooperative model of self directed learning, in facilitating and enhancing student learning.

Since implementation of the Clinical Arts and Technology Centre student evaluations and anecdotal comments have cited, and continue to cite the positive aspects and benefits of the facility and resources with regard to student learning. It was therefore appropriate eighteen months after implementation of this initiative to formally investigate the following question:

Is the Clinical Arts and Technology Centre, and the associated "co-operative model" of self directed learning, effective in facilitating and enhancing clinical (psychomotor) skill acquisition and clinical skill competency of first and second year undergraduate student nurses?

The absence of a significant body of literature relating to the utilisation of similar facilities and learning approaches, particularly within New Zealand, lends added importance to this research within the context of undergraduate nursing education in New Zealand.

1.5 Aims of the Research

i. To determine student satisfaction with and perceptions of the Clinical Arts and Technology Centre facility, resources and model of self directed learning.

ii. To determine overall student competency outcomes in relation to utilisation of the Clinical Arts and Technology Centre.

iii. To identify areas for programme improvement, and facility and resource development.

1.6 Organisation of the Thesis

1.6.1 Evaluation logic

In planning and conceptualising the research aims and strategy I developed the following framework in order to link each aspect of the study.

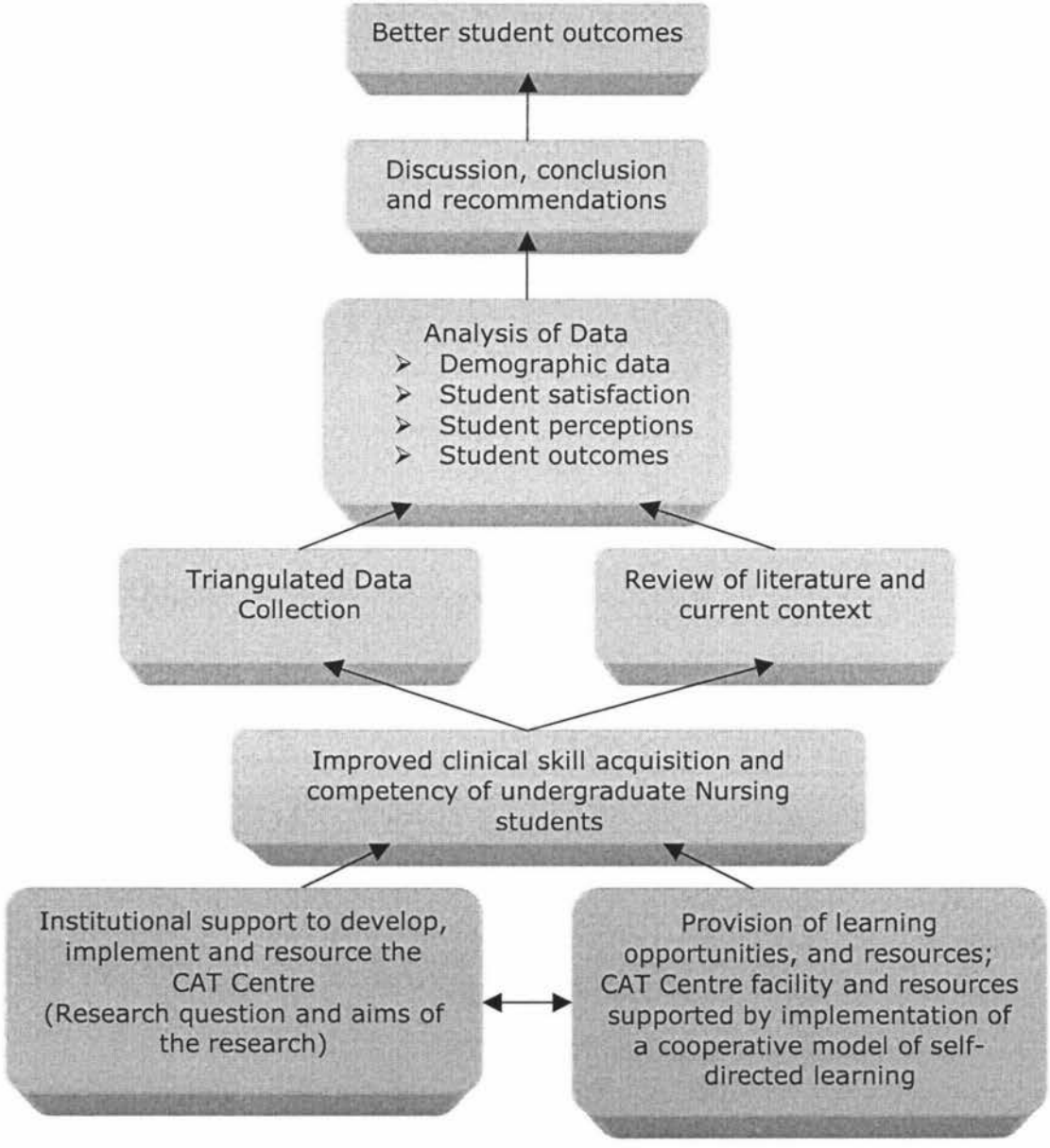

Figure 1 Evaluation Logic

1.6.2 Thesis outline

Chapter one – Throughout chapter one the thesis topic has been introduced. A background to the research has been provided positioning the research significance, the interests of the researcher, the research question, related research aims, and the evaluation logic.

Chapter two – In chapter two, national and international literature in relation to the current context of undergraduate nursing education, the introduction of clinical simulation laboratories, clinical simulation, computer-assisted simulated learning, and self directed learning is explored with a particular focus on the development of undergraduate nursing student knowledge, clinical skill acquisition and competency.

Chapter three examines the methodological underpinnings of this research, and discusses the researcher's rationale for choosing to use an Evaluation Research Methodology. A detailed explanation of the research process, ethical considerations which formed the basis of the ethics approval documentation submitted to the Massey University Human Ethics committee and the Eastern Institute of Technology Ethics Committee, and methods of collection and data analysis undertaken to complete this research are provided.

Chapter four presents the research findings under the following broad categories:

- Characteristics of the Sample.
- Student satisfaction.
- Student competency outcomes (in terms of clinical skill acquisition and achievement of prescribed clinical competencies) in relation to attendance/utilisation of the Clinical Arts and Technology Centre.

Chapter five focuses on a discussion of the overall research findings in relation to the research question, aims, data triangulation and relevant national and international literature. The strengths and limitations of the research are presented and recommendations drawn from the study findings are made for future programme improvement, and facility and resource development.

Chapter six – The thesis concludes with a summary of the research study, the conclusions and understandings which have been gained, and recommendations that have been made.

CHAPTER 2.0 LITERATURE REVIEW

2.1 Introduction

This chapter focuses on a discussion of national and international literature in relation to the current context of undergraduate nursing education and the acquisition of psychomotor skills by undergraduate nursing students, particularly in relation to the use of simulation laboratories, clinical simulation experiences, computer assisted interactive learning, and models of self directed learning to facilitate and support the acquisition and development of psychomotor skills, nursing knowledge and clinical competency. The body of literature which exists relating to the use of simulation in other disciplines such as medicine and laboratory science technology has not been included as a predominant focus of the literature relating to these disciplines was found to be based on the use of the pure science laboratory setting, science experiments, laboratory tests, and dissections, rather than the broader concept of clinical simulation and the development of simulation laboratories as they relate to undergraduate nursing education.

The literature reviewed and discussed in this chapter has been derived from published books, nursing and allied health journals, and on-line internet based nursing and allied health journals. An extensive search of several major databases, the Cumulative Index of Nursing and Allied Health Literature (CINAHL), Index New Zealand, and electronic library catalogues at Massey University, Palmerston North and the Eastern Institute of Technology, Hawke's Bay was undertaken.

The key words/phrases used in this search were; nurse training, nurse education; clinical simulation; clinical skill or psychomotor skill – acquisition, development, and competency, models of teaching/learning; simulation laboratory or practice suite – multimedia, self-directed learning; computers in nursing education, computer assisted instruction, CD-ROM, Interactive video instruction. The search was further limited to, undergraduate nursing education, and bachelor of nursing.

2.2 Overview of the Current Context

As stated by McManus and Sieler (1998), registered nurses hold a position of trust in society and have a responsibility to be competent. The ultimate goal for the undergraduate nursing student is to register as a nurse and to practice nursing in a competent manner. Success in a nursing programme and subsequent registration leads to the public expectation that the nurse is competent in his/her practice. Nurse educators have a responsibility to educate practitioners who will not only be competent but will also be able to continually up-date and review their practice expertise in order to meet ever-changing demands.

In recent years national and international nursing literature has reflected a growing concern relating to opportunities for clinical practicum experience, clinical skill acquisition, and clinical skill competency of undergraduate nursing students. Nursing is essentially a practice based professional discipline, with a large component of education devoted to experiential learning, in a variety of clinical settings. Nurse educators recognise the value of these practicum experiences, however learning in the clinical environment is dependant upon a number of variables, often outside the control of the educational institution, such as patient acuity, staff: patient ratios, 'casualisation' of the Registered Nurse workforce, and the commitment of the practicum venue to facilitate the learning experience for the nursing student.

Nursing literature cites issues concerning the diverse variation in clinical practicum experiences of undergraduate nursing students, often associated with, or as a result of unpredictable and inappropriate staffing levels, and limited patient accessibility (Studdy, Nicol, & Fox-Hiley, 1994; Bavin & Shang, 1996; Knight, 1998a; Holloway, 1999; Knight, Moule & Desbottes, 2000; Vernon, 2000). Reliance on staff members within clinical practicum facilities, to assist with the clinical supervision and preceptoring of students has become increasingly problematic due to fewer nurses, changes in skill mix, and escalating levels of responsibility within the clinical units (Holloway, 1999; Johnson, Zerwic & Theis, 1999; Williams, 1999). Rapid technological advances, higher patient acuity levels, pressures for cost containment, and an accelerating knowledge base continue to make it increasingly difficult to educate 'competent' nurse graduates (Hilton, 1996; Morton, 1997; Holloway, 1999). In response to these changes nurse educators are challenged to offer a curriculum that

prepares the undergraduate nurse with knowledge and technical skills, mitigated with flexibility, creativity and active involvement in the learning process. Snyder, Fitzloff, Fiedler, and Lambke (2000), note that a new system of health care is evolving as a result of the "explosion" in technology coupled with issues of accessibility and cost containment.

Porter-O'Grady (2001) describes an 'altered mental model' or a need for nurses to embrace new and innovative ways of thinking and delivering nursing and nursing education in the 21st century. Porter-O'Grady states, "nursing practice in its current configurations and forms is dying as the demands of the health system are changing both in substance and service" (p. 182). He espouses a future requirement for nursing practice skills which focus more on activities of assessing, informing, guiding, teaching, and counselling rather than the "time-based tasks" associated with nursing care. These he terms as "quickly becoming historic references to an age that no longer exists" (p.183). If this is indeed the situation, and nurse educators believe the purpose of nursing education is to prepare 'competent' nurses to meet the current and future healthcare needs of society, then as stated by Heliker (1994, p.44), "nursing education faces a great challenge as it reviews the outcomes of traditional teaching strategies and explores new alternatives." Clearly an approach to clinical education which encourages the student to interact with the knowledge and skills inherent in nursing practice, and to take greater responsibility for their own skill acquisition and development is a model that should be implemented into nursing education. However, it also requires some caution in relation to the degree of responsibility of the student and the responsibility of the nursing lecturer/registered nurse to facilitate a supportive and safe environment in which the student can acquire and develop their knowledge and skills tempered with the need to ensure a safe environment for the recipients of care.

2.3 Clinical (Psychomotor) Skill Development in Nursing Education

Nurse training was traditionally considered as being a 'hands on' apprenticeship style of learning. Since the time of Florence Nightingale, knowledge was deemed necessary for a nurse, and learning to nurse was primarily presented as the refinement of practical skills toward the 'art' of taking care of the patient (Bjork, 1997). The traditional apprenticeship model of nursing education which permeated the history of nursing

education internationally and in New Zealand until as late as the early 1980s supported the development of practical skills through 'on the job training'. Although the nursing profession initially viewed this apprenticeship model as an efficient way of 'training' nurses, establishing nursing schools within the hospital environment also ensured an inexpensive and captive labour force for the employing hospital (Taylor & Care, 1999).

Bjork's (1995) Norwegian study carried out over a forty-year time-frame, reviewed research that focused on nurses' and patients' perceptions of what constituted 'good' nursing care. The initial studies showed agreement from both nurses' and patients' that nursing care which contributed to ensuring patient hygiene and comfort (practical skills) was deemed as 'good' nursing care. However, whilst patients' perceptions remained unaltered, later studies revealed a change in what nurses' believed constituted 'good' nursing care. The importance of psychosocial aspects of care, rather than pure practical skills were identified (White, 1972). Bjork (1995) attributed the change in nurses' perceptions to be the result of "forces such as educational policy, issues of professionalism and academic aspirations" (p.8).

In New Zealand the movement of nursing education away from the hospital environment and into the education sector paralleled education trends in other Western countries (Bevis, 1982; Bjork, 1997; Bjork & Kirkevold, 2000). Booth (1997) identified the development of contextually meagre nursing practice suites within technical institutes as creating an artificial division between nursing education and the clinical environment. The result was compartmentalisation of student learning with a focus on development of the students' manual skill and dexterity which was still to a large degree developed in the clinical environment, in isolation from the cognitive and knowledge based aspects underpinning the performance of nursing practice being taught in the academic environment. These issues have been echoed in studies by Bradshaw (1998) and Bjork and Kirkevold (2000).

As discussed by Bjork (1997) a narrow conceptualisation of what constitutes a practical skill, for example the performance of a technical/manual movement or task, coupled with a focus from nursing researchers on performance of specific skills or tasks, has reinforced a simplistic task orientated understanding of practical skill development. As a result, the use of the traditional practice suite has been mocked in nursing education,

as a relic of a bygone era (Knight, 1998b). However, whilst this view has been espoused within nursing education there is no substantive evidence or research to support the demise of these facilities. In fact, theories of skill acquisition and a growing body of nursing research support the ongoing development of the 'traditional practice suite,' into multifunctional simulation laboratories.

2.3.1 Multifunctional simulation laboratories and psychomotor skill development

Taylor and Care (1999) acknowledge that constraints within contemporary nursing education in relation to the time students spend in the practicum environment, and students' access to expert practitioners, compel nursing educators to make optimal use of opportunities for alternative practicum learning experiences. Now in the 21st century, schools of nursing in North America, the United Kingdom and more recently New Zealand have responded to these challenges by developing and implementing a range of these 'new' multifunctional simulation (psychomotor skill) laboratories, which aim to focus not only on the "psychomotor tasks" of nursing but to also support the development of students' cognitive, communication and interpersonal skills. The evolution of these facilities coupled with utilisation of more innovative models of teaching and learning have been identified as the conduit to facilitate translation of basic theoretical knowledge into practice, whilst also keeping pace with developments in nursing education, technological advances, and the growing challenge for schools of nursing to provide safe and supportive environments in which clinical skill acquisition can occur (Oxendine, 1968; White & Ewan, 1991; Hilton, 1996; Beeson & Kring, 1999; Johnson, Zerwic, & Theis, 1999; Bjork & Kirkevold, 2000; Knight, Moule & Desbottes, 2000; Vernon, 2000; White, 2000). This emergence of a more innovative practice focus requires a paradigm shift from the traditional mental models and skill-sets embedded in nursing education.

Knight and Mowforth (1998) note that a review of nurse education in the United Kingdom (Project 2000), and research derived from the United States of America indicated that nursing students are experiencing difficulties in acquiring psychomotor skills. Student and clinical evaluations clearly identified reduced clinical placements and lack of adequate college preparation as being the cause. This phenomenon is not an isolated one as nationally and internationally undergraduate nursing students continue to

cite the need for increased opportunity to rehearse and master core clinical skills, prior to embarking upon practicum experiences (Hilton, 1996; Knight, 1998b; Knight & Mowforth, 1998; Johnson, Zerwic & Theis, 1999; Vernon, 2000).

Knight and Mowforth (1998) go on to describe the research, planning, development, and implementation "why we did it, how we did it" (p. 389) of a skills centre in the Department of Nurse Education at the Glenside campus of the Avon and Gloucester Faculty of Health which opened in 1995. Prior to approval of funding for the development of the skills centre the project team was asked to identify particular skills that the nursing students were lacking. It is interesting to note that the two main issues they identified were students' lack of dexterity when faced with certain psychomotor skills, and clinical staffs' lack of awareness of students' learning outcomes resulting in sometimes high expectations of students for their level of education. These are issues that have also been identified within the Bachelor of Nursing programme at the Eastern Institute of Technology. Knight and Mowforth (1998) caution that whilst the skills centre is more than just an area where isolated tasks are taught, it will never be an alternative to the clinical practicum experience, rather it is complementary to that experience.

A small body of nursing literature now exists which supports the premise that students who have the opportunity to practice skills in a safe, controlled and non threatening environment, such as a simulation laboratory, are better prepared, and less apprehensive when moving into a real practicum situation (Hilton, 1996; Janes & Cooper, 1996; Morton, 1997; Olesinski, Brickell & Pray, 1998; Knight, 1998b; Knight & Mowforth, 1998).

Gomez and Gomez (1987), and Janes and Cooper (1996), investigated the effect of practice conditions on nursing students when learning psychomotor skills. Gomez and Gomez (1987) hypothesized that the practice of a psychomotor skill would be more effective in the patient care setting than when undertaken in a laboratory, as the patient care setting offered the reality of a changing environment (noise, real patients, visitors and equipment). In order to test this hypothesis Gomez and Gomez undertook a quantitative comparative study of 63 undergraduate nursing students. The students were randomly divided into two groups (a control group and an experimental group) and were taught the skill by teacher directed lecture and demonstration. The students all

practiced taking a blood pressure, the control group in the laboratory and the experimental group in the patient care setting. Skill acquisition was measured using a criteria checklist. Gomez and Gomez reported that the experimental group (in the patient care setting) demonstrated a greater degree of confidence and accuracy when taking the blood pressure than the control group. They went on to conclude that the reason this was so was because the experimental group had begun to differentiate between environmental constraints. It is not clear how Gomez and Gomez (1997) made this assumption as the criteria checklist on which the students were assessed focuses solely on objective measures of skill accuracy, and does not identify student confidence, environmental constraints, or how these concepts could have been measured. In contrast Janes and Cooper (1996) believe laboratory sessions provide the opportunity for students to repeat and practice a task or scenario with support as required therefore facilitating acquisition of knowledge and or psychomotor skills. Janes and Cooper (1996) theorise that practicing leads to a change in student performance allowing them to move more quickly from novice to more experienced participant. As routine nursing skills become reflexive, more time can be devoted to cognitive processes such as problem solving. Simulations can then assume greater complexity and reality and also provide students with the opportunity for feedback through audio-visual means, peer review and lecturer assessment.

Aronson, Rosa, Anfinson, and Light (1997) discuss the use of a simulated clinical problem-solving model in facilitating the development of strong clinical judgment skills in nursing students. Aronson et al believe that nursing students are adept at assimilating isolated pieces of data but require direction and practice at discerning and correlating data to clinical decision-making skills, "tying it together" (p.17). In response to these issues, two 'Clinical Problem Solving Learning Laboratories' were initiated in the associate degree nursing programme at Capital Community Technical College, Connecticut. These facilities provided the resources which enabled students to participate in simulated learning experiences. Nursing students undertook scenario based simulated sessions which required the review and analysis of a variety of subjective and objective data, gathering of data related to the patient situation, followed by clinical decision making and appropriate nursing intervention. The laboratory sessions were used for student practice, peer review, and assessment of student competency. Similar to the views espoused by Janes and Cooper (1996), Aronson et al

(1997) believe that the use of a clinical problem solving laboratory provides students with a safe and supportive environment in which clinical practice and the development of strong clinical judgement skills can occur and through this process of development nursing graduates will be better prepared to adapt to a variety of healthcare settings.

Curricular changes within the undergraduate nursing programmes at the Glasgow Caledonian University were made in response to a combination of local health sector and institutional constraints with regard to clinical practicum experiences. As a result a reduction in the time undergraduate nursing students would spend in traditional clinical settings prompted a review of the skills teaching programme. O'Neil and McCall (1996) describe the increased resourcing of what had been a basic skills laboratory, allowing them to design and customise a simulation laboratory which consists of a suite of customised rooms, including a preparation area, tutorial room with a video playback facility, a four bed hospital including video and audio equipment at each bed space, a domestic bedroom, bath, shower and toilet facilities. The laboratory was manned by a nurse, and open access was provided to the students within the nursing programmes. O'Neil and McCall (1996) identify that in an attempt to promote an appropriate learning environment increased emphasis was placed on fostering students' self-directed and ongoing learning skills. O'Neil and McCall describe a progressive education programme within the laboratory setting which relied on a partnership relationship between the teachers and students as students move through the three year undergraduate nursing programme. The programme they describe was developed from a small (n = 2) pilot study conducted by O'Neil and McCall (1996), which evaluated a model of teaching and learning based on Objective Structured Clinical Examination (OSCE), used in conjunction with student self and peer evaluation. Details of the methodology, measurement and results of the pilot study were not provided by the authors.

In 1998 Nicol and Freeth implemented what they termed an "innovative new approach" (Nicol & Freeth, 1998, p. 601), to teaching, learning and assessment of clinical skills. This model was implemented in direct response to the changed nature of clinical placements for nursing students, shorter in-patient episodes, and increasingly high workloads of staff within local clinical facilities. Students were spending less time in the traditional hospital-ward environment where in the past they were able to practice

and achieve clinical skill competency. The driving forces identified in the article by Nicol and Freeth (1998) were similar to those presented by O'Neil and McCall (1996). Nicol and Freeth go on to describe a model which introduces nursing students to simulated professional practice within the supportive and safe environment of a skill centre (simulation laboratory) and to facilitate student mastery of fundamental clinical skills, through supported simulated practice and evaluation. Nicol and Freeth (1998) identify that development and implementation of this model required ready access to a modern, well-equipped and flexible skill centre. The model of learning was designed to address issues of reliability previously associated with the traditional Objective Structured Clinical Examination (OSCE). Whilst incorporating aspects of the traditional OSCE, the model was structured to enable students to remain at one practice station, to follow through one scenario, and provide the care for one simulated patient, rather than moving around a variety of different stations within a limited time-frame. The model was implemented into a Diploma in Nursing programme and utilised activities such as video recording of student performance, student self assessment and peer review, in addition to assessment of the students' 'global' performance in the areas of "safety, accuracy, effectiveness, affectiveness and self evaluation" (Nicol & Freeth, 1998, p.608). Whilst Nicol and Freeth (1998) have described at length the implementation of a model of student learning in association with an enhanced simulation laboratory, no formal research documentation was found. Therefore it is not possible to determine whether the assumptions made by Nicol and Freeth (1998) in relation to the success of a teaching programme in association with the simulation laboratory experience, are transferable or supported by research evidence.

Further studies by Johnson, Zerwic, and Theis (1999), Knight, Moule and Desbottes (2000), and Snyder, Fitzloff, Fiedler, and Lambke (2000) identify the importance of providing safe and supportive simulation environments, where nursing students can practice, gain confidence and constructively evaluate their own psychomotor skill development, away from the visibility of the clinical practice arena. These studies also demonstrate the important role of a variety of simulation experiences in the acquisition and translation of knowledge and development of psychomotor nursing skills.

The study undertaken by Johnson, Zerwic, and Theis (1999) describes using a simulation environment which incorporates multimedia audio and videotapes to record

role-playing activities by nursing students participating in simulation experiences whilst undertaking an identified clinical course. The emphasis of the study and simulation experience was to facilitate student discussion and review of the simulated learning experience, rather than formal evaluation of their individual performance. An evaluation of the simulation activity was undertaken using a questionnaire, which incorporated a six-point Likert scale rating system. All 51 nursing students undertaking the clinical course were included in the study, the findings of which indicated that students identified the simulation experience as the most positive aspect of their course, facilitating validation of their knowledge and decision-making skills.

Previous publications by Knight (1998a), Knight (1998b) and Knight and Mowforth (1998) are built on by Knight, Moule and Desbottes (2000), who discuss the implementation of a structured approach to teaching clinical skills within the skills centre at the Glenside campus of the Avon and Gloucester Faculty of Health. The method they describe builds upon the model, 'the learner and teacher' from Gentile (1972) as described by Pease (1977), and incorporates the theoretical principles of skill acquisition discussed by Knight (1998a). A skill grid is used to identify the depth, and source of knowledge at each stage of skill performance. Knight et al (2000) believe that a fully equipped skills centre used in conjunction with a comprehensive model of problem-based-learning will provide students with the opportunity to link knowledge with skill therefore improving the transfer of theoretical knowledge into practice.

In a more recent study Snyder, Fitzloff, Fiedler, and Lambke (2000) describe how they restructured a traditional nursing practice suite and implemented a simulation laboratory designed to support student experimentation with psychomotor skills, and self-initiated approaches to problem solving. The restructured laboratory experience was based on the premise of life-long skill acquisition and placed emphasis on communication and conceptualisation of nursing principles through practice. Much like the work of Janes and Cooper (1996) and Nicol & Freeth, (1998), Snyder et al (2000) contend that nursing students, who develop skills that extend beyond techniques, will be better prepared to meet the demands of current and future health care systems and patients. Their study indicated that the students' preference was to learn psychomotor skills through "hands on practice" supported by watching a skill on video or observing peers/faculty perform the skill. A supportive environment and supporting actions such as talking through a

procedure with peers, observing mistakes made by peers, questioning, prior experience, group discussion and trying, failing and trying again were identified by the students as assisting in this process.

2.3.2 Psychomotor skill development and multimedia and computer-assisted learning

New developments in computer technology and capabilities are changing healthcare delivery and nursing education (Gleydura, Michelman, & Wilson, 1995). The study by de Tornyay (1971) expanded upon the traditional clinical skill laboratory concept to replace the teacher with 'new' media in the form of slides, film, video and programmed instruction. It was at this time that learning styles, individualised learning, and self-instruction became key concepts of skill learning. The integration of overhead transparencies, power-point presentations, and video and audio technologies into nursing education, has been followed by ongoing developments in computer technologies and software. Literature surrounding the implementation of computer technologies into nursing education emerged in the early 1990s (Engberg & White, 1991; Bolwell, 1992; Cambre & Castner, 1992; Kippers & Rizzolo, 1992; Khoiny, 1995). Further investigations and studies have followed which focus on student interaction with, and use of a variety of multimedia resources for example computer assisted self-directed/interactive learning packages, interactive CD ROMs, and internet based and virtual learning resources (Gleydura, Michelman, & Wilson, 1995; Khoiny, 1995; DeAmicis, 1997; Suggs, Mittelmark, Krissak, Oles, Lane, & Richards, 1998; Huffstutler, Wyatt, & Wright, 2002). Gleydura, Michelman, and Wilson (1995) reviewed interactive video instruction (CD Rom's) as a multimedia tool in nursing education and contend that organisations and nursing educators should look beyond traditional nursing school curricula to incorporate multimedia resources which will have a major impact on future health care education and health care delivery. Khoiny (1995) describes environment, learning styles, and access as factors that contribute to the effectiveness of computer-assisted instruction when used as a teaching strategy in nursing education. Khoiny (1995, p. 167) states "knowledge of these confounding variables ... will help the nurse educator choose effective software programmes and establish an environment that minimizes frustration and promotes learning through computer assisted instruction."

Studies by DeAmicis (1997), Ayoub, Vanderboom, Knight, Walsh, Briggs and Grekin (1998), and Suggs, Mittelmark, Krissak, Oles, Lane, and Richards (1998), compare traditional teaching methods with models of self-directed computer-assisted-interactive learning. The comparative study undertaken by DeAmicis (1997) focused on 32 undergraduate nursing students involved in a traditional lecturer/demonstration versus an interactive computer based independent self-study programme. Two questions were posed "Are there differences in the two groups of students' ability to perform a re-demonstration of intravenous therapy skills? Do students report differences in the effectiveness of the two teaching methods to facilitate learning therapy skills? Results of the study supported existing literature, which indicates that interactive-video-disc-instruction is an effective alternative teaching strategy. The study indicated that the use of interactive-video-disc-instruction by baccalaureate nursing students when learning and practicing nursing skills increased students' proficiency in performance of a variety of practice based skills, and also assisted the students to become more comfortable and proficient in reading and using computer-based instruction.

The study undertaken by Ayoub et al (1998) examined the use of an interactive computer classroom compared with the use of a traditional lecture/discussion format with undergraduate nursing students participating in a management decision-making course. The interactive computer classroom incorporated structured learning activities, which allowed students (n = 16) within the experimental group to participate simultaneously and anonymously in the activities. The control group (n = 24) undertook the same course, delivered by the traditional lecture/discussion format. Outcome measurements included academic performance, class participation and attendance records. As reported by Ayoub et al (1998) examination scores and participation rates of students in the experimental group (interactive computer classroom) were considerably higher than those of the control group (traditional method), however no significant difference was noted in class attendance. An evaluation questionnaire with open-ended questions which was completed by the participants, revealed that students' participating in the interactive computer classroom believed that the process enhanced application and understanding, however the need for increased preparation time for faculty staff and lack of tolerance due to delays resulting from technical difficulties were also identified.

Suggs et al (1998) undertook a study that focused on the efficacy of a self-instruction package when compared to a traditional continuing education offering. A quantitative study design and a sample group consisting of 63 registered nurses were utilised. The control group taught by a traditional lecturer directed approach, consisted of 35 nurses who were already enrolled in the programme. A further 28 nurses recruited for the research were assigned to an experimental group undertaking a self-instruction learning package. Suggs et al (1998) demonstrated that learning from computer based self-instruction packages can be effective and provide the added benefit for the participant of being able to complete the learning package at their own convenience and rate. Self-instruction combined with access through computer technology allowed participants to access the learning programme from a distance, and added to the convenience for the participant. During the study it was also noted that whilst development of self-instruction learning packages are time intensive initially they are much less intensive once produced, requiring only intermittent updating of materials. In contrast traditional teaching modalities were found to be time intensive throughout the education experience. In addition whilst the 'up-front cost of producing the self-directed learning package was found to be greater than for the traditional teaching method, this was a one-off cost and over the long term the package was found to be more cost effective, providing the ability to have multiple users and unlimited access to knowledge which allowed students to repeatedly review the material if they wished (Suggs et al, 1998).

These findings in an environment of increasing economic constraint, higher patient acuity and more limited access to practicum experiences highlight that the utilisation of teaching and learning strategies, which are both cost-effective and enhance student access to a range of information and experiences can only be of benefit to nursing education. As identified earlier in this literature review the emergence of multifunction simulation laboratories, which could be termed a 'one-stop-shop' for clinical skill development, incorporate not only the traditional resources associated with nursing practice but also a wide range of multimedia resources, contribute a new dimension to nursing education. As discussed by Ribbons (1998) advances in multimedia, which now allows the ability for digital-based technology to deliver sound, full colour graphics, video, and animation, in addition to text, provides nurse educators with "a tool unrivalled in its capacity to enhance the learning process" (p. 109).

As discussed by Huffstutler et al (2002) to remain competitive in the healthcare workforce nurses must be proficient in not only clinical skills and decision-making but also information technology. Huffstutler et al believe integration of technology into nursing curricula is essential in order to prepare graduates who are conversant with the appropriate knowledge and skills and to be current in the technology associated with their profession. The integration of handheld computer technology in the form of a 'Personal Digital Assistant' is discussed in relation to a teaching and learning strategy implemented by Huffstutler et al (2002) at the Virginia University School of Nursing. The initial introduction of this technology was as a tool to support nursing students undertaking pharmacology courses. This idea builds on the multifunctional simulation laboratory concept to extend access to multimedia resources and information to nurses beyond the laboratory environment.

Whilst searching and reviewing the literature it quickly became apparent that the use of multifunctional simulation laboratories in facilitating psychomotor skill development of undergraduate nursing students is underpinned by:

- Theories of psychomotor skill acquisition;
- Self-directed learning.

2.4 Theories of Psychomotor Skill Acquisition

Knight (1998a) explores skill acquisition theory derived from both the connectionist and cognitive 'schools' of psychology. As discussed by Knight, connectionist (stimulus-response) theories argue that environment is the dominant factor which influences learning and behaviour. In contrast "cognitive theories seek to explain learning as an individual's interpretation of the environment" (Knight, 1998a, p. 450). A key characteristic of cognitive theories is insight. Knight refers to this as 'penny dropping,' "an initial slow acquisition of skill followed by rapid progression to problem-solving" (Knight, 1998a, p.450). Knight (1998a) goes on to cite a number of connectionist theorists for example, Pavlov, Thorndike, Guthrie, Hull, and Skinner, and cognitive theorists such as Lewin and the gestalt psychologists - Koffka, Hartmann, and Tolman who have espoused theories which to some extent have influenced the models of teaching used in nursing education over a number of years.

Through study of the nervous system neurological theories have also emerged. These theories have particularly influenced and contributed to the instructional practice related to teaching motor skills, in nursing education. Stallings (1973, as cited by Knight, 1998a, p. 448) defines motor skills as "any muscular activity that is directed toward a specific objective". Inherent in this definition is the fact that motor skills are also referred to as sensory-motor, perceptual-motor and psychomotor skills, indicating that sensing, perception and knowledge are necessary for the execution of a skilled performance or the accomplishment of a task (Knight, 1998a).

Heidgerken (1965, p. 11) defines a skill as "a refined pattern of movement or performance based upon, and integrated with, the perceived demands of the situation". Heidgerken (1965) goes on to make a distinction between sensory-motor and perceptual-motor skills, emphasising the latter as the typical nursing skill, since it is the mental process of interpreting sensory information that turns the action into a skill and not merely a habit.

Building upon the work of the 'skill acquisition' theorists, Knight (1998a) describes an information-processing model of human performance which, in conjunction with Table 1, Gentile's (1972) model – the learner and teacher, underpins psychomotor skill teaching at the skills centre in the Department of Nurse Education at the campus of the Avon and Gloucester Faculty of Health. The model is based on a continuous feedback loop where the student is provided with information, observes an activity, has the opportunity and resources to practice the activity (active participation), is provided with cues and feedback as necessary, develops a motor plan and then carries out the performance of the skill.

Table 1
The learner and teacher (Gentile, 1972 as described by Pease, 1977)

Learner	Teacher
Perceives and desires goal	Provides 'set to learn'
Identifies relevant stimuli	Provides teaching cues
Formulates a motor plan	Assists learners with motor plan formulation
Emits a response	Provides learners with opportunity to emit a response
Attends to the result	Provides learning cues and assists with interpreting results
Revises the motor plan	Adjusts their performances
Emits another response	Provides opportunities to emit another response

"Set to learn" is a term identified by Knight (1998a, p. 453) as the vital factor in teaching motor skills. It is described as involving motivation of the student to see that achievement of the skill is worthwhile. This is achieved through demonstration of the skill and the relationship between the skill in its entirety and individual parts. Teaching cues and skill analysis are tools which are used during the teaching and learning process, and are underpinned by student participation and opportunity to attempt the skill. Formulation of a motor plan by the student is described as a perceptual process involving internalisation of the skill components by the student. Knight (1998a) acknowledges that identifying if this process has occurred is difficult, however notes that students who show signs of early boredom are unlikely to proceed with learning the skill. Throughout this model of learning attention is paid to the actual performance of the skill rather than the outcome, providing the opportunity for constructive feedback and encouraging the student to evaluate his/her own performance.

The work of Benner (1984) remains one of the foremost in describing the passage of nurse from novice to expert, detailing the process of skill acquisition by nurses and the ways in which nurses at varying levels of experience function. Benner (1984) refers to the ability of an individual to 'know-how' to perform a skill without necessarily knowing the 'know-what' or 'know-why' of its performance. This is a behaviour which clearly sits within the stimulus response (conditioning) / connectionist school of learning as described by Knight (1998a). Benner, Tanner and Chesla (1996) explored nurses' performance in the clinical setting using narrative interviews and observation. Different levels of practice amongst nurses were described in terms of cognitive and intuitive processes, perception of the individual and ethical involvement. However, whilst the research of Benner et al (1996) is comprehensive, studies, which have been focused on clinical skill acquisition, have mostly been quantitative in nature, measuring or evaluating nurses performance of specific tasks or observational elements of larger practical actions rather than the wider topic of clinical skill acquisition. Examples include studies which involve the performance of procedures or skills such as "An examination of nurses' practices when performing aseptic technique for wound dressings," (Bree-Williams & Waterman, 1996), or "Nurses' infection control practice: hand decontamination, the use of gloves and sharp instruments," (Gould, Wilson-Barnett & Ream, 1996).

As discussed by Bjork and Kirkevold (2000) nursing skills are shaped by nurses' intentions and informed by their personal and factual knowledge of the patient in conjunction with ethical, practical and theoretical nursing knowledge underpinning and directing their nursing practice. Bjork and Kirkevold (2000) present a practical skill performance model characterised by complexity on many levels in an attempt to broaden the traditional conceptualisations of practical skill performance. They suggest that earlier studies relating to skill performance have been limited to and focused solely on addressing the students' motor aspects of clinical skill performance. However, reliance on 'simple procedure knowledge' is inadequate when clinical skills are understood as complex actions requiring a broader knowledge base. Literature suggests that students in learning situations need the opportunity to be observed and guided through a performance in order to allow for correction of errors, exchange of knowledge and discussion (Knight, 1998b; Bjork & Kirkevold, 2000). Acknowledgement of students' need for a variety of learning experiences that focus not only on task orientated performance of skills, but critical thinking, problem-solving and decision making in clinical situations, continue to be identified in national and international nursing literature (Boney & Baker, 1995; Bjork, 1997; Bjork, 1999; Hilton, 1996; Holloway, 1999; Melby, Canning, Coats, Forster, Gallagher, McCartney & McCartney, 1997; Johnson, Zerwic & Theis, 1999; Bjork & Kirkevold, 2000; Knight, Moule & Desbottes, 2000). The integration of learning theories, development of a structured model of teaching and learning, and a supportive safe practice environment are integral components of psychomotor skill development (Beeson & Kring, 1999, Snyder, Fitzloff, Fiedler & Lambke, 2000).

2.5 Self-directed Learning and Psychomotor Skill Acquisition and Development

A primary criticism of traditional nursing education has been its reliance on teacher-centred methods of instruction, treating students as passive recipients rather than active participants (Hurst, 1985; D'A Slevin & Lavery, 1991). Literature suggests this traditional method of education does not equip nursing students with the skills required for independent learning and provides a poor foundation to facilitate ongoing education (D'A Slevin, & Lavery, 1991; Nolan & Nolan, 1997a; Bjork, 1997; Bjork, 1999; Kerr, 1997; Kenny, 1998). Learning that is meaningful and participative stimulates creativity, intellectual curiosity and critical thinking (Knight, 1998b; Snyder et al, 2000).

Self-directed learning is said to occur when "...the learner takes the initiative and responsibility for their learning process" (Armstrong, Toebe, & Watson, 1985). Literature and anecdotal evidence suggests that a variety of models of 'self directed learning' have been assimilated into nursing education. However whilst this literature review revealed a plethora of research on self-directed learning and related concepts such as problem based learning and cognitive apprenticeship, literature in relation to psychomotor skill acquisition and models of psychomotor skill acquisition combined with self directed learning in nursing education were extremely limited.

Knowles' (1975) andragogical approach to education appears to be the basis of most conceptualisations of self-directed learning within nursing literature. Knowles (1985, p. 274) states that self-directed learning is:

> A process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes.

Knowles (1984) suggests that self-directed learning does not mean learning in isolation; rather it is a skill which requires nurturing in association with various kinds of resources, for example teachers, mentors, peers, and other human resources. This is a view also espoused by Iwasiw (1987) and Nolan and Nolan (1997b). Therefore students require an opportunity to access guidance or be supported in their endeavours when first entering a self-directed learning environment, as those who have not mastered some of the basic skills of self-direction and are novices to nursing practice, may experience feelings of anxiety, frustration and failure (Nolan & Nolan, 1997b).

Knowles (1975) developed a rating tool for students to assess their self-directed learning competencies. Iwasiw (1987) who further developed the work of Knowles (1975), outlines five characteristics of self directed learning. Iwasiw suggests that students are responsible for; identifying their own learning needs, determining their learning objectives, deciding how to evaluate learning outcomes, identifying and pursuing learning resources and strategies, and evaluating the end product of learning. Whilst this model may appear somewhat idealistic, Iwasiw does point out that the

impact of self-directed learning on the student cannot be underestimated and that the role of the teacher is to assess the students' readiness to assume responsibility and to assist the student through the transition process. Iwasiw (1987) goes on to suggest that as nursing education occurs within the boundaries imposed by professional, curricular, legal and institutional requirements there is a need to adopt a more limited approach to self-directed learning. "Freedom within boundaries" is how Iwasiw (1987, p. 224) describes the role of self-directed learning within nursing education. Therefore the teacher must retain responsibility for ensuring specific learning objectives are addressed, and for assigning the student a grade against those learning objectives.

The later study by D'A Slevin and Lavery (1991) explores the concept of self-directed learning and its applicability to nursing education particularly in Northern Ireland and the wider United Kingdom. A continuum comprising four models ranging from total self-direction through facilitation and partnership to total teacher direction was developed. The determination point at which a course falls on the continuum is related to the interaction of five key variables: control, teacher input, student input, assessment, and teacher/learning styles. In exploring these models D'A Slevin and Lavery (1991) identified that there are inherent difficulties in adopting a model of total-self-direction into a nursing programme. As a result they suggested a 'partnership model', where control is shared equally between teacher and learner on a transactional basis, is the most appropriate for nursing education.

Nolan and Nolan (1997b) argue that there is a need to develop a new approach to self-directed learning, termed the 'cooperative model.' They suggest this model has a clear affinity with D'A Slevin and Lavery's partnership model, lying on the continuum nearer teacher-directed learning. The model places emphasis on tutors providing initial direction and leadership, so that students can gradually develop the skills needed to become self-directed (Nolan & Nolan, 1997b) and utilises pedagogical approaches, which recognise the value of didactic as well as experiential teaching strategies.

> "...every act of teaching should have built into it *some* [emphasis added] provision for helping the learner to become more self directing" (Knowles, 1975 as cited by Nolan & Nolan, 1997b, p. 104).

The term 'self-directed learning', which implies that the individual has complete control, and directs his or her own learning, is somewhat ambiguous. Literature reviewed suggests that in nursing education a variety of models of 'self-directed learning' have been adopted. Whilst Iwasiw's (1987) model implies students have complete control over their learning experience, she does go on to set limits on the self-directed learning approach using what she terms 'freedom within boundaries.' D'A Slevin and Lavery's (1991) 'partnership model' of self-directed learning and Nolan and Nolan's (1997b) 'cooperative model' of self-directed learning place emphasis on joint tutor and student involvement within the learning process. These more recent models are perhaps a truer reflection of the original work of Knowles (1975) who suggested that self-directed learning does not mean learning in isolation, that it requires nurturing in association with the provision of appropriate resources. It can be concluded that self-directed learning is not confined to one generic model, rather it is a combination of models which comprise varying degrees of the 'self-directed learning philosophy' and that when discussing and utilising models which include a 'self-directed learning philosophy' the expectations of all parties should be made explicit from the outset.

Love, McAdams, Patton, Rankin and Roberts (1989) explored the learning experiences of second year nursing students in the United States. Their research demonstrated there was no significant difference between the psychomotor skill performance of students who learnt in a self-directed manner and those taught in a traditional structured environment. In contrast to the study by Love et al (1989) the results of research by Nixon, Morgan, Forsyth, and Ellis (1996) indicate that the method of teaching and learning had a major impact upon student skill performance. Nixon et al identified that undergraduate nursing students who took part in self-directed learning demonstrated a higher level of competency in performing both the cognitive and psychomotor components of nursing skills in comparison to those in the (teacher-directed) control group. However the reason this occurred was not clear.

Nixon et al's (1996) comparative study of teacher directed, and self directed methods of teaching clinical skills to undergraduate nursing students goes on to suggest, that the process of teacher-directed learning does not foster student responsibility for learning, nor does it capitalise on the notion of autonomy in learning. Nixon, et al (1996) argue that as students entering a course, draw from a diverse range of cultural, educational and

occupational experiences, a self-directed learning approach enables the student flexibility to study what is relevant to their own needs and personal growth, through learning activities which may be partly or wholly under the learner's control. They submit, this approach to learning may enhance the students' engagement with content, autonomy and clinical reasoning skills. This is a sentiment echoed by Turunen, Taskinen, Voutilainen, Tossavainen and Sinkkonen (1997) who believe adoption of programmes which increase nursing students' self direction in learning, whilst still fulfilling curricular requirements, more adequately prepare them to meet the challenges of change in society and the health sector. Whilst both studies describe the benefits of self directed learning it must be acknowledged that for many students and teachers this requires a paradigm shift, and that first the student must be supported to learn the skills of being self directed. It should also be acknowledged that many teachers also need to learn how best to facilitate a self-directed learning approach.

The clinical model of teaching and learning proposed by Studdy, Nicol, and Fox-Hiley (1994) includes five stages: exposure, exploration and elaboration, experimentation, evaluation, and skills acquisition in association with an individual schedule of skill development. Studdy et al suggest that radical approaches to teaching and learning of clinical skills are needed in nursing education. However, whilst they consider that self-directed learning plays a significant role in facilitating this process, the concept of self directed learning, and reference to how student learning is actually facilitated has not been clearly articulated within the framework they propose.

Purdy (1997) challenges the whole concept of self-directed learning and suggests that the application of such a model in the teaching of clinical skills to undergraduate nursing students is problematic. Purdy argues that the adoption of models of teaching based around theories of self-direction lead to tension between independent learning and the required course content. In contrast Pedley and Arber's (1997) study of nursing students' response to self-directed learning, indicated that the nursing students viewed self-directed learning as a beneficial learning experience facilitating choice and autonomy, shared learning, self responsibility, and development of research skills.

Building upon previous research focusing on computer assisted interactive versus linear or didactic models of teaching, Beeson and Kring (1999) investigated two methods of

teaching students factual knowledge, the use of self-directed computer-assisted-interactive-video-presentation versus a traditional lecture/linear video method. The research questions they posed were: Does teaching method (interactive video or traditional lecture/linear video) affect nursing students' factual knowledge of blood pressure measurement? Does teaching method (interactive video or traditional lecture/linear video) affect nursing students' performance of a psychomotor skill (blood pressure measurement)? The subject group identified was made up of 104 sophomore nursing students enrolled in a nursing assessment course. Whilst mean pre-test scores did not show significance between the two groups, post-test scores showed both groups made gains in knowledge. However, students taught by the traditional methods gained significantly more factual knowledge than those taught by the interactive computer-assisted-interactive-video-presentation. In contrast there was no significant difference in performance of blood pressure measurement between the two groups. As a result Beeson and Kring deduced using a combination of teaching strategies may produce positive outcomes and assist to reinforce student learning for example allowing students to view the interactive video prior to practicing and demonstrating the skill.

Williams (1999) evaluated problem based learning in a three year Australian undergraduate nursing programme. The method of learning was reliant on the students' ability to learn in a self directed mode using a problem-based learning approach. The new curriculum based on a problem-based learning approach was considered to bridge the 'theory practice gap'. A total of 14 clinical educators participated in focus group interviews over a period of 36 months. Results revealed that the educators perceived an improvement in the students' ability to inquire and learn in a self-directed manner, and the development of a more holistic view of the patient. However the educators perceived that the students also demonstrated lack of clinical preparedness, and inability to perform psychomotor skills to an acceptable level. The study found that students required more supervision and demonstrations in the simulation laboratory than pure self directed learning allowed. An increased appreciation of the need for lecturer input, preclinical laboratory work, and skill assessment to foster student learning was identified.

More recently the qualitative study undertaken by Lunyk-Child, Crooks, Ellis, Ofosu, O'Mara, and Rideout (2001), explored faculty and student perceptions of self-directed

learning and factors that facilitate or impede it. The following themes emerged: the need to define self-directed learning and to develop self-directed learning skills; need for confirmation, am I learning what I need to learn?; struggle for consistency, should all students, faculty and courses do it the same way?; the need for ongoing faculty development; the need for support and resources to succeed. The study highlighted that whilst a curriculum may be based around the tenets of self-directed learning, in practice there was a large variation in how self-directed learning was implemented, faculty and student expectations, experiences and levels of satisfaction. This study goes some way to confirm the findings of Bradshaw (1998) who discusses the tension around traditional and self-directed methods of teaching and learning, particularly in relation to undergraduate nursing education. Bradshaw states that undergraduate "nurses within the current ethos of professional education do not know what they do not know, because they do not know what they *ought* to know" (Bradshaw, 1998, p. 105).

2.6 Summary

This review of literature relevant to the development of psychomotor skills in undergraduate nursing students has encompassed research, and literature, relating to models of self-directed learning, clinical teaching and learning approaches, clinical skill development, and the use of simulated learning environments. Whilst it must be acknowledged that there is a plethora of literature and research relating to self-directed learning and related concepts such as student based learning, problem solving, and cognitive development, it is a matter of concern that there is a paucity of research which relates specifically to the acquisition and development of clinical (psychomotor) skills in undergraduate nursing students. Researchers have begun to examine the conditions in which nursing students learn psychomotor skills, although few studies were found to have investigated the effect of the teaching method, on the ability to learn and perform these skills. Yet nursing literature in New Zealand and overseas continues to highlight 'clinical skill competency' as being at the core of the profession's development, and critical to the safe and effective delivery of health care. Further research is required to evaluate the relationship between teaching method and performance of psychomotor skills and to investigate the effectiveness of new technologies in teaching nursing students, especially in the psychomotor domain.

Of the relatively small number of studies that have examined the development of psychomotor skills of undergraduate nursing students, the majority have utilised quantitative analytical approaches, the primary focus being discrete aspects such as, teacher involvement, cost, and comparative analysis of student learning outcomes. The data derived from these studies portrays only a snapshot of the process and outcome, rather than a broader contextual view of student skill development or student satisfaction with regard to the learning process.

Ambiguity in the interpretation, definition and use of 'self-directed' approaches when teaching clinical skills is evident and efforts to analyse self-directed learning as 'the' model for facilitating student acquisition of clinical skills have so far proved inconclusive. The following question remains "are nursing educators adequately preparing and equipping students to become self-directed autonomous practitioners or is self-directed learning just seen by students and lecturers as a convenient and cheaper way of allocating curricular time?" If self-directed learning is to be considered as a valid model for teaching clinical skills, it must be clearly defined and researched within the specific context of nursing education, and from the perspective of both students and educators.

The majority of the research studies published to date have originated from the United Kingdom, North America and more recently Australia. Whilst these studies cite issues similar to those being experienced in New Zealand, for example the "theory practice gap," student access to appropriate, safe and cost effective practicum experiences, and concerns relating to student skill acquisition and competency, they are not based in the context of New Zealand undergraduate nursing education, nor do they reflect our local constraints and socio-political influences.

It is therefore timely that this evaluative research study has been undertaken; to provide information which will benefit the local institutional, student, and practicum venue needs, and to add to the existing small body of knowledge and understanding, currently derived from research undertaken outside New Zealand, in relation to the emerging use of multifunctional simulation laboratories to facilitate the psychomotor skill development of undergraduate nursing students.

CHAPTER 3.0 METHODOLOGY

3.1 Introduction

A review of the literature has shown that multifunctional psychomotor skill (simulation) laboratories are now being developed within schools of nursing, to counter the effects of reduced access to appropriate clinical practicum venues, and students' need for supportive and facilitative learning and practice environments. However, efforts to analyse self-directed learning as 'the' model for facilitating student acquisition of clinical skills, have so far proved inconclusive. What can be acknowledged is student need for a variety of learning experiences that focus not only on task orientated performance of skills, but problem-solving and decision making in clinical situations.

The purpose of this study is to evaluate Eastern Institute of Technology undergraduate nursing students' satisfaction with, and perceptions of, the effectiveness of the Clinical Arts and Technology (CAT) Centre and the associated 'cooperative model' of self directed learning. This study has been undertaken in order that the Faculty of Health & Sport Science at the Eastern Institute of Technology, Hawke's Bay, can make informed quality decisions and improvements regarding ongoing programme developments and/or necessary programme, resource and facility changes.

In this chapter the chosen research approach and study design are introduced, the rationale for using an Evaluation research methodology is discussed and the scope of the research in relation to the research purpose and ethical issues is described.

3.2 Selection of the Research Approach

In determining which research approach would be the most appropriate to achieve the purpose of the research study and elicit information on the issues identified, a range of qualitative and quantitative research methodologies were explored.

Empirico-analytical (quantitative) research has for a long time held a virtual monopoly amongst research paradigms. The traditional 'scientific' technical approach is typified by reductionist methods which value the neutrality of the researcher and the presence of an objective reality waiting to be measured and quantified (Carr & Kemmis, 1983). The

success of positivist approaches in the natural sciences has led to positivist methods together with their underlying assumptions, being transferred to the social sciences. Neuman (2000) states;

> Positivism sees social sciences as an organised method for combining deductive logic with precise empirical observations of individual behaviour in order to discover and confirm a set of probabilistic causal laws that can be used to predict general patterns of human activity (p. 86).

Nursing's earliest forays into research occurred within the positivist paradigms, during a time when the 'scientific' empirico-analytical (positivist) perspective was considered 'a superior way' for human beings to attain knowledge (Neuman, 2000). However, as time has passed the failures of positivism to take into account the importance of interpretations and meanings has led to a shift towards more qualitative methodologies (Carr & Kemmis, 1983). Quantitative research methods are usually highly structured with all facets documented in advance of data collection, utilising a deductive approach, whereas qualitative research methods utilise more inductive approaches to provide a deeper insight into the relationship between cause and effect, (Field & Morse, 1985).

Qualitative designs are said to be naturalistic in that the researcher does not attempt to manipulate the research setting. Qualitative designs are "non-manipulative, unobtrusive, and non-controlling; [there is an] openness to whatever emerges – [a] lack of predetermined constraints on outcomes" (Patton, 1990, p. 41). Neuman (2000) identifies two approaches within this paradigm, interpretive and critical social science. Interpretive research approaches attempt to gain the understandings of research participants by examining human behaviour within its context (Corner, 1991), and revealing the meanings behind phenomena (Duffy, 1985). The research setting is a naturally occurring event, program, community relationship, or interaction that has no predetermined course established by and for the researcher. Critical social research is action orientated, designed to uncover myths, reveal hidden truths, and help people to change the world for themselves (Neuman, 2000). Naturalistic inquiry is thus contrasted to experimental-type positivist research in which, ideally the researcher attempts to completely control conditions of the study by manipulating, changing, or holding constant external influences and in which a very limited set of outcomes are measured (Patton, 1990).

Psychomotor skills laboratories including models of self-directed learning have been implemented in a number of overseas nursing programmes (Credy, Horsfall, & Hand, 1992; Nixon, Morgan, Forsyth, & Ellis, 1996; Knight & Mowforth, 1998). However, literature suggests that research examining these relatively new teaching strategies and facilities has mainly been confined to quantitative approaches, focusing on comparison of student outcomes (Nixon et al, 1996), and the needs of educators (Heliker, 1994). The knowledge derived from these studies is considered valid, transportable and able to be generalised, and has formed the basis for some aspects of decision-making when implementing the Clinical Arts and Technology Centre at the Eastern Institute of Technology. However, the conclusions derived from these studies relate to specific aspects, have a narrow focus, and portray only a snapshot of information within a defined context, rather than a broader contextual view of the facility and model of teaching employed.

The strength of approaching this research study from a purely positivist perspective would be the ability to focus on one specific aspect of the learning skills programme, for example student outcomes and to follow a logical, deductive system of data gathering and analysis, based on precise observation which others could repeat or to replicate a previously published piece of research. However in pursuing a solely positivist approach the study would not have fulfilled the stated research purpose and may merely have confirmed what other researchers had previously identified. Hence this approach could also be considered a weakness.

The interpretative approach is focussed on interpreting a particular environment and social context, in this case the experiences and perspectives of undergraduate Bachelor of Nursing students participating in the clinical skills programme within the Clinical Arts and Technology Centre environment. By undertaking this approach I have the opportunity to openly investigate, understand and describe what is occurring within the programme and facility from a student perspective. The utilisation of an inductive, non-linear research methodology to uncover the context, in which learning and skill acquisition is occurring, would add depth to the research findings however, whilst useful to the Eastern Institute of Technology these results alone would not fulfil the stated research purpose and may not necessarily be relevant or transferable to another institution or simulated learning environment.

It must also be acknowledged that there appears to be a gap in the literature with regard to the perceptions and experiences of undergraduate nursing students who are undertaking clinical (psychomotor) skill programmes which utilise simulation laboratory environments and models of self directed learning.

As the implementation of the Clinical Arts and Technology Centre and the programme of clinical skill acquisition, underpinned by the Faculty's philosophy of self-directed learning, were new developments within the undergraduate Bachelor of Nursing programme I believe it was important to situate this research within a research paradigm which allowed the researcher to 'keep an open mind' and not be limited by predetermined hypotheses. When considering the most appropriate research approach and study design to adopt, the following key considerations were identified:

- *Why the research is being done and for what purpose will the results be used?*

  A comprehensive evaluation of the Clinical Arts and Technology Centre and the associated cooperative model of self directed learning must occur in order that the Faculty of Health and Sport Science at the Eastern Institute of Technology (EIT) can make informed quality improvements relating to ongoing programme, resource and facility development, and/or necessary programme, resource and facility changes. Knowledge and information gained from this study is required to be utilised in order to ensure the best possible quality outcomes for students, lecturers, the polytechnic, clinical providers and ultimately consumers of healthcare.

- *What should the research focus on?*

  Full implementation of the Clinical Arts and Technology Centre facility and the associated model of teaching and self-directed learning was a three year staged process targeted at undergraduate Bachelor of Nursing students. The initial student group identified to utilise the facility were first year undergraduate Bachelor of Nursing students. Particularly within year one of the EIT Bachelor of Nursing curriculum, there are clearly identifiable core skills of which demonstration of clinical competency is a requirement. These clinical skills are further developed, enhanced and refined as the student progresses through the three-year degree programme. Use of the resources and learning opportunities offered through the Clinical Arts and Technology Centre and the associated cooperative model of

teaching and self-directed learning from which the undergraduate clinical (psychomotor) skill acquisition programme was developed, are thought to aid in facilitating and enhancing the students' learning process.

Throughout the first year of implementation adjustments and improvements to both the facility and model of learning were made. Lecturers and students were orientated to the facility, resources and model of teaching and learning. Lecturers and students had the opportunity to work with, and adjust to, the newly implemented facility and model of teaching and learning. In 2001 the use of the Clinical Arts and Technology Centre was extended into year two and year three of the Bachelor of Nursing curriculum. It was envisaged that as the initial year one group of students moved through the three year undergraduate Bachelor of Nursing programme, so would the roll out of the associated model of teaching and self-directed learning underpinning practice within the Clinical Arts and Technology Centre.

During 2001 (the second year of implementation) year one and year two nursing lecturers had had the opportunity to become familiar with the use of the Clinical Arts and Technology Centre resources and the changes to teaching and learning practice. At the time this study was undertaken formal implementation of the facility and the associated model of learning was focused specifically on year one and year two undergraduate Bachelor of Nursing students. For this reason the research focuses on undergraduate EIT Bachelor of Nursing students enrolled in either year one or year two practicum courses in which identified core clinical skills are taught.

- *What is the research question?*

  Are the Clinical Arts and Technology Centre, and the associated co-operative model of self-directed learning, effective in facilitating and enhancing clinical (psychomotor) skill acquisition and clinical skill competency of first and second year undergraduate student nurses?

- *How or to whom will the study be limited?*

  No clinical simulation facilities with a similar approach to teaching and learning of core clinical skills have been identified within any other schools of nursing in New Zealand. Due to regional considerations and constraints there is variation in content

at similar stages within Bachelor of Nursing curricula throughout New Zealand educational facilities, hence a direct comparison between students in differing programmes is not appropriate. Therefore this study has been limited to undergraduate Bachelor of Nursing students enrolled in year one and year two practicum courses at the Eastern Institute of Technology.

- *What time-frame and resources were available?*

  In order to identify a specific group of student participants, data collection for the study was scheduled to take place during the 2001 academic year. A budget was identified and incorporated as a component of the planned Clinical Arts and Technology Centre implementation process.

- *What were the ethical implications in carrying out this research?*

  The participants in this study have been identified as year one and year two undergraduate nursing students. Consideration was given to and criteria formulated with regard to access to participants, informed consent of participants, anonymity and confidentiality of participants, participants right to decline to take part, uses of the information and the conflict of interest and conflict of roles of the researcher and participants.

As the objective of this research is to contribute to the overall evaluation of the effectiveness of the recently established and implemented Clinical Arts and Technology Centre, and the associated model of cooperative self-directed learning / programme of clinical (psychomotor) skill development in the Bachelor of Nursing programme, Evaluation research methodology was selected. Whilst my underlying philosophical stance was from a positivist perspective the benefits of being able to incorporate a mixture of qualitative and quantitative data collection methods was critical in providing me with a deeper understanding of student perceptions and experiences within the programme and to more clearly ascertain student satisfaction with the facility, resources, model of self-directed learning, and outcomes in terms of clinical skill acquisition.

It must also be acknowledged that Bachelor of Nursing lecturer satisfaction with the facility, resources and model of teaching and self-directed learning, and feedback from personnel within the practicum venues with regard to their perception of student clinical

competence, will provide additional perspectives and depth to the overall research findings. However, these stakeholder groups have not been included in this piece of research.

3.3 Evaluation Research Methodology

Evaluation research is an approach to research which seeks to establish the value of an empirical topic such as a programme (service), treatment, practice or policy, to the recipients of the service (Guba & Lincoln, 1989; Carnwell, 1997; Beanland, Schneider, LoBiondo-Wood & Haber, 1999; Ovretveit, 2000). Whilst Evaluation research uses analytical means to document the worth of an activity it is a methodology which spans experimental, quasi-experimental and non-experimental naturalistic paradigms (Beanland et al, 1999). Evaluation research is a particularly useful approach to research as it enables one to determine the value of the service we provide through the use of inductive and/or deductive approaches to evaluation (Clifford, 1997). In simple terms the purpose of evaluation research is to determine whether any changes or developments to a service (programme, treatment, practice or policy etc) are required. Casswell (1999) discusses evaluation research as being distinguished from other kinds of research by why it is done rather than how it is done. The evaluation approach which is taken is dependant upon the type of item being evaluated and the purpose of the evaluation hence the terms qualitative or quantitative may be used to describe the data, data collection or philosophical assumptions underlying an evaluation. Bigman (1961) as cited by Beanland et al (1999) identified the following uses of evaluation research:

1. To discover whether and how well the objectives are being fulfilled.
2. To determine the reasons for specific successes and failures.
3. To direct the course of experiments and techniques for increasing effectiveness.
4. To uncover principles underlying a successful programme.
5. To base further research on the reasons for the relative success of alternative techniques.
6. To redefine the means to be used for attaining objectives and to redefine sub goals, in light of research findings.

Evaluation research is concerned with seeking the views of different stakeholders in order to accurately evaluate service provision. Complementary methods of data collection may be derived from both positivist and interpretive paradigms, but without the rigorous controls or techniques to reduce bias of full experimental evaluation or experimental design (Ovretveit, 2000). Neuman (2000) discusses 'triangulation of method' as a means of mixing qualitative and quantitative styles of research and data. The complementary strengths of combining qualitative and quantitative data collection methods provides the researcher with fuller and more comprehensive research results (Rountree & Laing, 1996; Creswell, 1998; Ovretveit, 2000) which are both process and outcome orientated, and exploratory and confirmatory (Carnwell, 1997).

Emphasis is placed on the importance of validity in evaluation research. Collection of information from a variety of sources enhances construct validity using triangulation, which reveals the convergence of evidence (Yin, 1994). Data Triangulation (the use of multiple sources), gives a study its robustness. The comprehensive nature of the design allows establishment of value judgements based on evidence drawn from a variety of data collection methods, incorporating descriptive, exploratory and/or explanatory perspectives (Neuman, 2000). It is judged according to its internal and external validity, objectivity and ability to be replicated.

3.4 Research Approach

Evaluation research is said be distinct from other research activities because of why it is done, the focus being its immediate practical use (Casswell, 1999). The purpose of undertaking this research was to elicit information which would inform quality improvement initiatives and ongoing development of the Clinical Arts and Technology Centre and the associated programme of clinical (psychomotor) skill acquisition for undergraduate Bachelor of Nursing students.

Ovretveit (2000) identifies four evaluation perspectives - experimental, economic, developmental and managerial. The range and applicability of these evaluative perspectives formed the basis of my decision to use evaluation research. In order to fulfil the research purpose, the study would encompass elements of all four perspectives however, the predominant perspectives were 'developmental' and 'managerial.' Developmental evaluations have an immediate practical focus and may be carried out

by an independent evaluator or by the provider. They enable providers to judge the value of what they are doing, and to carry out improvements and ongoing programme development. The aim of Managerial Evaluation is to enable managers and policy makers (for example Faculty and Eastern Institute of Technology management), to judge the value and effectiveness of activities and interventions. Like developmental evaluations, managerial evaluations can be used to improve the service quality or efficiency (Ovretveit, 2000).

Although both the developmental and managerial approaches to evaluative research are influenced by and draw on experimental and economic evaluation perspectives, a need for this evaluation to take a flexible approach to deciding on and collecting a range of data that could be used to assess the effectiveness and value of the Clinical Arts and Technology Centre facility, resources and programme of learning, and which would have immediate and practical use in terms of ongoing facility and programme development influenced the researcher's overall approach to the research. Figure 2 represents an overview of the research approach developed for the present study.

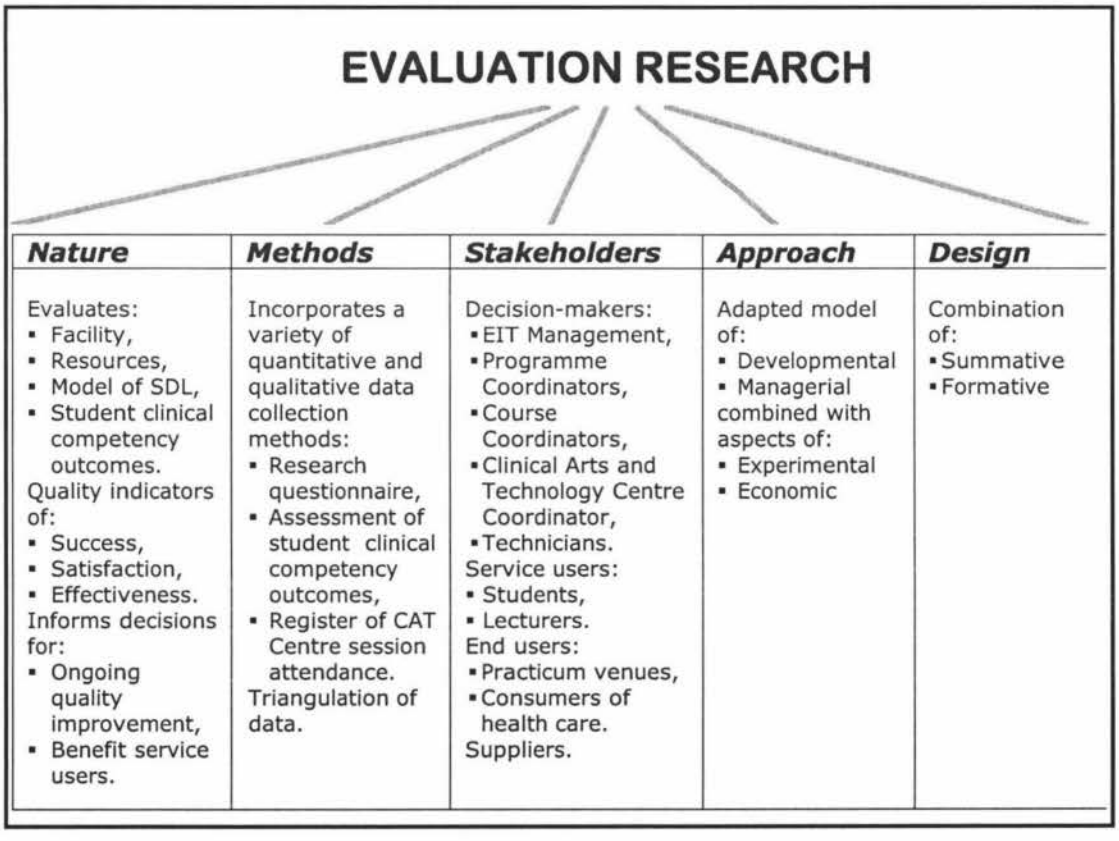

Figure 2 Evaluation Research Approach for the Present Study

3.5 Research Design

Whilst my overall philosophical approach was interpretive the ability to adapt developmental and managerial evaluation approaches and to develop a research design, illustrated in Figure 3, with an underlying pluralistic approach rather than the predominant mode of evaluation research which is "experimental, rationalist and objectivist" (Ovretveit, 2000, p. 130), provided the flexibility to use a variety of formative and summative data sources and methodological triangulation in order to answer the research question. As stated by Tukey (1962, cited by Ovretveit, 2000, p. 121), "Far better an appropriate answer to the right question, which is often vague, than the exact answer to the wrong question, which can always be made precise."

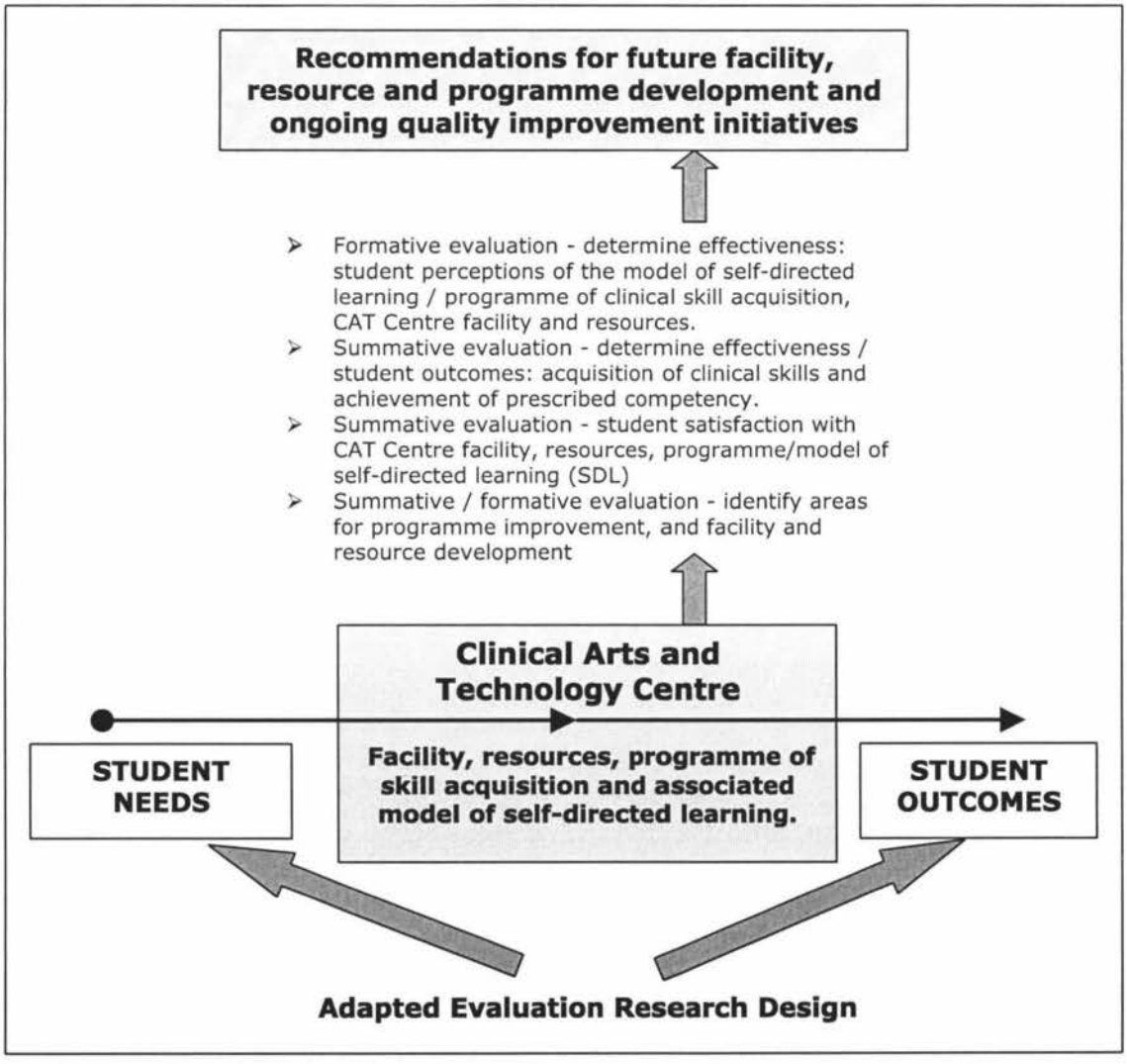

Figure 3 Adapted Evaluation Research Design for the Present Study

The research was planned to incorporate both formative and summative evaluation designs. Formative evaluation is a type of developmental evaluation which is used to provide information and assistance to the people who are able to make changes and improvements to the programme (Carnwell, 1997; Ovretveit, 2000). Formative evaluation may be used to derive quality improvement information when implementing a new programme or activity, or alternatively be built-in to a programme to provide continuous feedback on the programme (Carnwell, 1997; Casswell, 1999; Newman, 2000). Summative evaluation is evaluation that takes place after the programme is finished and looks at the final result of the programme (outcomes), the emphasis being assessment of the effectiveness of the completed programme, and whether or not the programme should continue (Carnwell, 1997). A combination of both formative and summative methods in the research design gives a more rigorous and complete evaluation of the activity or programme under scrutiny (Casswell, 1999; Neuman 2000). As discussed by Neuman (2000) both types of evaluation are essential to provide an accurate overall evaluation.

3.5.1 Research question

Are the Clinical Arts and Technology (CAT) Centre and the associated "co-operative model" of self directed learning, effective in facilitating and enhancing clinical (psychomotor) skill acquisition and clinical skill competency of first and second year undergraduate student nurses?

3.5.2 Aims of the research

i. To determine student satisfaction with and perceptions of the Clinical Arts and Technology Centre facility, resources and model of self directed learning.

ii. To determine overall student competency outcomes in relation to utilisation of the Clinical Arts and Technology Centre.

iii. To identify areas for programme improvement, and facility and resource development.

Following the review of current literature the following hypotheses were derived;

- Student performance of psychomotor skills will improve due to increased opportunity for direction and practice.

- Increased student confidence in their ability to perform psychomotor skills will have a positive impact upon their development, dexterity and achievement of psychomotor skill competency.

- In order to undertake self-directed learning opportunities successfully the student must first learn how to be self-directed "Don't know what they don't know."

- Student perceptions of self-directed learning and use of the Clinical Arts and Technology Centre will change as they move through the programme.

- School leavers will indicate a greater preference for didactic teacher/lecturer directed models of learning than older students.

3.5.3 Data collection

As evaluation research is concerned with "seeking the views of different stakeholders" (Carnwell, 1997), between methods triangulation (a combination of quantitative and qualitative methods of data collection and analysis) has been incorporated in the evaluation design. Mullen and Iverson (1986) suggest that quantitative methods can confirm or verify a theory, for example the effectiveness of the programme, whereas qualitative methods need to be used to discover new theories or to identify what is happening to the users of the service (Patton, 1987), in this case the year one and year two undergraduate Bachelor of Nursing students. Between methods triangulation is used in order to evaluate the phenomenon in the study, and to test the degree of convergence and validity of the data (Denzin, 1978; Yin, 1994; Carnwell, 1997).

The different methods of data collection, which were used within this evaluation study, are described below:

1. Attendance and use of the Clinical Arts and Technology Centre and resources by year one Bachelor of Nursing students, enrolled in BN5.150 Nursing Knowledge

2, was recorded and collated statistically in conjunction with student outcomes data.

2. Raw statistical data derived from student outcomes in the year one clinical course BN5.150, Nursing Knowledge 2 was recorded. All year one undergraduate Bachelor of Nursing students participating in this course (whilst the study was occurring), were assessed on a range of prescribed "core clinical competencies." Nurse lecturers developed a criterion referenced assessment tool, using a standardised format, for each of the identified core competencies (example attached, Appendix IX). These tools were pre and post moderated by other nurse lecturers within the faculty prior to being used to assess a student's clinical skill competency. The same four lecturers assessed all year one Bachelor of Nursing students. Students are required to achieve a pass for each core competency in order to achieve an overall pass for the course. Teaching, practice and assessment of the identified core clinical competencies took place in the Clinical Arts and Technology Centre. Students were scheduled theory and independent time in which they were able to access and use the facility and learning resources including lecturer assistance. Whilst students were given a set timeframe by which they were required to have demonstrated achievement of each core competency, they were also encouraged to self identify when they required assistance and when they felt they were "ready" to undertake a competency assessment.

3. The third method of data collection was undertaken through a postal self-completion questionnaire (Appendix VI) and was inclusive of year one and year two Bachelor of Nursing students. The questionnaire was developed following an extensive literature review, consultation and discussion with nursing lecturers and undergraduate nursing students. Six months prior to the commencement of this evaluation research project, the draft research questionnaire was piloted with 16 undergraduate Bachelor of Nursing students. This process enabled the questionnaire to be tested and feedback given. The questionnaire format was modified and minor anomalies such as spelling mistakes and formatting errors were corrected. No changes were made to the structure or intent of any of the questions. The questionnaire was designed to capture a wide range of

information through the use of open, closed and attitudinal questions. Nominal data was derived through categorisation of dichotomous data into two groupings, for example questions with a response of yes or no. Attitudinal questions were measured using a five point Likert scale which comprised a list of positively and negatively worded statements with which the respondents were asked to indicate their strength of agreement or disagreement. The decision to use a five-point Likert scale was arbitrary. The option of a four point scale was rejected on the basis of not wishing to force the respondents in either the positive or negative direction. Whilst it is acknowledged that the use of a five point scale offers a neutral category which can create problems in terms of frequent responses (LoBiondo-Wood & Haber, 1994), this was not exhibited in the respondent data. The use of a larger number (seven or nine point scale) whilst believed to obtain higher measurement sensitivity was not deemed appropriate for this study. Respondents were also given the opportunity to provide individual information about the subject, through the use of an unstructured "comment" format, which was included in each section of the questionnaire. The questionnaire was distributed on two separate occasions (July and November 2001), in order to test the hypothesis that "student perceptions of self-directed learning and use of the Clinical Arts and Technology Centre would change as they move through the programme."

In order to ensure the anonymity of respondents the research questionnaires were not allocated an identification code until they were returned. The data set was then explored and data was recorded and coded to facilitate analysis.

3.5.4 Sampling

As stated by Lo-Biondo-Wood and Haber (1994, p. 290) the "purpose of sampling is to increase the efficiency of a research study" by selecting a portion of the identified population to represent the entire population. For the purpose of this study a non-probability convenience sampling strategy was undertaken. It is acknowledged that a disadvantage and potential weakness of a convenience sample in terms of a research questionnaire, is the risk of bias relating to the fact that the participants are self selecting and therefore the number of respondents and information which they volunteer may not

be representative of the entire population of year one and year two EIT undergraduate Bachelor of Nursing students. However, a major advantage of this sampling strategy is the accessibility of the sample group. As identified in section 3.5.3, three separate methods of data collection were undertaken during this study. When undertaking data collection using the research questionnaire the convenience sample identified was drawn from the entire group of EIT year one and year two undergraduate Bachelor of Nursing students enrolled in clinical courses during the 2001 academic year. However, the data collected in relation to Clinical Arts and Technology Centre attendance and student competency outcomes was restricted to EIT year one undergraduate Bachelor of Nursing students enrolled in the Clinical course BN5.150 during the 2001 academic year. Year two undergraduate nursing students were excluded from this sample group due to the restrictions of the year two Bachelor of Nursing course requirements, and the requirement for the year two students to undertake an eight-week off campus health sector practicum during the period in which data collection was being undertaken.

3.5.5 Data collation and analysis

In order to formulate the results from the data collected, two individual processes of data collation and analysis were used. Quantitative data derived from student course outcomes, student utilisation of the Clinical Arts and Technology Centre facility and resources, and individual participant responses to the Clinical Arts and Technology Centre Questionnaire, were coded, collated and analysed using the software package SPSS for Windows Version 11.0. By using this software package the information derived from each participant was individually coded and identified. Preliminary analysis was completed examining the relationship between variables using basic statistical frequencies, means and ranges. The qualitative data set derived from individual respondent comments, was analysed using a systematic process of content analysis and inductive (data driven) thematic analysis, modified from the model described by Boyatzis (1998).

As discussed by Boyatzis (1998) analysis of qualitative research data begins with a search for reoccurring regularities or themes. "Thematic analysis is a process for encoding qualitative information" (Boyatzis, 1998, p.4). Polit and Hungler (1997) believe a search for themes involves the discovery of commonalities, but also

encompasses a search for a natural variation in the data. In the final stages of data analysis thematic data is weaved together to form an integrated whole. In many cases the themes may appear as concepts indicated by the data, rather than clearly described statements made by the participants.

As data driven codes are constructed inductively from the raw information, the task of the researcher is to interpret the findings after obtaining the data, and to identify the emerging theme(s). The closeness of the code to the raw data increases the likelihood that various people examining the raw information will perceive and therefore encode the information similarly. The result is higher interrater reliability. As discussed by Boyatzis (1998, p.44) there are three stages in developing and using an inductively (data) derived code.

Stage I: Deciding on sampling and design issues, including selection of sub-samples. The full sample group was comprised of all year one and year two EIT undergraduate Bachelor of Nursing students who responded to the research questionnaires. Four sub-sample groups were formed using student year and questionnaire response date. Initially all respondent data was grouped by questionnaire response date, either July 2001 or November 2001. These two groups were further reduced into sub groups by student year resulting in two year one student sub-samples, July and November and two year two student sub-samples, July and November.

Stage II: Developing themes and a code that differentiate the sub-samples.

A simplified process of thematic data analysis was commenced. Raw data derived from respondent's comments was collated into the sub-sample groups by student year and questionnaire date. Specific topics identified in the questionnaire such as learning style; student satisfaction with the facility, resources, access, and learning environment; and student ideas for ongoing development, improvements, and change, were developed into codes which enabled the raw data to be further reduced.

Stage III: Applying the code to determine valid differences.

The codes were then applied across all sub-samples and interpretation and comparisons of the emergent themes were made.

3.5.6 Issues of reliability and validity

Evaluation research is no different from any other form of research in that methodological deficits may exist and are not necessarily obvious until the research is undertaken. Reliability and validity of results are dependant upon the rigorous nature in which sampling, data collection, collation and analysis is conducted. Reliability is "the extent to which a data gathering method will give the same results when repeated (i.e. consistency). It refers to the amount of random or systematic error (bias) or variance in data which the method gives." (Ovretveit, 2000, p. 214). Validity is "the extent to which a measure or piece of data 'reflects' what it is supposed to measure or give information about" (Ovretveit, 2000, p. 215). The aim is, to reduce random errors through the use of a reliable measure, and to reduce additional systematic error (bias) by using a valid measure. As discussed by Ovretveit (2000) the importance of validity in evaluation research relates to whether the data collected is relevant for judging the identified criterion for valuation thus addressing the research purpose rather than solely focusing on whether the data gives a valid representation of some aspect of the study.

A well designed instrument for data collection is critical to this process (Minichiello, Sullivan, Greenwood & Axford, 1999). According to Bailey (1991) conclusively proving reliability and validity can be difficult particularly when using questionnaires. The weaknesses of a convenience sample such as the sample used in this study in relation to self-selection of participants, sufficient numbers of respondents and the bias of the respondents are acknowledged as limitations of the study. As discussed by LoBiondo-Wood and Haber (1994) caution must be taken in this regard when using a questionnaire, and drawing conclusions that are generalisable to the wider population.

Biases introduced by the researcher can also directly affect the validity and reliability of the ultimate research findings. In order to reduce the possibility of this occurring I undertook three distinct methods of data collection and utilised between methods triangulation in order to elicit a broader understanding of the data and information elicited from the study. Validity of the research tool (questionnaire) used in this study, was examined following the initial pilot survey. As previously discussed the pilot survey took place six months prior to the commencement of this research and involved 16 year one and year two volunteers from the undergraduate Bachelor of Nursing programme. The questionnaire results were collated and shared with the participants in

order to check for accuracy and consistency of interpretation by the students when responding to the questionnaire and by the researcher when analysing the results. The pilot survey indicated consistency of responses to the questionnaire and accuracy of interpretation.

Data triangulation adds to the robustness of the research through a broader range of data and perspectives, which in turn enhances construct validity (Ovreveit, 2000; Davidson & Tolich, 1999; Carnwell, 1997). Between methods triangulation refers to combining methods of data collection between the two approaches, quantitative and qualitative (Carnwell, 1997). For example the quantitative data derived from students' clinical competency outcomes and attendance at the Clinical Arts and Technology Centre sessions combined with the findings elicited from student responses to the attitudinal and closed questions asked in the research questionnaire were analysed in relation to respondent comments and emerging themes. Analysis of this broad range of data provides a greater insight into respondent satisfaction and perceptions of the Clinical Arts and Technology Centre and of the cooperative model of self-directed learning. This also gives the researcher the ability to test the convergence of data. If the results agree with one another the researcher can be more certain that they are an accurate depiction of the truth. As discussed by Carnwell (1997) an advantage of combining methods is to test the degree of external validity.

This study was set up to assess the validity of current practice in relation to student learning and the Clinical Arts and Technology Centre. Due to the absence of literature focusing on this overall concept, the approach taken remains to be tested by other institutions and learning centres prior to making any comments that might address the external validity of this study in a broader context.

3.6 Ethical Considerations

3.6.1 Approval process

Prior to commencing this research two separate ethics approval processes were undertaken. During formulation of the initial research proposal permission was sought from the Dean of the Faculty of Health Science at the Eastern Institute of Technology for this Evaluation Research study to be undertaken (Appendix I). An ethics application

was then made to, and permission to carry out the research was granted by, the Massey University Human Ethics Committee (Appendix II). The Massey University Human Ethics Committee application and approval documentation was then lodged with the Eastern Institute of Technology Research Ethics Committee, prior to commencement of this evaluation research study.

Meeting appropriate ethical requirements is an essential component of undertaking a sound research process. The researcher's attention to, and adherence with, the detailed ethical requirements outlined in the ethics approval application have ensured that there was "no harm" to participants throughout this research undertaking.

3.6.2 Recruitment of participants

Participants were all undergraduate Bachelor of Nursing students enrolled in either year one or year two Bachelor of Nursing clinical courses at the Eastern Institute of Technology during the 2001 academic year. Recruitment of participants was commenced in June 2001. An information sheet (Appendix III) explaining fully the purpose and requirements of the research being undertaken, accompanied by the research questionnaire (Appendix IV) was mailed, by the faculty Administration Secretary, to every year one and year two Bachelor of Nursing student, enrolled in a clinical course within the Bachelor of Nursing programme at the Eastern Institute of Technology during the 2001 academic year. The information sheet also included full contact details of the researcher and her supervisor, to enable potential participants to have the opportunity to discuss or clarify any details regarding the research or questionnaire. Student participation in this study was on a voluntary and anonymous basis.

Posters (Appendix V) advertising the research study were posted on the Clinical Arts and Technology Centre student notice board. A questionnaire reminder postcard (Appendix VI) was mailed to all potential participants (year one and year two Bachelor of Nursing students enrolled in a clinical course during the 2001 academic year), one week prior to the advertised return date of the July and the November student questionnaires, the 27 July 2001 and 23 November 2001 respectively.

Permission and consent was sought from the Eastern Institute of Technology to access and utilise statistical outcome data in relation to the clinical (psychomotor) skill assessment and evaluation of year one undergraduate Bachelor of Nursing students who were enrolled in the practicum course Nursing Knowledge 2 (BN5.150) during the 2001 academic year in conjunction with student attendance at the scheduled Clinical Arts and Technology Centre sessions. This statistical data was already being gathered by EIT as a component of BN5.150 course administration requirements and was provided to the researcher for the purpose of this study in a statistical form, which was not identifiable to any particular student.

3.6.3 Direct involvement of research participants

As discussed in section 3.6.2, all year one (n = 86) and year two (n = 48) undergraduate Bachelor of Nursing students enrolled in clinical courses during the 2001 academic year were invited to complete and return the Clinical Arts and Technology Centre questionnaire on two separate occasions, July and November 2001. It was determined that the questionnaire would take approximately 15 to 20 minutes to complete and was comprised of questions relating to student satisfaction, student perceptions of the Clinical Arts and Technology Centre facility, resources, and model of self-directed leaning.

Year one Bachelor of Nursing Students' participation in the clinical (psychomotor) skill assessment and evaluation of their individual core clinical (psychomotor) skill competency, is a summative requirement of the BN5.150 course, and was scheduled to occur independently of this research study. The statistical 'outcomes' data utilised for this evaluation research study was derived from the overall collation and compilation of BN5.150 course results and used in direct collation with BN5.150 students' attendance and utilisation of the Clinical Arts and Technology whilst enrolled in this course.

3.6.4 Informed consent

Participants were requested to complete and return an anonymous questionnaire that was mailed to them. As completion and return of the questionnaire by participants was on a voluntary and anonymous basis a consent form was not included with the research

information sheet however the following statement was included on both the student information sheet and research questionnaire. "It is assumed that filling in and returning this 'anonymous' questionnaire implies your consent."

The information sheet also included the following information:

- The purpose of the study, which was stated in clear and simple terms;
- the anticipated participant input in terms of estimated time involved in completing the questionnaire;
- the participant's right to decline to take part, decline to answer questions, and the right to ask questions and gain further information about the study.

3.6.5 Anonymity and confidentiality and potential harm to participants

No potential harm to participants was anticipated. All questionnaires were mailed to prospective participants by the faculty administration secretary. All responses from participants were returned directly to the researcher in the self-addressed pre-paid envelopes, which accompanied the research questionnaire. No participants chose to contact the researcher and respondents' identifying details were not sought, and are not known to the researcher. All materials collected during the study were kept in a locked file in the researcher's office and are confidential to the researcher. Computer files relating to the research data are password protected and stored on the researcher's computer. The draft and final research reports do not contain any information identifying individual participants.

When the final research report has been completed and examined all raw data will be filed and kept in a secure place by the researcher for a period of five years, as per Massey University audit requirements. At the conclusion of the five-year period the data will be destroyed. All summative assessment data will be kept as per the Eastern Institute of Technology Academic Policy.

3.6.6 Conflict of interest/conflict of roles

I am the Nursing Section Manager within the institution in which this research has been undertaken. However, I do not teach in any of the year one or the year two Bachelor of

Nursing courses where clinical (psychomotor) skills were assessed or evaluated. The programme of clinical (psychomotor) skill acquisition and development underpinned by the use of the Clinical Arts and Technology Centre facility, resources, and associated cooperative model of self-directed learning, are core components of the Bachelor of Nursing programme and would occur irrespective of this research being undertaken. However, rigorous evaluation of the Clinical Arts and Technology Centre programme of clinical (psychomotor) skill acquisition will provide information on which to determine future facility and programme developments, efficacy of the facility and programme of learning and its value to students. In an effort to minimise any conflict of interest and/or role all student responses have been elicited by the use of a voluntary anonymous questionnaire.

3.7 Summary

I have examined the methodological underpinnings of this research, and discussed the rationale for choosing to use an Evaluation Research Methodology. A detailed explanation of the research process including aspects of the research design such as methods of data collection and analysis, recruitment of participants, and ethical considerations have been given. In Chapter Four the research results are presented.

CHAPTER 4.0 RESEARCH RESULTS

4.1 Introduction

As described in chapter three, collection, collation and analysis of data took place using between methods triangulation. Essentially data was derived from three sources:

1. Register of attendance and use of the Clinical Arts and Technology Centre by year one students, enrolled in BN5.150 Nursing Knowledge 2.
2. Clinical competency outcomes of students enrolled in BN5.150, Nursing Knowledge 2.
3. Postal self-completion questionnaires (Appendix IV) sent to year one and year two Bachelor of Nursing students in July and November 2001

The data was then collated into two data sets, quantitative and qualitative. Two individual processes of data collation and analysis were then commenced. As discussed in Chapter Three, quantitative statistical data was analysed through the use of Statistical Package for the Social Sciences (SPSS) for Windows Version 11.0. Errors or inconsistencies in the statistical data due to data entry were carefully screened out and corrected by evaluating the range of values, generated by running the SPSS descriptive frequencies (Appendix VII). The statistical results are presented in this chapter in the following sections:

4.2 Characteristics of Sample

- Distribution and return of the research questionnaire by student year
- Age distribution
- Preferred learning style

4.3 Student satisfaction

- Overall satisfaction
- with the facility
- with the resources
- with the model of self directed learning

4.4 Student competency outcomes and attendance

- Year one student attendance at Clinical Arts and Technology Centre sessions.
- Year One Student Competency Outcomes in relation to Clinical Arts and Technology Centre attendance.

Throughout the research questionnaire respondents were provided with the opportunity to make comments in relation to all questions. As discussed previously the qualitative data set derived from these comments was grouped by the sub-samples of questionnaire date (July or November) and student year (Bachelor of Nursing year one or year two). This grouping of data was done in order to determine if there was a change in student perceptions as they moved through the programme. Approximately half of the total number of respondents chose to make individual comments. As the questionnaire was organised into specific topic areas for example satisfaction, preferred learning style etc, coding and analysis of the data proved to be a relatively straightforward exercise. However, it became obvious that to a large degree the questionnaire topics had guided the respondents' focus when writing their comments, as responses generally related specifically to one of the following topics, student satisfaction (facility, resources, computers, access, utilisation, learning environment), self-directed learning and recommendations for ongoing improvement. As a result of this occurring pure data driven analysis of results could not be ensured, hence the use of a simplified form of inductive thematic analysis.

Words and phrases from the individual respondent comments were assigned the code that best described their content. In most cases this directly related to a particular questionnaire topic. From the collation of coded information five consistent overall themes emerged. A comparison of the themes across the sub-sample groups resulted in the emergence of variation in student perspectives and provided the researcher with a greater understanding of the differing levels of student perceptions over time, and by student year. Emerging themes are presented and discussed throughout this chapter in relation to the associated quantitative results.

4.2 Characteristics of Sample

4.2.1 Distribution and return of the research questionnaire by student year

The research questionnaire was distributed on two occasions (July and November 2001), to 86 year one and 48 year two undergraduate Bachelor of Nursing students undertaking clinical courses in the Bachelor of Nursing programme during the 2001 academic year. Data relating to the distribution and respondent sample is presented in Table 2.

Table 2
Distribution and return of the research questionnaire by student year

	Questionnaire Date							
	July			November			Overall Respondent Return Rate	
		Response			Response			
Year	Sent n	n	%	Sent n	n	%	n	%
One	86	26	30	86	57	66	83	53%
Two	48	37	77	48	36	75	73	47%
Total	134	63	47	134	93	69	156	100%

Of the 156 overall respondents, 53% (n = 83) were year one students and 47% (n = 73) were year two students. Respondents' questionnaires were allocated a numerical identification code on their return, in order to facilitate data input and statistical identification of the questionnaire in SPSS. As the questionnaires were not coded prior to being distributed (to ensure anonymity of the respondent) it was not possible to identify if the same respondent participated in the July and November questionnaire or if there was a significant variation in respondent groups by questionnaire date. The quantitative data was collated by the overall respondent group, and analysed using the variables of questionnaire date, student year and age group.

The response rate of year one students to the July questionnaire was poor (n = 26; 30%) despite prior advertising of the research study and information being sent to each individual student. Anecdotal comment received from a number of the year one Bachelor of Nursing students indicated that many had discarded the first questionnaire without reading the covering letter, information sheet or questionnaire. These students identified that they had seen the Massey University Logo on the top of the information

sheet and at first glance had thought it was "some sort of marketing survey." However, this was not the case when the November questionnaire was distributed and a significantly larger proportion 66% (n = 57), of the year one Bachelor of Nursing students responded by completing and returning the questionnaire.

The response rates of year two Bachelor of Nursing students to both the July and November questionnaires were consistently high with response rates of 77% (n = 37) and 75% (n = 36) respectively.

4.2.2 Age distribution

As demonstrated in Table 3, the age distribution of respondents in the year one and year two Bachelor of Nursing student groups was consistent.

Table 3
Age distribution of respondents by student year

	Student Age									
	17-20 years		21-30 years		31-40 years		41 years plus			Total
Year	n	%	n	%	n	%	n	%	n	%
One	18	22	26	32	27	33	11	13	82	53
Two	17	23	23	32	22	30	11	15	73	47
Total	35	22	49	32	49	32	22	14	155[+]	100

[+]*NB. Total n=155, One year one respondent failed to identify age group*

There was no significant difference between respondent age distribution and respondent group. In both groups the largest percentage of respondents identified as being situated in the 21 – 30 and 31 – 40 year age groups. These statistics are consistent with, and reflect the overall age distribution of students across the wider Bachelor of Nursing programme, within the institute in which this research has been undertaken.

4.2.3 Learning style

Respondents were asked to indicate their preferred learning style on a multiple response (mentioned / not mentioned) basis and had the opportunity to identify more than one preferred learning style. The preferred learning style most often identified by

respondents was "Lecturer directed" (n = 109) which represented 32% of the total overall responses. The least preferred learning style was "one-to-one lecturer assisted" which represented a response from 10% (n = 35) of the total respondent group. Overall respondent preferences are depicted in Figure 4.

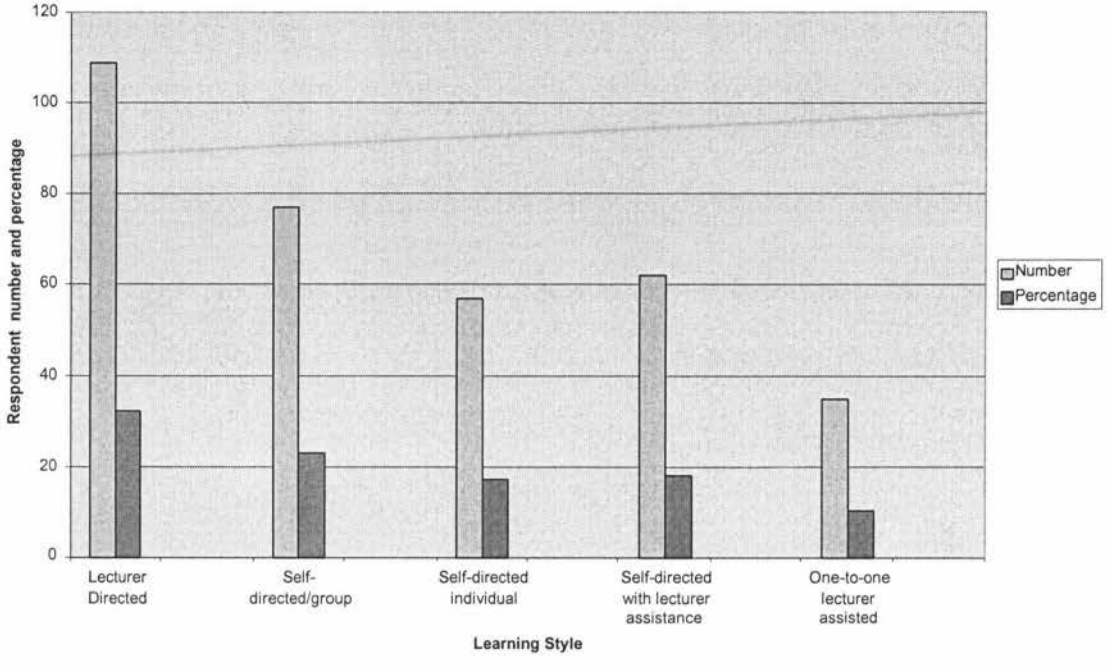

Figure 4 Preferred Learning Styles of Respondents

In order to more thoroughly interpret the questionnaire results the data set was further refined and cross-tabulated using the variables of questionnaire date, age group, and student year.

Overall results of learning styles data when cross-tabulated with questionnaire date revealed no significant ($p < .05$) results. However it is interesting to note that in response to the July questionnaire only (n = 26) 16% of the overall respondent group mentioned a preference for self-directed group learning in contrast to the November questionnaire where (n = 51) 33% of respondents mentioned a preference for this learning style. It is acknowledged that the significant increase in the number of year one student respondents to the November questionnaire may have contributed to the increase in respondent preference for this learning style. Another contributing factor may be due to the increased familiarity with and use of the Clinical Arts and

Technology Centre by year one students, particularly during semester two whilst undertaking the practicum course BN5.150 Nursing Knowledge 2. A core component of this course requires attendance at scheduled Clinical Arts and Technology Centre practicum sessions during which time students are encouraged and supported to work in groups of their peers.

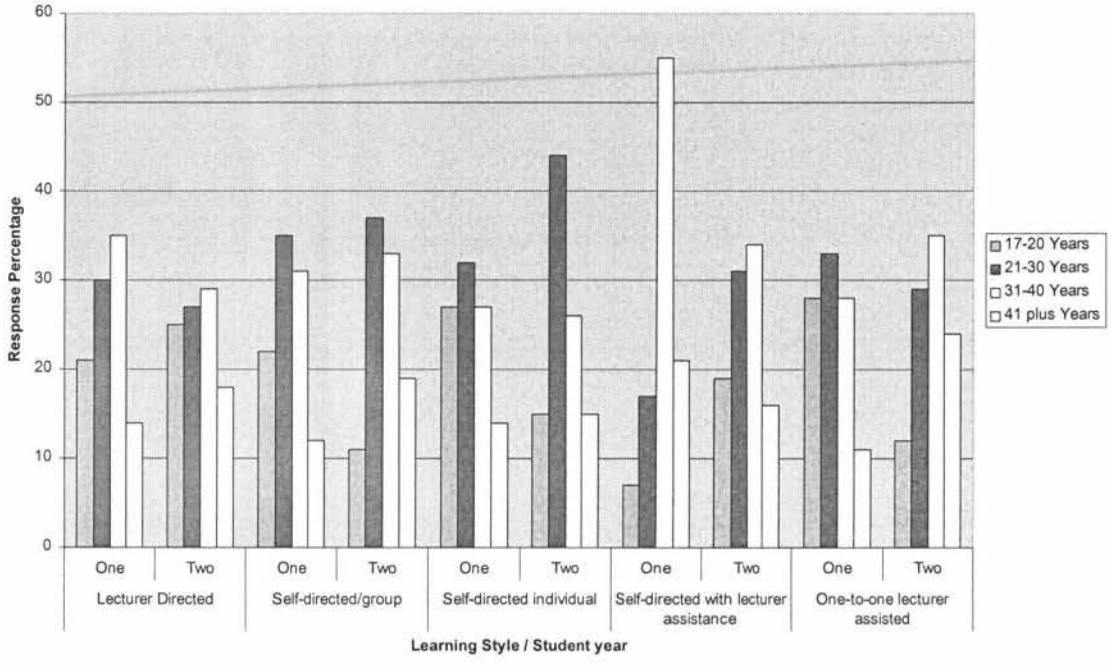

Figure 5 Preferred Learning Styles identified by Respondent Age and Student Year

The results illustrated in Figure 5 represent a cross-tabulation of respondents' preferred learning style by student year. No significant results were identified in relation to learning style and age with the exception of "self-directed with lecturer assistance." This item was found to be significant ($p < .05$) with age ($\chi^2 = 11.698$, $df = 3$, $p = .008$). It would appear that those aged 31 and over appreciate this approach to learning more than those who are 30 years or less.

Table 4 illustrates the independent cross-tabulation of the five identified learning styles with the variable student year. Two of the five learning styles revealed significance ($p < .05$) in relation to student year. The learning style "self-directed group" was found to be significant with student year ($\chi^2 = 8.403$, $df = 1$, $p = .004$). It appears that 65% of year one respondents identified a preference for this learning style in contrast to only 35% of year two respondents.

Table 4
Preferred Learning Style by Student Year

	Student Year					
	Year One		Year Two		Total	
Item	n	%	n	%	n	%
Lecturer Directed	58	53	51	47	109	70
Self-directed / group	50	65	27	35	77	49
Self-directed individual	23	40	34	60	57	37
Self-directed with lecturer assistance	30	48	32	52	62	40
One-to-one lecturer assisted	18	51	17	49	35	23

"Self-directed individual learning" was also significant with student year ($\chi^2 = 5.961$, df = 1, p = .015) however, in contrast to the previous results only 40% of year one students showed a preference for "Self-directed individual learning" whilst 60% of year two students mentioned it as their preferred learning style.

These results do not support the hypothesis that "school leavers will indicate a greater preference for didactic teacher/lecturer directed models of learning than older students." It is interesting to note that a general preference for lecturer directed learning, was identified by 70% (n = 109) of the overall year one and year two respondent groups. Student comments in response to the research questionnaire and anecdotal lecturer feedback indicate that the preference for "lecturer-directed learning" identified by the students may be due to a perceived complexity of the nursing role. Many students made similar comments, "how can we know what we are doing is right, if we don't know what we need to know?"

4.3 Student Satisfaction with the Clinical Arts and Technology (CAT) Centre

4.3.1 Overall student satisfaction

Respondents indicated on a five point Likert scale (the score of 1 indicating low satisfaction, 3 medium and 5 high) their overall satisfaction in relation to the Clinical Arts and Technology Centre facility, resources and philosophy. Responses were made to five attitudinal questions, which were analysed using a one-way analysis of variance (ANOVA). Table 5 depicts the mean scores for each statement by student year.

Table 5
Satisfaction with the Clinical Arts and Technology Centre facility, resources and philosophy

Overall does the CAT Centre facility and resources support you to:	Student Year	n	Mean Score	F	P
Think on your feet?	One	83	3.88	.377	.540
	Two	72[+]	3.79		
Develop and use critical thinking?	One	83	4.04	5.737	.018*
	Two	72[+]	3.72		
Develop and use focused communication?	One	83	4.02	6.487	.012*
	Two	72[+]	3.63		
Identify and practice appropriate therapeutic interventions?	One	83	4.53	11.798	.001*
	Two	72[+]	4.11		
Reinforce prior learning?	One	83	4.58	5.384	.022*
	Two	72[+]	4.31		

[+]*NB. Total Year Two Responses n=72, One year two respondent failed to complete this question*

As depicted in Table 5 a significant variance ($p < .05$; indicated by *) between the year one and year two groups was identified in the following items: develop and use critical thinking; develop and use focused communication; identify and practice appropriate therapeutic interventions; and reinforce prior learning. In each of the above identified items the Year one group rated a significantly higher level of satisfaction in relation to the Clinical Arts and Technology Centre facility resources and associated philosophy of self-directed learning.

A further comparison of means was undertaken using the independent variables of questionnaire date and respondent age. Table 6 depicts mean responses by questionnaire date. All items showed an improved mean score in the November questionnaire in comparison to the July questionnaire. A significant variance ($p < .05$; indicated by *) was noted in four items; think on your feet; develop and use critical thinking; develop and used focused communication; and identify and practice appropriate therapeutic interventions. Student comments indicate that the improvement in mean scores from the July to the November questionnaire dates were related to the increased student familiarity with and utilisation of the Clinical Arts and Technology Centre facility and resources by year one Bachelor of Nursing students.

Table 6
Satisfaction with the CAT Centre facility, resources and philosophy by questionnaire date

Overall do the CAT Centre facility and resources support you to:	July		November				
	n	Mean scores	n	Mean scores	df	F	P
Think on your feet?	62[+]	3.65	93	3.97	1	5.058	.026*
Develop and use critical thinking?	62[+]	3.68	93	4.03	1	7.134	.008*
Develop and use focused communication?	62[+]	3.58	93	4.01	1	7.307	.008*
Identify and practice appropriate therapeutic interventions?	62[+]	4.10	93	4.49	1	10.160	.002*
Reinforce prior learning?	62[+]	4.34	93	4.53	1	2.426	.121

[+]*NB. Total July Responses n=62, One year two respondent failed to complete this question*

No items showed significance ($p < .05$) in variation between mean scores when cross-tabulated by respondent age group.

From the compilation and thematic analysis of student comments five overall themes emerged which are presented throughout this chapter in relation to the associated statistical results. Theme # 1: Confidence building emerged as a result of student comments in relation to satisfaction with the Clinical Arts and Technology Centre facility, resources and the associated philosophy of self-directed learning. A discussion of the students' comments follows.

Theme # 1: Confidence building

Overall there was overwhelming and consistent satisfaction expressed in relation to the Clinical Arts and Technology (CAT) Centre facility, resources, access, and learning environment. Many of the comments reflected the feelings of a year two student who commented, "Excellent facility. Great learning environment. Enjoy working there." The positive perceptions of the students were able to be clearly identified and were echoed across each sub-sample group. A year one student commented in response to the July questionnaire: "I think it is a great facility and gives students hands-on experience to try new things and to learn in a safe place." Another commented, "I think it will be a great place to learn and I will use it more as I progress through the programme." Similar comments were a consistent thread in amongst year one student responses. Responses made by year one students to the November questionnaire also

appeared to reflect a greater familiarity with the practical use of the facility and resources. Two November year one respondents commented, "The CAT Centre is really great. We are lucky to have this area to use. I feel like I'm really able to make use of it now, good to practice core skills, awesome facility!" and "The computers and resources available have provided an enormous amount of help when it comes to science, practical and studying. I use them a lot now. I really enjoy working in there."

Year two student comments continued the positive theme of satisfaction however their comments appear to be a bit more discerning and provide an in-depth assessment of the facility and how it worked for them. One year two student commented,

> The CAT Centre is a very important and necessary part of the BN programme for care, skill practice. I think that the CAT Centre is a good idea and it is helpful in learning skills, which need to be demonstrated in nursing practice on clinicals.

Another year two student commented, "Staff are approachable and great teachers. A lot of equipment is available to use which is a great idea. Makes you feel more confident going out into practice. I really enjoy the CAT Centre" while a third said,

> CAT Centre is and has been a vital part of my practical learning for the BN programme. On the whole very good and educational, makes you think about what you are doing and why. Very useful in building self-confidence before clinical experience.

Whilst students expressed overwhelming satisfaction with the concept of the Clinical Arts and Technology Centre facility, resources, access and learning environment they were also invited to make individual comments in relation to specific aspects of the facility, resources, computer resources, access, and learning environment. A range of interesting comments were made in relation to these items and are presented in the following four sections. However, two consistent themes (Theme # 2: Competition for opportunities and Theme # 3: The need for direction and confirmation) emerged from comments made by the year one and year two student groups. These themes are discussed in the sections which follow those on satisfaction with the Clinical Arts and Technology Centre, in association with the relevant quantitative results.

4.3.2 Satisfaction with the facility

Respondents' satisfaction was further refined and is discussed in terms of satisfaction with the Clinical Arts and Technology Centre facility. Respondents were asked to indicate satisfaction with the facility on a yes / no basis. Table 7 depicts the overall results cross-tabulated by the independent variables of questionnaire date and student year.

Table 7
Satisfaction with the Clinical Arts and Technology Centre facility

Questionnaire Date	Satisfied with Clinical Arts and Technology Centre facility	Student Year		Satisfaction	
		One	Two	Total	%
July	Yes	26	36	62	98
	No	0	1	1	2
November	Yes	55	36	91	98
	No	2	0	2	2
Overall Group	Yes	81	72	153	98
	No	2	1	3	2
Total		83	73	156	100.0

Overall satisfaction with the facility was high with 98% (n = 153) of respondents indicating that they were satisfied with the Clinical Arts and Technology Centre facility. Table 8 represents a further cross-tabulation of responses by student age and year.

Table 8
Satisfaction with the Clinical Arts and Technology Centre facility

	Student Year				Satisfaction Total			
	Year One		Year Two		n	n	%	%
Age Distribution	Yes	No	Yes	No	Yes	No	Yes	No
17-20 years	18		17		35		22	
21-30 years	26		23		49		31	
31-40 years	25	2	21	1	46	3	31	2
41 plus years	11		11		22		14	
Missing	1[+]				1			
Total	80	2	72	1	152	3	98	2

[+]*NB. Total Year One Responses n=82, One year one respondent failed to indicate age*

Of the respondents who indicated they were not satisfied with the facility, all identified in the 31 – 40 year age group, two were in year one and one was a year two student. Both year one students express a lack of confidence in accessing and using the facility especially the computer resources. Both indicated that they believed there should be a lecturer in attendance at all times. Overall the level of satisfaction across all groups remained consistently high. No significant ($p < .05$) variation between the groups was identified.

4.3.3 Satisfaction with the resources

A cross-tabulation of respondents' satisfaction in relation to the Clinical Arts and Technology Centre resources by questionnaire date and student year is depicted in Table 9. Overall respondent satisfaction with resources was high (97%).

Table 9
Student satisfaction with the Clinical Arts and Technology Centre resources

Questionnaire Date	Satisfied with Clinical Arts and Technology Centre Resources	Student Year		Satisfaction Total	
		Year One	Year Two		
		n	n	n	%
July	Yes	25	36	61	97
	No	1	1	2	3
November	Yes	54	36	90	97
	No	3	0	3	3
Overall Group	Yes	79	72	151	97
	No	4	1	5	3
Total		83	73	156	100.0

Five respondents (3%) indicated they were not satisfied with the resources. Two of the five respondents, both from year one, provided comment in relation to their dissatisfaction. Both identified that they had difficulty using the computer resources and felt that insufficient information and/or training was provided on the use of these resources. One of the students commented "it is frustrating when you don't know what you need to know. How do you know what to learn?"

A further cross-tabulation of responses was undertaken by student year and age distribution. Results are presented in Table 10. Satisfaction with the Clinical Arts and

Technology Centre resources remained consistent across all groups. No significant variation in responses between groups was identified. Of the five respondents who identified they were not satisfied with Clinical Arts and Technology centre resources, three were from the 21 – 30 year age group and one from of the 17 -20 year and 31 - 40 plus groups respectively. It was interesting to note that four of the five respondents who identified they were not satisfied with resources did not identify dissatisfaction with the Clinical Arts and Technology Centre facility.

Table 10
Satisfaction with the Clinical Arts and Technology Centre resources

	Student Year				Satisfaction Total			
	Year One		Year Two					
Age Distribution	Yes	No	Yes	No	n Yes	n No	% Yes	% No
17-20 years	18		16	1	34	1	22	.5
21-30 years	23	3	23		46	3	29	2
31-40 years	26	1	22		48		31	.5
41 plus years	11		11		22		14	
Missing	1[+]							
Total	78	4	72	1	150	5	97	3

[+]*NB. Total Year One Responses n=82, One year one respondent failed to indicate age*

Satisfaction with the computer resources

As the integration of computer resources in the form of interactive CD ROMs, self learning packages, on-line resources and reference libraries was a new and important innovation in the implementation of the Clinical Arts and Technology Centre, respondents were asked to rate their overall satisfaction in relation to the computer resources and their ease of use. Responses made to three attitudinal questions were captured using a five point Likert scale (1 indicating low satisfaction, 3 medium and 5 high). Overall data analysis was undertaken using a comparison of means and analysis of variance (ANOVA). Three independent variables; student year, questionnaire date and respondent age were used throughout the analysis. The results are presented in Tables 11 – 13.

Table 11
Satisfaction with Clinical Arts and Technology Centre computer resources by student year

	Student Year						
	Year One		Year Two				
Item	n	Mean scores	n	Mean scores	df	F	p
CAT Computers user friendly	81[+]	4.00	72[+]	3.97	1	.034	.855
CD ROM's stimulate and enhance learning	81[+]	4.25	72[+]	4.13	1	.626	.430
CD Rom subject choices appropriate	81[+]	4.37	72[+]	4.31	1	.236	.628

[+]*NB. Total Year One Responses n=81, Total Year Two Responses n = 72: Two year one and one year two respondent failed to complete this question*

As illustrated in Table 11 whilst year one students indicated consistently higher mean scores in all items, the variation between the year one and year two student group was not significant ($p < .05$).

Table 12
Satisfaction with computer resources by questionnaire date

	Questionnaire Date						
	July		November				
Item	n	Mean scores	n	Mean scores	df	F	p
CAT Computers user friendly	63	3.83	90[+]	4.10	1	3.267	.073
CD ROM's stimulate and enhance learning	62[+]	3.89	90[+]	4.40	1	11.892	.001*
CD Rom subject choices appropriate	62[+]	4.21	90[+]	4.43	1	3.189	.076

[+]*NB. Total July Responses n=62, Total November Responses n = 90: One July year one, two November year one and one November two respondents failed to complete this question*

Table 12 outlines the comparison of items with questionnaire date. All items showed improvement in mean scores from the July to November questionnaire dates. However, one item "CD ROM's stimulate and enhance learning" showed a significant ($p < .05$) improvement in mean score in the November questionnaire. This overall improvement in mean values may be due to the increased familiarity and confidence of students using the Clinical Arts and Technology Centre computers in the later half of the academic year, in particular the year one student group who undertake scheduled Clinical Arts and Technology Centre sessions within their timetabled theory courses.

No significant variance was identified between student age groups (Table 13), however it is interesting to note that the item "CD ROM's stimulate and enhance learning" shows a progressive improvement in mean score as the respondent age increases: m = 3.81 for the 17 -20 year group to m = 4.36 for the 41 plus group.

Table 13
Satisfaction with computer resources by respondent age

Item	Age group – Mean Scores				df	F	p
	17-20	21-30	31-40	41^{+}			
CAT Computers user friendly	4.18	3.71	4.06	4.14	3	2.244	.086
CD ROM's stimulate and enhance learning	3.81	4.23	4.31	4.36	3	2.337	.076
CD Rom subject choices appropriate	4.45	4.23	4.42	4.23	3	.900	.443

Satisfaction with guest speakers

On a regular basis guest speakers are invited to present workshops and lectures at the Clinical Arts and Technology Centre. Student attendance at these sessions is optional and has been extremely variable. Anecdotal comments from nursing lecturers indicated that there was generally a higher attendance at guest speaker workshops by nursing students in the 30 plus age groups. With this in mind it was deemed important to not only determine student satisfaction with this initiative but also whether advertising of the sessions was adequate and appropriate. Data was analysed using a comparison of means and an analysis of variance (ANOVA).

Table 14
Satisfaction with Clinical Arts and Technology Centre guest speakers

Overall Group Statistics	Student Year	n	Mean scores	Std. Deviation	F	p
In-service education sessions informative	One	80	4.06	.847	1.481	.225
	Two	71	4.11	.979		

Table 14 illustrates the consistently high mean satisfaction scores across both year one and year two student groups. No significant variance ($p < .05$) was identified between groups when analysed by student year, questionnaire date or respondent age.

Table 15
Satisfaction with guest speaker advertising

Advertising adequate?	Questionnaire Date	Student Year		Total	
		Year One n	Year Two n	n	%
Yes	July	14	16	30	19.4
	November	47	29	76	49.0
Total		61	45	106	68.4
No	July	12	21	33	21.3
	November	9	7	16	10.3
Total		21	28	49	31.6

NB. Total n=155, One respondent failed to complete this question

As depicted in Table 15 student satisfaction with regard to advertising of guest speaker sessions was split with 68% (n = 106) of respondents indicating that advertising was adequate whilst 32% (n = 49) of respondents indicated that advertising was not adequate. In order to determine which group of students perceived that "guest speaker sessions" were not adequately advertised the data was cross-tabulated and analysed using a Chi-Square test. Statistical significance ($p < .05$; indicated by *) became apparent when cross-tabulated by respondent age and questionnaire date as depicted in Table 16.

Table 16
Chi-Square Test - Satisfaction with guest speaker advertising

Independent variable	n	χ^2	df	p
Student year	155	2.902	1	.088
Questionnaire date	155	21.176	1	.001*
Age	154	7.850	3	.049*

Of the respondents to the July questionnaire 48% (n = 30) indicated that advertising was adequate whilst 52% (n = 33) of respondents indicated that it was not. In contrast 83% (n = 76) of the respondents to the November questionnaire indicated advertising was satisfactory and only 17% (n = 16) of respondents indicated dissatisfaction with the level of advertising for guest speaker sessions. This improvement in students' perceptions of the adequacy of advertising may be due to the students' increased familiarity with the facility and resources and awareness of the opportunities available to them whilst on the campus of EIT. The improvement in student response to the

November questionnaire and increased year one student access to the Clinical Arts and Technology Centre facility may also have contributed to this positive change in perceptions.

It is interesting to note that respondent age was also a significant variable ($\chi^2 = 7.850$, df = 3, p = .049). Figure 6 depicts the overall number and percentage response in relation to student perceptions of adequacy with the advertising of guest lecturer sessions. As illustrated the level of respondent satisfaction improved consistently in relation to respondent age group. These results highlighted a need to address future strategies for guest lecturer advertising particularly in relation students in the 30 and below age groups.

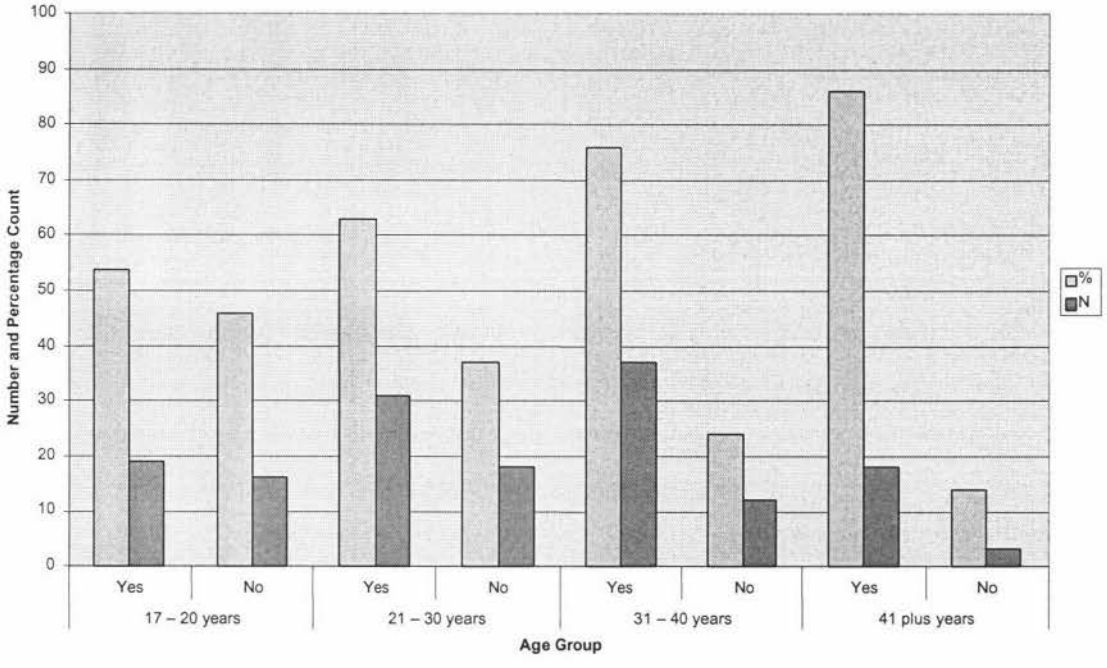

Figure 6 Adequacy of Guest Speaker Advertising

4.3.4 Satisfaction with access to the facility and resources

Respondents indicated their satisfaction with access to the Clinical Arts and Technology Centre on a yes / no basis. Results cross-tabulated by student year and questionnaire date are presented in Table 17. Of the overall respondent group (n = 156), 92% (n = 144) indicated they were satisfied with access to the facility and resources whilst 8% (n = 12) indicated they were not.

Table 17
Satisfaction with the Clinical Arts and Technology Centre access

Questionnaire Date	Satisfied with Clinical Arts and Technology Centre Resources	Student Year		Total	
		Year One n	Year Two n	n	%
July	Yes	22	34	56	89
	No	4	3	7	11
November	Yes	56	32	88	95
	No	1	4	5	5
Overall Group	Yes	78	66	144	92
	No	5	7	12	8
Total		83	73	156	100.0

Overall respondent satisfaction improved from 89% in response to the July questionnaire to 95% in response to the November questionnaire. Year one student satisfaction improved from 85% in July to 98% in response to the November questionnaire, whilst year two student satisfaction remained relatively constant at 92% and 89% respectively. Again the increased response rate of year one students to the November questionnaire in association with increased utilisation of the Clinical Arts and Technology Centre facility by year one students during the second semester, may have contributed to the overall improvement in respondent satisfaction. Of those respondents who indicated they were not satisfied 3% were aged 17 -20 years, 4% were aged 21 – 40 years, and 1% were in the 41 years plus age group.

In order to ascertain if the current Clinical Arts and Technology Centre hours were adequate to meet student needs, participants were asked to indicate if they would utilise the Clinical Arts and Technology Centre should the hours be extended. Table 18 represents the overall group response. An overwhelming 82% (n = 117) of respondents indicated that they would utilise extended hours. The preference of respondents to a range of specified extended hour options was indicated on a multiple response basis. There was no significant variation ($p < .05$) in overall response between student year ($\chi^2 = .757$, df = 1, p = .384), questionnaire date ($\chi^2 = .040$, df = 1, p = .841) or age distribution ($\chi^2 = 1.305$, df = 3, p = .728), however a higher proportion 46% (n = 65) of year one students identified a preference to utilise extended hours in contrast to 36% (n = 52) of year two students.

Table 18
Student desire to utilise extended hours in Clinical Arts and Technology Centre

Utilise extended hours	Student Year: Year One n	Year One %	Year Two n	Year Two %	Total n	Total %
Yes	65	46	52	36	117	82
No	12	8	14	10	26	18
Total	77	54	66	46	143	100
Saturday AM	23	14	24	14	47	28
Saturday PM	22	13	14	8	36	21
Mon-Fri 4.30-7.00pm	46	27	41	24	87	51

NB. Preference for extended hours indicated on a multiple response basis

Of the extended hours options offered the most preferred option appears to be Monday – Friday 4.30 – 7.00 pm, identified by 51% (n = 87) of respondents whilst the least preferred option mentioned by respondents was Saturday PM, 21% (n = 36).

4.3.5 Utilisation of the Clinical Arts and Technology Centre

In order to determine student utilisation of the Clinical Arts and Technology Centre respondents were asked to identify how often they accessed the facility for either self-directed practice or scheduled workshop sessions. Table 19 illustrates respondent utilisation of the facility for independent practice when cross-tabulated by student year and questionnaire date.

Table 19
Student utilisation of the Clinical Arts and Technology Centre for independent practice

Student Year	Questionnaire date	Never n	Never %	Monthly n	Monthly %	Weekly n	Weekly %	Daily n	Daily %	Other n	Other %	Total n	Total %
One	July	2	1	10	6	9	6	4	3	1	.5	26	17
	November			18	12	32	21	6	4	1	.5	57	37
	Total	2	1	28	18	41	26	10	6	2	1	83	54
Two	July	4	3	14	9	11	7	0	0	7	5	36	23
	November	4	3	18	12	8	5	0	0	6	4	36	23
	Total	8	5	32	21	19	12	0	0	13	8	72	46
Total		10	6	60	39	60	39	10	6	15	10	155	100

Whilst the data showed no significance in variation between groups when cross-tabulated by questionnaire date or respondent age, a comparison by student year was significant $p < .05$ ($\chi^2 = 29.367$, df = 4, $p = .001$). Of the year two respondent group 44% (n = 32) identified that they used the facility for independent practice on a monthly basis in contrast to only 34% (n = 28) of the year one respondent group. However 49% (n = 41) of the year one respondent group identified they used the facility for independent practice on a weekly basis whilst only 26% (n = 19) of year two respondents indicated weekly use. It is interesting to note that there was an increase in utilisation of the Clinical Arts and Technology Centre by year one students from the July to November questionnaire dates from 17% (n = 26) to 37% (n = 57) of the overall respondent group. It may be assumed that the higher response rate of year one students to the November questionnaire was responsible for this variation in data. However, increased year one student confidence and familiarity with utilisation of the facility and resources for independent practice, may also be a contributing factor in the improved utilisation of the facility for independent practice by the November questionnaire date. In contrast utilisation of the facility by year two students remained consistent across the overall respondent group when analysed by questionnaire date, 23% (n = 36).

Table 20
Student utilisation of the Clinical Arts and Technology Centre for scheduled workshops

Student Year	Questionnaire date	Never		Monthly		Weekly		Daily		Other		Total	
		n	%	n	%	n	%	n	%	n	%	n	%
One	July	2	1	0	0	8	5	14	9	2	1	26	17
	November	1	1	0	0	19	13	32	21	3	2	55	36
	Total	3	2	0	0	27	18	46	30	5	3	81	53
Two	July	0	0	9	6	11	7	2	1	13	9	35	23
	November	2	1	14	9	13	9	2	1	5	3	36	24
	Total	2	1	23	15	24	16	4	3	18	12	71	47
Total		5	3	23	15	51	34	50	33	23	15	152	100

Table 20 presents a cross-tabulation of student utilisation of the Clinical Arts and Technology Centre facility for scheduled workshops. Again no significant variation was identified when cross-tabulated by questionnaire date and respondent age however when cross-tabulated by student year a significant variation ($p < .05$), between groups was identified ($\chi^2 = 65.630$, df = 4, $p = .001$). Whilst "weekly" utilisation of the facility

for scheduled workshops showed little variation between student years (year one 33%, year two 34%), the items monthly and daily utilisation showed significant variation. Thirty-two percent of the year two respondent group identified they used the facility on a monthly basis however no year one students identified this item. The item daily use was identified by 57% of year one respondents in contrast to only 6% of year two respondents. It is assumed that, to a large degree, this variation in utilisation between years is due to the Bachelor of Nursing course requirements, and the requirement for and scheduling of workshop practicum activities. Analysis of student comments resulted in the emergence of Theme # 2: Competition for opportunities and provided further insight into the students' perceptions in relation to access to the Clinical Arts and Technology Centre facility and resources.

Theme # 2: Competition for opportunities

The following comment, made by a year two student, is a useful summary of his/her fellow year two student responses.

> The CAT Centre is excellent. I think the resources which are available there, including CD ROMS are very helpful, but in year two we don't get much opportunity to use it (except for pre-practicum days which are great), because the year one students are constantly in there in large class groups.

Another year two student commented, "The CAT Centre is a great learning centre. Has heaps of learning resources – great stuff, pity we don't get the opportunity to use it. Access needs to be freed up to allow year two students in."

"Limited opportunity" was a theme, which prevailed amongst the year two student group responses, whilst "opportunity" was a theme which emerged from year one student comments, particularly in response to the November questionnaire. Year one students mentioned this item on numerous occasions however, their responses were generally in direct contrast to those of the year two students, and reflected what they perceived as unlimited open access to and availability of the Clinical Arts and Technology Centre and resources.

Whilst year two student comments reflect limited opportunity to access the Clinical Arts and Technology Centre facility and resources it must be noted that a distinction was made between access to the facility and access to lecturer support and assistance.

Student comments in relation to lecturer support and assistance remained consistently positive across both the year one and year two student groups.

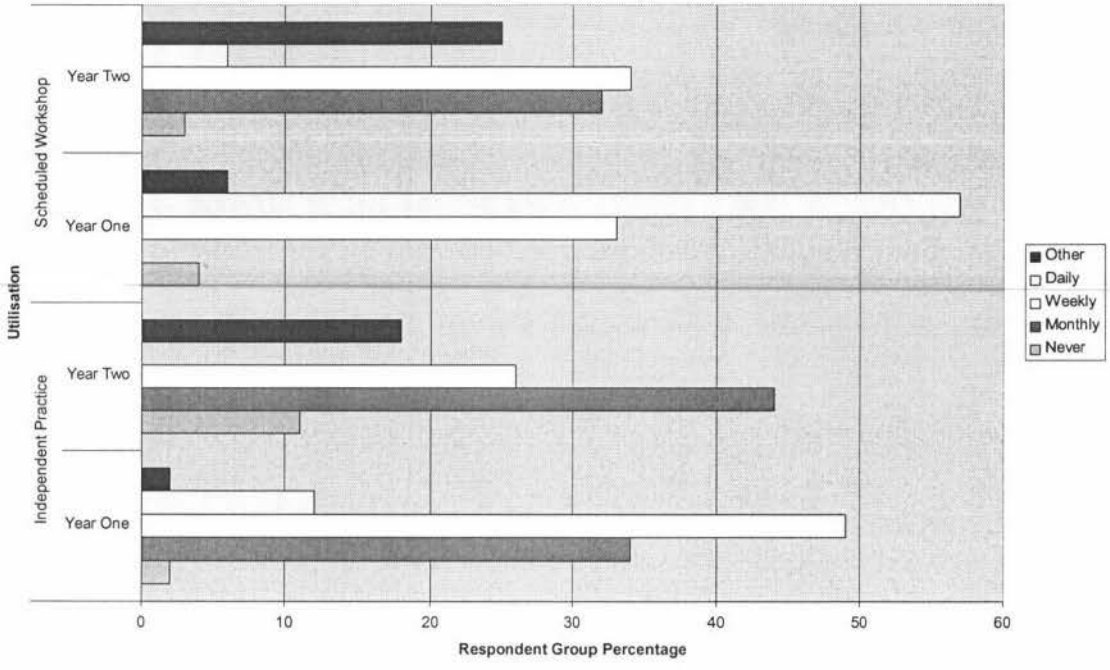

Figure 7 Student Utilisation of the Clinical Arts and Technology Centre Facility and Resources

Respondents identified on a multiple response basis how often they utilised the Clinical Arts and Technology Centre facility. Figure 7 illustrates the utilisation of the facility for independent practice and scheduled workshop sessions. A number of students identified they did not use the Clinical Arts and Technology Centre for regular daily, weekly or monthly sessions however they tended to use it for blocks of time when they decided they had something to practice. These students chose the option 'other' when responding to this question.

As a number of year two students had previously identified they had "limited access" to the Clinical Arts and Technology Centre, a cross-tabulation of student utilisation of the Centre was undertaken. Results are depicted in Table 21 and have been cross-tabulated by student year and overall group response.

Table 21
Student utilisation of Clinical Arts and Technology Centre

Item	Response	Year One		Year Two		Total	
		n	%	n	%	n	%
Independent practice[+]	Yes	56	37	48	31	104	68
	No	27	18	22	14	49	32
Independent peer/group activities[+]	Yes	68	45	57	37	125	82
	No	15	10	13	8	28	18
Computer resources[++]	Yes	64	41	49	32	113	73
	No	19	12	22	14	41	27
Tutor assisted learning[+++]	Yes	39	26	36	24	75	50
	No	43	28	33	22	76	50

NB. [+]Three year two students failed to respond to items one and two. [++]Two year two students failed to respond to item three and [+++]one year one and four year three students failed to respond to item four.

Significant variation ($p < .05$) between groups in three items: independent practice by questionnaire date; independent peer/group activities by questionnaire date; and tutor assisted learning by respondent age was identified.

Chi-square results for the items "independent practice" and "independent peer/group activities" are illustrated in Table 22. Sixty-eight percent (n = 104) of the overall respondent group identified independent practice as being their reason for utilising the Clinical Arts and Technology Centre. In response to the July questionnaire independent practice was identified by only 57% (n = 35) of respondents. However, in November 75% (n = 69) of respondents identified independent learning as a reason for using the Centre. In contrast the percentage of students who said they did not access the facility for independent practice dropped from 43% (n = 26) to 25% (n = 23) from July to November.

Table 22
Chi-Square Test - Clinical Arts and Technology Centre utilisation

Questionnaire date	n	χ^2	df	P
Independent Practice	153	5.233	1	.022*
Independent peer/group Activities	153	6.212	1	.013*

In relation to independent peer/group activities 82% (n = 125) of respondents indicated they accessed the Clinical Arts and Technology Centre. An increase in utilisation of the

facility from the July to November questionnaire dates was revealed, 72% (n = 44) of the July respondent group indicated they accessed the facility for independent peer/group activities in contrast to 88% (n = 81) of the November respondent group. Again this increase in utilisation could be attributed to a variety of reasons, for example, the November increase in year one respondent numbers, a variation in actual respondent groups between each questionnaire and students increased awareness and utilisation of the facility as the year progressed.

Table 23
Chi-Square Test - Clinical Arts and Technology Centre utilisation

		Age group						
		17-20	21-30	31-40	41^{+}			
Respondent Age		n	n	n	n	χ^2	df	p
Tutor assisted learning	Yes	9	25	30	10	10.744	3	.013*
	No	25	22	18	11			

Table 23 presents the Chi-Square results of respondent utilisation of the Clinical Arts and Technology Centre for tutor assisted learning cross-tabulated by respondent age. It is interesting to note that whilst the 17 – 20 year and 41 plus age groups identified the greatest preference for lecturer directed learning, the 17 – 20 year group indicated the least utilisation of the Clinical Arts and Technology Centre for tutor assisted learning at 26%. In contrast utilisation for tutor assisted learning by the 41 plus group was 48%, 21 -30 years 53% and 31 – 40 year age group 63%. Data was further cross-tabulated by the preferred learning styles however no significance in variation was identified.

It is pleasing to note that 73% (n = 113) of the overall respondent group access the facility to use the computer resources. Of this group 77% (n = 64) identify as year one students and 69% (n = 49) identify as year two students. Whilst not significant, there was a slight improvement in utilisation of computer resources between the July (69%) and November (76%) questionnaire response.

Respondents were asked to indicate: if the Clinical Arts and Technology Centre had been available to them at the times that they would have liked to use it, whether tutor supervision and/or assistance had been readily available to them, and if they would like to access the facility and resources more often. Student responses to these questions are illustrated in Table 24.

Table 24
Clinical Arts and Technology Centre and resource availability

Item	Response	Student Year: Year One n	Year One %	Year Two n	Year Two %	Total n	Total %
CAT Centre availability	Yes	64	42	57	37	121	79
	No	19	12	13	9	32	21
Tutor supervision available	Yes	73	48	55	36	128	84
	No	10	6	15	10	25	16
Use CAT Centre more often	Yes	66	43	54	35	120	78
	No	17	11	16	10	33	22

No significance ($p < .05$) in variation was identified between items or groups when data were cross-tabulated. Seventy-nine percent (n = 121) of respondents felt the Clinical Arts and Technology Centre facility was readily available when they would have liked to use it, and 84% (n = 128) indicated that tutor supervision and / or assistance was readily available to them. Of the overall respondent group 78% (n = 120) identified that they would have liked to use the Clinical Arts and Technology Centre facility more often. A number of students identified that they found the Clinical Arts and Technology Centre "a safe and relaxed environment to practice core skills and access clinical and computer resources." Many year two students cited "limited opportunity" in relation to their timetabled theoretical courses and "limited availability" in relation to year one student utilisation as barriers to accessing the facility and felt that extended hours would provide them with a greater opportunity for access.

Theme # 3: The need for direction and confirmation emerged from student comments in relation to Clinical Arts and Technology centre access and utilisation. Initially amongst year one students (July questionnaire date) there appeared to be an almost unanimous desire for lecturer directed learning when undertaking sessions in the Clinical Arts and Technology Centre environment. Year one students frequently cited the need to have a lecturer present to guide, reassure and confirm what they were doing was correct. A year one student in response to the July questionnaire made the comment, "if you don't know what you need to know then you need to have a tutor to tell you what to do and make sure you are doing it right!" Another year one student commented,

> It's hard to be self directed if you don't really know if what you are doing is right, and if it's not then you don't know. It's good to have a lecturer there when you first start using the CAT Centre because you need someone to tell you what you need to do, how to use things and where to find them.

Many of the July year one student respondents reflected similar statements in relation to "not knowing what we need to know," uncertainty with regard to how to use the Clinical Arts and Technology Centre facility and resources. They felt they were "not familiar enough with the resources available and how to use them," and needed direction and constant reassurance and confirmation. As one student stated, "I could learn much faster if someone was there to tell me what to do, guide me and tell me whether I'm doing things correctly or not."

It was interesting to note that in response to the November questionnaire the comments made by the year one student group had shifted, in that the need for direction and confirmation, whilst still evident, was articulated differently. A selection of four of the November year one student responses have been included:

> Lecturer directed learning works well for me, although when I'm in the CAT Centre I do ask for one-to-one lecturer assistance if there is something I don't understand. The rest of the time I find it OK to practice things on my own or with friends. I am satisfied with the help I am getting from lecturers when I need it.

> I think I work better on my own. There are lots of resources and cues available. I like to be able to approach the lecturer for assistance if I need it.

> I like lecturer input early on, but once I know what I should/need to be doing I would rather do my own thing. I like to use all the resources including the computer programmes to brush up on skills I already have and work at my own pace.

> Having someone available to ask for help, when I think I need it or to come and check that what I'm doing is O.K. is really great. It helps to build confidence without having someone constantly watching you.

It can be assumed that this change in perspective may have resulted from a combination of several contributing factors - a slightly different composition of the respondent group, an increasing level of nursing knowledge, and the students' increased familiarity and confidence when working in the Clinical Arts and Technology Centre learning environment. Whatever the reason it is clear that the students were beginning to develop a level of knowledge and confidence which allowed them to access the facility and resources, including lecturer support, on a more individualised basis in relation to

their own particular needs at the time. There did not appear to be an overwhelming need to have a lecturer constantly in attendance.

In contrast to the year one student group, year two students identified a preference for self selection in relation to lecturer assistance and use of the facility. A need for lecturer direction was not evident in the year two student responses. The comments which follow were made by three of the year two respondents.

> Once you get used to being able to just walk into the CAT Centre and use the computers or do things, without being told what to do, it's really good. It's easy to ask for help if you need to check something.
>
> In year one I got a little frustrated in the CAT Centre as I wasn't sure what I needed to learn, or what to do next, I think it was a confidence thing, but now I enjoy being able to learn things by myself, or with friends, when I want to, knowing that I can get help if I need it.
>
> Being able to walk in and use the CAT Centre when I need to, and to know that all the resources including a lecturer are there for our use when we need them is great. Having the opportunity to practice when and what you want to, in a group or by yourself is really good and helps build confidence in what you are doing.

To a large degree these comments are representative of many of the year two student responses which were collated. Unlike the year one student group there did not appear to be any difference in the overall year two group perceptions when analysed by questionnaire date.

4.3.6 Satisfaction with the model of self directed learning

The "cooperative model" of self-directed learning, which was implemented in conjunction with the Clinical Arts and Technology Centre, was an initiative, which was new to the Faculty and the Bachelor of Nursing programme. It involved supporting students to learn how to undertake self directed discovery and become confident in their approach and ability to participate in self directed learning.

Initially respondents were asked to respond to two attitudinal questions: As a student what does the Clinical Arts and Technology Centre mean to you: Are you challenged to explore / expand your clinical knowledge and skills? How important do you think self-

directed discovery and independent learning are for the professional nurse? (Appendix IV, Research Questionnaire).

A comparison of means using the independent variables student year, questionnaire date and respondent age group was completed. No significance in variance ($p < .05$) was identified in the comparison of mean results between student year groups. However, as depicted in Table 25 in relation to questionnaire date both items indicated improved mean scores in response to the November questionnaire. One item "challenged to expand knowledge" demonstrated a significant variation ($p = .001$) between July ($m = 3.81$) and November ($m = 4.29$) mean scores.

Table 25
Self directed discovery / learning by questionnaire date

	Questionnaire Date						
	July		November				
Item	n	Mean scores	n	Mean scores	df	F	p
Challenged to expand knowledge?	63	3.81	93	4.29	1	12.280	.001*
Importance of self directed discovery?	62	4.52	90	4.61	1	.977	.325

Table 26 depicts the mean responses by respondent age group. It is interesting to note that one item "challenged to expand knowledge" showed significance ($p = .002$) in variation between age groups. The 21 – 30 year group scored at a significantly lower level ($m = 3.71$) than the other three age groups. The 40 plus and 31 – 40 year groups scored the highest for this item with mean scores of 4.36 and 4.31 respectively.

Table 26
Self directed discovery / learning by respondent age group

Item	Age Group - Mean Scores						
Age Group (Years)	17-20	21-30	31-40	41^{+}	df	F	p
Challenged to expand knowledge?	4.17	3.71	4.31	4.36	3	5.237	.002*
Importance of self directed discovery?	4.66	4.54	4.63	4.40	3	1.004	.393

Respondents where asked to identify, on a yes / no basis, whether they enjoyed self directed discovery and independent learning. Table 27 is a cross-tabulation of

responses by student year and questionnaire date. It is interesting to note that across both the year one and year two respondent groups the majority of respondents (n = 129; 84%) identified that they enjoyed self-directed discovery and independent learning. It must also be acknowledged that whilst the poor response rate of year one students (30%) to the July questionnaire did not have a significant impact upon the overall results, it may have contributed to the slightly lower percentage of July year one respondents (65%) who indicated they enjoyed self-directed discovery and independent learning. In contrast 88% of year one respondents to the November questionnaire indicated they enjoyed self directed discovery and independent learning.

Table 27
Enjoyment of self directed/independent learning

Enjoy self directed discovery and independent learning?	Questionnaire date	Student Year: Year One N	Year One %	Year Two n	Year Two %	Total n	Total %
Yes	July	17	65	32	89	49	32
	November	49	87.5	31	86	80	52
Total		66	80	63	87.5	129	84
No	July	9	35	4	11	13	8
	November	7	12.5	5	14	12	8
Total		16	20	9	12.5	25	16

NB. Total July n=62, One year two respondent failed to indicate
Total November n=92, One year one respondent failed to indicate

Results from the year two respondent groups remained consistent across both the July and November questionnaire with both groups indicating a high level of enjoyment of self directed learning, (89%) and (86%) respectively.

A greater insight into the students' perceptions of self-directed learning was achieved through thematic analysis of comments made by students in response to the research questionnaires. **Theme # 4: Development of self-directed learning skills** resulted from this analysis.

Generally respondents appeared to understand the term self directed learning and clearly articulated what it meant for them. The majority of the respondents agreed that the ability to undertake self-directed learning was important. A year two student defined self-directed learning as, "taking responsibility for your own learning, and knowing how

and when to access support from lecturers and use the appropriate frameworks and resources to guide your work." However it was interesting to note that overall the respondents identified that self-directed learning didn't just happen, that there was a process of learning how to become self-directed which occurred over a period of time – development of self-directed learning skills. This process was highlighted by the subtle differences in responses when comparisons were made between sub-sample groups, particularly in relation to the year one student group, when compared with the year two student group and / or questionnaire date. Building confidence in their own ability seemed to play a major role in the process of developing self-directed learning skills. Even those students who had identified a preference for self-directed learning identified that it required a degree of self-confidence in their own knowledge and ability. One year one July respondent expressed her concern, "I think in 1st year things are still very new and self-directed learning might not always be appropriate because you might be doing things wrong and you don't necessarily have the knowledge to know." Another year one November respondent commented,

> ...it was really frustrating working in the CAT lab when I first started as I didn't know enough about what I was doing and I was scared I would do things wrong, but now we use it so often I have got used to finding things and know that all I have to do is ask if I have a problem.

A November year two student posed this thoughtful and insightful response;

> I think self-directed discovery and independent learning are important for the professional nurse, because things are always changing in the practice situation. We have to keep up with the times. To gain knowledge and refine your skills I strongly believe you need to take responsibility for your own learning and to do that you need to have autonomy and develop a good sense of self-directed learning early on. I think early on I used to get frustrated in the CAT Centre, probably because of my lack of knowledge, but by practicing you become more confident and things seem to fall into place. It's all a process of learning.

Other fellow year two students echoed similar sentiments and identified that they had developed skills of self-direction which would benefit them throughout their nursing careers. One student commented that;

> Initially when I first started the programme and going to the CAT Centre I thought it wasn't fair. What was all this self-directed learning stuff? Was this just cost cutting? I had paid good money and expected to have a lecturer. But now I understand that learning how to do things on my own at my own pace has helped me to build my self-confidence and that's something I can use forever. Great value!

Overall the comments made in relation to "development of self-directed learning" appeared to link closely with those made in relation to "the need for direction and confirmation." Words such as familiarity and confidence appeared frequently in respondent comments and are common in the emergence of both themes. It would appear from the student responses that as individual student's confidence grew, so did their ability to participate and embrace the concept of self-directed learning. However, whilst both the year one and year two respondent groups identified initial frustration with the reality of self-directed learning, the year two student group clearly felt that once you had learnt to be self directed and become more confident that it was an advantage, and allowed you to learn at your own pace. It is apparent that as students progressed through the programme their views in relation to self-directed learning altered, and it became a more acceptable and in many cases a preferred learning style, particularly when used in conjunction with the more traditional lecturer directed modes. This preference was particularly evident with year two students who identified as being from the 31 year plus age groups.

One assumes that another major contributing factor in this process is the student's ongoing development and expansion of their nursing knowledge, particularly evident in the contrast of responses made between July, year one Bachelor of Nursing students, five months after commencement in the programme, and November year two Bachelor of Nursing students, who are nearing completion of two years in the programme.

4.3.7 Satisfaction with the learning environment

In conjunction with satisfaction with the model of self-directed learning, students were asked to indicate their satisfaction in relation to the Clinical Arts and Technology Centre learning environment, including their access to support and assistance and their perceptions of the overall coordination of the facility. Again five attitudinal questions were asked and respondents scored their level of satisfaction on a five point Likert scale. Table 28 indicates an ANOVA of items in relation to student year. Year one students scored a consistently higher level of satisfaction in all items than year two students. Statistical significance ($p < .05$; indicated by *) was identified in three items; learning environment supportive; learning environment appropriate/accessible to refine skills; and appropriate resources and learning activities available.

Table 28
Satisfaction with Clinical Arts and Technology Centre learning environment by student year

Item	Year One n	Year One Mean scores	Year Two n	Year Two Mean scores	df	F	p
Learning environment supportive	83	4.64	73	4.27	1	11.092	.001*
Learning environment conducive	83	4.39	73	4.15	1	3.266	.073
Learning environment appropriate/accessible to refine skills	83	4.52	73	4.22	1	5.386	.022*
Appropriate resources and learning activities available	83	4.48	73	4.22	1	5.640	.019*
Positive learning environment	83	4.63	73	4.42	1	3.420	.066

Table 29 shows year one and year two groups by questionnaire date. As can be seen consistent improvement in November mean scores was evident across all items. Statistical significance ($p < .05$; indicated by *) was identified in the same three items previously noted; learning environment supportive; learning environment appropriate/accessible to refine skills; and appropriate resources and learning activities available. This improvement in mean scores across items in the November questionnaire may be related to the increased use of the Clinical Arts and Technology Centre by students in the second semester of the academic year, in particular the year one students who are encouraged to access the centre on a regular basis.

Table 29
Overall Group Satisfaction with Clinical Arts and Technology Centre learning environment by questionnaire date

Item	July n	July Mean scores	November n	November Mean scores	df	F	p
Learning environment supportive	63	4.30	93	4.58	1	6.094	.015*
Learning environment conducive	63	4.13	93	4.38	1	3.567	.061
Learning environment appropriate/accessible to refine skills	63	4.11	93	4.56	1	12.202	.001*
Appropriate resources and learning activities available	63	4.21	93	4.46	1	5.162	.024*
Positive learning environment	63	4.44	93	4.59	1	1.734	.190

Table 30 reflects a comparison of means by respondent age group. It is interesting to note that the item "learning environment is conducive to either group or individual practice" was found to be significant (p = .024) between the differing age groups. The 17 -20 year group and 41 plus group identified significantly higher mean scores than those of the 21 - 40 year groups and yet the 17 – 20 group and 41 plus groups had indicated individual practice was their least preferred learning style.

Table 30
Satisfaction with Clinical Arts and Technology Centre learning environment by respondent age

Item	Age Group - Mean Scores						
Age Group (Years)	17-20	21-30	31-40	41^{+}	df	F	p
Learning environment supportive	4.51	4.31	4.55	4.55	3	1.230	.301
Learning environment conducive	4.57	4.24	4.04	4.41	3	3.222	.024*
Learning environment appropriate/accessible, refine skills	4.63	4.24	4.35	4.32	3	1.620	.187
Resources and learning activities available	4.49	4.27	4.43	4.18	3	1.312	.273
Positive learning environment	4.71	4.51	4.47	4.41	3	1.213	.307

A large number of the respondents who made comment on this section of the questionnaire identified that lecturer contact was an important feature of the learning process they undertook when using the Clinical Arts and Technology Centre. **Theme # 5: Working at own pace** emerged as a result of analysis of the student comments. The perceptions of the respondents in relation to the type and degree of lecturer input varied significantly between the year one and year two student groups. A change in perception was also evident amongst the subgroup of year one student respondents, when comments were examined by questionnaire date. Generally July year one respondents identified that they preferred a teacher directed, lecturer dependant approach to activities they undertook within the Clinical Arts and Technology Centre. Similar to the findings in Theme # 3, "The need for direction and confirmation," this preference was particularly prevalent amongst the July year one student comments. As occurred in Theme # 3 there was evidence of a change in year one student perceptions which occurred between the July and November questionnaire dates. Whilst many year one students still mentioned a preference/need for lecturer directed learning activities, a large number also mentioned a preference for being provided with an initial

demonstration of what was required, and then given the opportunity to access the appropriate resources, including lecturer assistance if the student identified it was necessary. It was interesting to note, that again in response to the November questionnaire, the majority of the 17 – 20 age group still maintained a preference for lecturer directed learning. Whilst it is not clear why this occurred, perhaps it is an extension of being socialised into a secondary school philosophy of teacher-directed learning combined with a lack of self-confidence or ability to undertake a more self-directed learning approach.

In contrast, the year two student group perceived that practice through trial and error was a good way to learn as long as assistance and appropriate resources were available as and when required. Amongst these student responses there appeared to be a different expectation of the lecturer role, which had moved more toward that of a facilitator of the learning process rather than directing it. Again this change in perception seemed to be closely linked with the students' knowledge, opportunity, confidence, and motivation. One year two student commented:

> I learn best by doing things at my own pace. We have so many lectures, we are bombarded with information. The CAT Centre is a great to have a place to go and work through all the practical 'stuff.' You can use the computers or the other clinical resources and just put it all together, make sense, consolidate, without being told constantly what to do. Don't get me wrong the lecturers are great, but sometimes you just want someone to support you not tell you what to do.

Another provided the following insightful response;

> It gives you the opportunity to work things through in a way that works best for you. Some people learn faster than others and want to move on. It's good to be given the outline of what's required and then be able to work at your own pace in your own way. Lecturers should be able to walk you through the process but not hold your hand, trial and error; after all they won't be there when we register.

4.4 Student Outcomes versus Attendance

Clinical competency outcomes of year one students were statistically collated in conjunction with attendance at the scheduled Clinical Arts and Technology Centre sessions in order to determine overall student competency outcomes in relation to utilisation of the Clinical Arts and Technology Centre, and to test the two hypotheses; "Student performance of psychomotor skills will improve due to increased opportunity

for direction and practice" and "Increased student confidence in their ability to perform psychomotor skills will have a positive impact upon their development, dexterity and achievement of psychomotor skill competency."

4.4.1 Attendance at Clinical Arts and Technology Centre sessions

Eighty-six year one Bachelor of Nursing students were enrolled in the practicum course BN5.150 Nursing Knowledge 2, in the second semester July – November 2001. Components of the course included scheduled lectures, tutorials, clinical practicum and Clinical Arts and Technology Centre practicum sessions. During participation in this course students are taught and assessed on a range of identified core practice competencies. Each student was required to demonstrate achievement of identified core competencies prior to being placed in a practicum venue. Students were given two opportunities to achieve competency and were graded on a pass / not passed basis. Scheduled times were made for each student to attend, participate in and practice these competencies in the Clinical Arts and Technology Centre supported by a lecturer. Whilst attendance at the Clinical Arts and Technology Centre sessions was not compulsory it was highly recommended. A register of student attendance (Figure 8.0) at the Clinical Arts and Technology Centre sessions was kept during the period (July – November 2001) that the course was delivered.

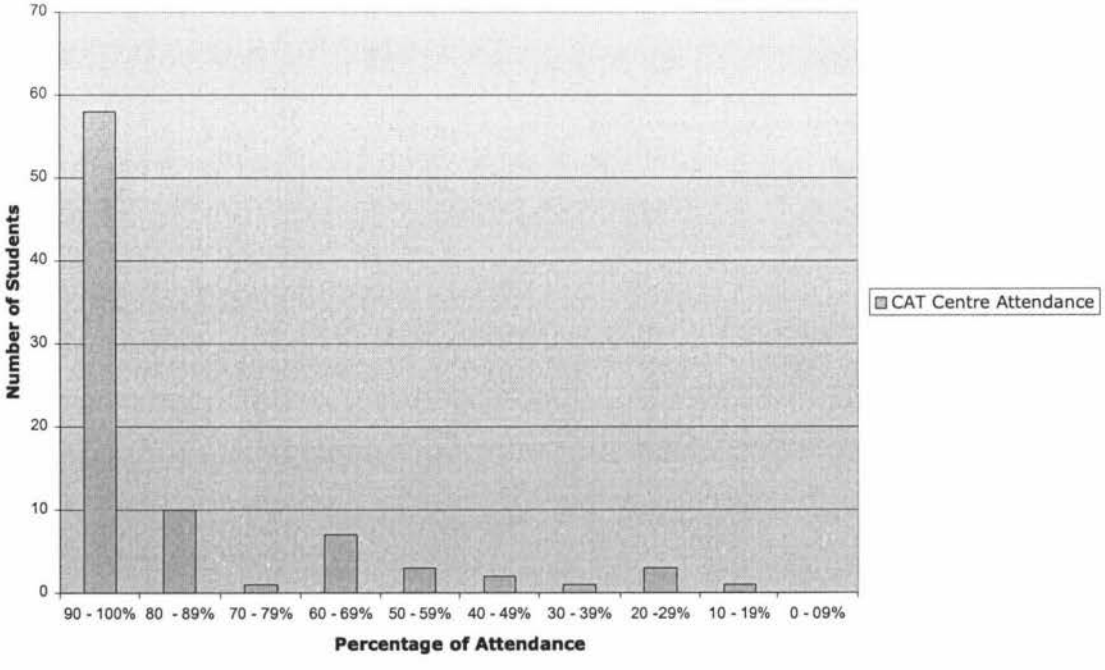

Figure 8 Year One Student Utilisation of the Clinical Arts and Technology Centre

Of the eighty six students who participated in this course 67.4% (n = 58) achieved 90 – 100% attendance, 11.6 % (n = 10) achieved 80 - 89% attendance, 1.2% (n = 1) achieved 70-79% attendance, 8.1% (n = 7) achieved 60 – 69% attendance. Ten students (11.6%) achieved less than 50% attendance at their scheduled sessions. Overall students provided a variety of reasons for non-attendance however the majority of responses cited personal issues and illness. Only three students identified non-attendance as being related to prior achievement of competency.

4.4.2 Year One Student competency outcomes in relation to attendance

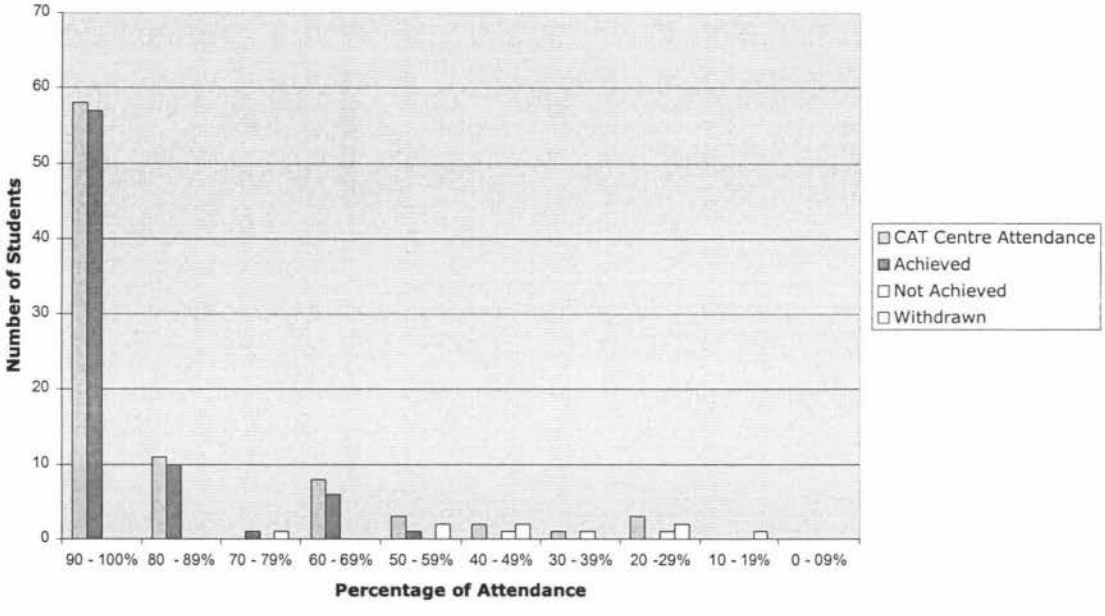

Figure 9 Clinical Arts and Technology Centre Student Attendances versus Outcomes

Figure 9 depicts a direct comparison of data collated relating to year one Bachelor of Nursing student attendance at scheduled Clinical Arts and Technology Centre sessions and student outcomes in relation to core clinical competency assessments. Achievement of competency by students for the identified core skills was achieved by 87% (n = 75) of the total student group. Of those who achieved competency 92% (n = 69) completed and achieved competency on the first attempt. Eight percent (n = 6) of the students required two attempts in order to achieve competency. Of the six students who achieved competency on the second assessment one had attended 80 – 89%, four had attended 60-69%, and one had attended 50-59% of the scheduled Clinical Arts and

Technology Centre sessions. Of the students who failed to achieve competency 3.5% (n = 3) had attended less than 50% of scheduled Clinical Arts and Technology Centre sessions. Eight students (9%) withdrew from the course prior to assessment being undertaken.

It is clear from these results that there is a direct correlation between attendance and use of the facility, and achievement of core competencies. These results support the hypothesis that "Student performance of psychomotor skills will improve due to increased opportunity for direction and practice." Whilst it is presumed that the confidence of individual students in their ability to perform psychomotor skills had a positive impact on the development, dexterity and achievement of their individual psychomotor skill competency, it is acknowledged that student confidence is not able to be adequately tested or determined through this statistical analysis.

4.6 Summary

In this chapter year one and year two student satisfaction and perceptions of the Clinical Arts and Technology Centre, facility, resources and model of self directed learning, have been presented in association with year one student competency outcomes and utilisation of the facility. In Chapter Five, triangulation of the research results are further discussed in relation to the research aims, hypotheses, existing literature and research limitations.

CHAPTER 5.0 DISCUSSION

5.1 Introduction

The Clinical Arts and Technology Centre is a "virtual" simulation environment that provides students with access to a facility and resources designed to support and enhance assimilation of theoretical and clinical knowledge, whilst providing them with an opportunity to prepare for practicum experiences in a safe and supportive environment. Since implementation of the centre and the associated model of self-directed learning student evaluations and anecdotal comments have cited, and continue to, cite the positive aspects and benefits of the facility and resources. In order to continue to develop and improve the current facility, resources and model of learning there was a need to clearly determine "are the Clinical Arts and Technology Centre, and the associated cooperative model of self-directed learning, effective in facilitating and enhancing clinical (psychomotor) skill acquisition and clinical skill competency of first and second year undergraduate student nurses?"

The aims of this evaluation research study were:

i. To determine student satisfaction with and perceptions of the Clinical Arts and Technology Centre facility, resources and model of self directed learning.

ii. To determine overall student competency outcomes in relation to utilisation of the Clinical Arts and Technology Centre.

iii. To identify areas for programme improvement, and facility and resource development.

The results presented in Chapter Four suggest that the Clinical Arts and Technology Centre and the associated cooperative model of self directed learning are effective in terms of student satisfaction and perceptions, clinical skill acquisition and ultimately the competency outcomes of undergraduate Bachelor of Nursing students at the Eastern Institute of Technology. Through a process of data triangulation Chapter Five builds on, explores and discusses the evaluation research results and findings presented in relation to the research question, the research aims, hypotheses and the existing body of literature.

The discussion is presented under the following headings:

- Student satisfaction and perceptions
- Skill acquisition and competency outcomes
- Limitations of the study

Identification of areas for programme improvement, and facility and resource development will be discussed throughout this chapter in association with the research findings. Recommendations for programme improvement, and facility and resource development are presented in Chapter Six.

5.2 Student Satisfaction and Perceptions

5.2.1 Student satisfaction and perceptions of the Clinical Arts and Technology Centre facility, resources and philosophy of learning

As demonstrated by the findings of this research, student satisfaction was evident throughout all aspects of the data analysis. Whilst overall satisfaction (evaluated using a five point Likert scale, five being the most positive and one being the least positive) was high ($m = 4.06$), a significant variation ($p < .05$) was identified between the year one ($m = 4.29$) and year two student groups ($m = 3.94$). The year one group scored consistently higher levels of satisfaction across four of the following five items, in response to the question, "Overall does the facility and resources support you to: think on your feet; develop and use critical thinking; develop and use focused communication; identify and practice appropriate therapeutic interventions; and reinforce prior learning;" when compared with the year two student group. A thematic analysis of student comments on each of the research questionnaires resulted in the emergence of Theme # 1 *Confidence Building.* The theme "Confidence building" directly supported the overall statistical results, and provided a greater insight into individual student perceptions in relation to the facility, resources, and model of learning. Overwhelming satisfaction with the facility, and resources, was evident throughout, however, it was pleasing to note that students also identified an appreciation of the added value that access to this facility and the resources contributed to their learning experience.

> The concept of the CAT Centre is excellent, I know friends in other BN programmes who don't have access to anything like this. Very useful in building your self-confidence and skill before clinical experience as you have time to think about what you are doing and why, and can practice knowing that it doesn't matter if you make a mistake" (Year Two Bachelor of Nursing student).

The implementation of the Clinical Arts and Technology Centre experience into the Bachelor of Nursing programme was considered a positive initiative by students and provided an opportunity for them to develop, expand and validate their knowledge as they progressed through the Bachelor of Nursing programme. This contention is supported by the improvement of student mean scores across all items in response to the November questionnaire. Whilst year two student mean scores remained consistently lower in comparison to year one, all student responses showed significant ($p < .05$) improvement in mean scores for four of the five items. Students identified that the Clinical Arts and Technology Centre facility, resources and philosophy encouraged them to "think on their feet, develop and use critical thinking, develop and use focused communication, identify and practice appropriate therapeutic interventions, and to reinforce prior learning." One year two student commented;

> It's a great way of reinforcing prior learning as you can put your theory into practice. This enables you to actually understand what you're doing, rather than writing it down on a piece of paper in a lecture."

Student comments unanimously highlighted the value of the Clinical Arts and Technology Centre and model of learning in terms of "Confidence Building." This is a concept which is also identified and supported by Johnson et al. (1999), Knight et al (2000), and Snyder et al (2000) who contend that students value the opportunity to practice in a safe and supportive environment where they can gain confidence and constructively evaluate their own psychomotor skill development and practice. The perception that increased self-confidence was an important aspect of skill development, psychomotor skill dexterity and ultimately achievement of clinical competency was reflected in many of the respondent comments, and was particularly evident amongst the year two respondent group.

5.2.2 Satisfaction with the facility

Ninety-eight percent (n = 153) of the overall student group indicated that they were satisfied with the facility. This was supported by student comments written on the research questionnaire. "The facility is a great place to practice clinical skills because you can imagine you're in the real environment and have access to all the equipment that you might need." However, whilst a high level of satisfaction was identified by the majority of students, additional comments made by 23 year one and 13 year two students, identified issues in relation to the size of the facility and the "inability to comfortably accommodate groups of more than twenty students when undertaking simulated practice activities." Whilst this was a small number of comments in relation to the size of the overall respondent group, the issue of facility size is an important consideration with regard to any future development and extension of the Clinical Arts and Technology concept into other programmes within the faculty.

5.2.3 Satisfaction with Resources

Of the overall student group 97% (n = 151) indicated that they were satisfied with the Clinical Arts and Technology Centre resources. There was no significant ($p > .05$) variation in student responses when cross-tabulated by student year, questionnaire date or respondent age. However, individual student comments (n = 24 year one, and n = 23 year two) indicated that improvements could be made in terms of increased stock levels of clinical items such as intravenous equipment, and dressing packs particularly prior to pre-practicum workshops and scheduled clinical competency assessments. The majority of these students commented that the facility was generally well stocked and kept up-to-date. Equipment was easy to find, and the self-learning packages, cue cards and computer resources were helpful. Many respondents identified the Clinical Arts and Technology Centre Coordinator, and faculty technicians as being beneficial and helpful to students accessing the facility and resources. Specific resources and initiatives included in the Clinical Arts and Technology Centre are the computer resources and guest speaker workshops. These aspects will be addressed individually in order to fully examine student satisfaction and perceptions.

Computer resources

Of the overall student group 73% (n = 41) identified that they accessed the Clinical Arts and Technology Centre to use the computer resources. No significant variation ($p < .05$) was identified in the mean scores recorded between groups. Thirty-three students commented that the range of computer resources was one of the most positive aspects of the Clinical Arts and Technology Centre. As identified in Chapter Four, overall mean satisfaction scores with regard to computer resources, ranged from 3.83 in July to 4.43 in November. One item, "CD ROMs stimulate and enhance learning," showed a significant improvement in score between questionnaire dates (m = 3.89) in July to (m = 4.40) in November. Whilst not significant ($p < .05$), again, year one respondents indicated consistently higher mean satisfaction scores than the year two respondent group. No overall theme emerged specifically in relation to computer resources however it was interesting to note that of the students who commented, many identified the range of interactive self-paced computer packages and resources as being of benefit to their learning process. One year one student commented "the computers and resources available have provided an enormous amount of help especially when it comes to science, practical and studying." A small group of students, six year one and two year two, identified that the limited number of available independent computers, and their own lack of computer skills, were a barrier to utilisation of the facility. These comments reflect issues also identified by Khoiny (1995) who discusses the importance of an environment that minimises frustration and promotes learning and accessibility, as factors that contribute to the effectiveness of computer assisted learning in nursing education.

Year one student utilisation of the computer resources increased between the questionnaire dates July and November, as did the mean satisfaction scores. It is acknowledged that there was a significant increase in year one student responses to the November questionnaire. However, respondent comments indicate that the improvement in utilisation of computer resources and mean satisfaction scores was directly related to increased student familiarity and confidence in using the computer resources and accessing the Clinical Arts and Technology Centre, rather than the increase in respondent numbers.

Guest speaker workshops

Satisfaction with the optional lunch-time workshops delivered by guest speakers in the Clinical Arts and Technology Centre was good (M = 4.06 – 4.11), despite variable attendance by students. No significance in variation ($p < .05$) was identified between student groups or by questionnaire date. Sixty-eight percent (n = 106) of students indicated that the advertising for these workshops was adequate whilst 32% (n = 49) indicated they were not. Seven students commented that advertising of the sessions occurred too late. One year two student stated "you never know when the sessions will be on until the last minute."

It was interesting to note that students' perceived adequacy of advertising, in relation to guest speakers, improved significantly ($p < .05$) between the July and November questionnaire dates. This improvement may be attributed to the increased advertising undertaken by the Clinical Arts and Technology Centre Coordinator in the second semester, in conjunction with the increased utilisation of the facility by year one students and increased awareness of the entire student body of the routine lunch-time activities within the Centre.

5.2.4 Satisfaction with access to the facility and resources

The percentage of students satisfied with access to the Clinical Arts and Technology Centre facility and resources was high (92%). Whilst there was no significance in variation ($p > .05$) between student years, questionnaire date or age, the rate of overall group satisfaction did show improvement between the July (89%) and November (95%) questionnaire dates. Year one student satisfaction rates improved from 89% in July to 98% in November. In contrast year two student satisfaction reduced slightly between July (92%) and November (89%). As discussed in Chapter Four, the increase in year one student satisfaction may have been related to the increased response rate of year one students to the November questionnaire and their increased utilisation of the facility for scheduled workshops whilst enrolled in the clinical course BN5.150 Nursing Knowledge 2. However, student comments in response to the two questionnaires indicate that the variance in satisfaction between student year and questionnaire was directly attributable to Theme # 2 *Competition for Opportunities*. Many year two student respondents (n = 37) perceived that the high utilisation of the Clinical Arts and

Technology Centre by year one students for scheduled workshops, significantly limited their access to the facility and resources. This issue was particularly prevalent amongst November year two respondent comments. In direct contrast 41 year one students identified "opportunity" in terms of what they perceived as open access to the facility and resources, as a positive feature of the facility and their achievement of clinical skill acquisition. Of the 12 students (8%) who indicated they were not satisfied with access to the facility, only three, all from the November year two respondent group chose to make a comment. These comments were consistent with the overall year two respondent group and related to a perceived lack of opportunity to access the facility and resources.

Student utilisation of the Clinical Arts and Technology Centre varied significantly ($p < .05$) between student years. Year one respondents identified that they used the facility for self-directed independent practice on a weekly basis and scheduled workshop / self-directed group learning on a daily basis. In contrast the year two students identified they used the facility for independent practice on a monthly basis and for scheduled workshop sessions four times a year.

In response to the question "Would you utilise the CAT Centre if it were open for extended hours?" 82% ($n = 117$) identified a desire to utilise the facility if the opening hours were extended. No significant variation ($p < .05$) was identified between or within respondent groups. The most preferred of the three extended hours options offered to the students was Monday to Friday 4.30 – 7.00 pm (51%), followed by Saturday AM (28%). The least preferred option was Saturday PM with a response rate of only 21%. Very few comments were made in response to this question ($n = 18$); however, of these comments 15 were made by year two students. Whilst in some cases these students identified year one utilisation of the facility as an issue, the majority identified lack of "free sessions" in the year two student timetable as being the reason they were unable to access the Clinical Arts and Technology Centre during the current opening hours.

When students were asked to identify if the Clinical Arts and Technology Centre had been available to them at the times that they would have like to use it, 79% ($n = 121$) of the overall respondent group indicated that it had. Fifty-one (37%) of these respondents identified as year two students so it was interesting to note that whilst they perceived

access to the facility and resources had been available when they had wished to use them, they had previously identified lack of opportunity / access to the facility as reasons for dissatisfaction.

Studies conducted by Knight (1998a & b), Knight and Mowforth (1998), and Knight, Moule, and Desbottes (2000), discuss the implementation and evaluation of a "skill centre" which they described as much more than just an area where a set of isolated tasks are taught. Whilst these articles reported high levels of student satisfaction with the "skill centre," students could only gain access to the centre through direct lecturer supervision. Their philosophy of controlled lecturer direction and supervision is in direct contrast to that of the Clinical Arts and Technology Centre, which encourages students to take responsibility for their learning and discovery through open access to the facility and resources. Knight and Mowforth (1998) cite issues of safety and security as reasons for limiting access, resulting in the need to supervise students within the centre. However, student comments in response to the present study indicate that "open access" to the Clinical Arts and Technology Centre facility and resources, is an aspect which is highly valued amongst the respondent group.

In contrast to the study by Knight and Mowforth (1998), no incidents have occurred in relation to security or safety during the time the Clinical Arts and Technology Centre has been operating. It has been suggested by some EIT Faculty of Health and Sport Science staff, that this may be due to a sense of value and ownership which has evolved amongst the nursing students who access the facility to undertake self-directed practice.

5.2.5 Satisfaction with and perceptions of the model of self directed learning

In contrast to the hypothesis that "school leavers will indicated a greater preference for didactic teacher/lecturer directed models of learning," it became apparent from the findings of this study that in general the majority of students 70% (n = 109), regardless of age, identified a preference for a lecturer-directed learning process. This is a finding that is supported by the previous research of Purdy (1997) and Williams (1999).

Self-directed group learning was the second most preferred learning style, identified by 49% of the respondents, followed closely by self-directed lecturer assisted learning which was identified by 40% of respondents. These learning styles are complementary

to the cooperative model of self-directed learning, on which the teaching and learning philosophy in the Clinical Arts and Technology Centre is based, particularly when used in a conjunction with traditional lecturer-directed approaches. Melby et al (1997) contend that lecture-dependent learning in nursing education is dangerous and is an "unwanted extension" of a secondary school learning philosophy. However, it is interesting to note that whilst the students who participated in this study initially identified a clear preference for lecturer-directed learning (in general), it became evident that many, particularly as they progressed through the Bachelor of Nursing programme, identified that their development and practice of core skills was enhanced by "trial and error" and the opportunity to undertake self-directed practice in the safe and supportive environment of the Clinical Arts and Technology Centre.

Of the overall respondent group 84% (n = 129) indicated that they enjoyed self-directed discovery and independent learning. Year two student results were consistent in July and November with 89% and 86% respectively. In contrast only 65% of year one respondent's indicated that they enjoyed self-directed discovery and independent learning in response to the July questionnaire. However, in November this had increased to 88%. This increase in scores may be due to the increased utilisation of the Clinical Arts and Technology Centre by year one students for scheduled workshop sessions during the August to November period. Comments made by year one students on the November questionnaire indicated that the scheduled workshop sessions increased their familiarity with the facility and resources and also increased their confidence in practicing core clinical skills in a self-directed manner.

When asked, "What does the CAT Centre mean to you?" and "Are you challenged to explore / expand your clinical knowledge and skills?" no significant variation in responses was identified between student years. Students' mean scores for both items were higher in response to the November questionnaire, however as depicted in Tables 27 and 28, a significant variance ($p < .05$) was identified with regard to student responses to the item "challenged to expand knowledge," when analysed by questionnaire date and respondent age. Students aged 31 years and over scored this item significantly higher than the students aged below 30 years. It was interesting to note that the age groups 31 years and over also scored significantly ($p < .05$) higher mean scores to the preferred learning style "self-directed learning with lecturer

assistance" than that of those aged 30 years or less. The learning style, "self-directed individual learning," was preferred by the 21 – 30 year group, whilst a preference for, "one-to-one lecturer assisted learning" was identified by students in the 17 - 20 year group.

Interestingly, preferred learning style analysed by student year highlighted a significant variance ($p < .05$) in preference. Of the year one student group 60% identified a preference for "self-directed group work" in comparison to only 37% of year two students however, 47 % of year two students identified a significant preference ($p < .05$) for "Self-directed individual learning" in contrast to only 27% of year one students.

Of the overall respondent group 68% identified they used the Clinical Arts and Technology Centre for "independent practice," and 82% indicated they used it for "independent peer / group activities." A significant ($p < .05$) increase in utilisation of the facility for both items occurred between the July and November questionnaire dates. This increase was thought to be attributable to the increase in awareness, knowledge, confidence and utilisation of the facility, particularly amongst the year one student group. Theme # 3: *The need for direction and confirmation*, and Theme # 4: *Development of self-directed learning skills* provided a deeper insight into the student's satisfaction with regard to the model of self-directed learning, preferred learning styles and utilisation of the facility. Respondent comments identified that self-directed learning "did not just happen," that there was a process of learning how to be self-directed which occurred over a period of time, and this process varied between individuals. "Confidence building" was a concept, which was cited repeatedly by respondents and linked closely to the process of successfully undertaking self-directed learning activities. These findings are supported by the existing work of Knowles (1975), Iwasiw (1987), and Lunyk-Child et al (2001), and confirm the hypothesis that "in order to undertake self-directed learning opportunities successfully the student must first learn how to be self-directed." As discussed previously a number of student cited the phrase "we don't know what we don't know."

Whilst many of the students cited the benefits of utilising the Clinical Arts and Technology Centre and associated resources to facilitate and enhance their learning process a number also identified the importance of a balanced approach to the teaching and learning process which spanned the continuum of lecturer-directed, to self-directed

models of teaching and learning depending upon the topic and situation. These results are supported by the findings of Nixon et al (1996) and Nolan and Nolan (1997b) who determined that the teaching and learning method was a significant indicator with respect to differences in skill performance and that a combination of teaching strategies would reinforce learning and have a more positive effect on student competency outcomes.

The findings of this study support the contention that regardless of age, students must first learn how to be self-directed. The learning process with regard to acquisition of clinical psychomotor skills, spans initial reliance on teacher/lecturer direction and support at one end of the continuum, moves on to interdependence with colleagues and peers in the form of group work and practice, then moves on toward self-directed independence (D'A Slevin & Lavery, 1991; Knight, 1998a; Beeson & Kring, 1999; Lunyk-Child et al, 2001).

5.2.6 Satisfaction with the learning environment

Student responses to a range of attitudinal questions in relation to the Clinical Arts and Technology Centre learning environment were extremely positive. Statistical mean scores were consistently high across both the year one and year two student groups (average M = 4.51). As illustrated in Table 30, the year one student group scored the highest level of satisfaction with the learning environment in comparison to the year two student group. Significant ($p < .05$) variation in response was identified in three items when analysed by student year - the learning environment is "supportive and encouraging," "Presents an appropriate / accessible environment to practice, and refine core skills," and "Appropriate resources and learning activities were available." Student satisfaction also improved in relation to questionnaire date. A number of students identified that lecturer or facilitator contact was an important aspect in relation to their satisfaction with the Clinical Arts and Technology Centre learning environment. However, the level of contact identified varied particularly by student year. Theme # 5, *Working at own pace* emerged from these comments. Amongst the student comments a particular distinction was made between the lecturer roles and the role of the Clinical Arts and Technology Centre Coordinator, and the Technicians. Students cited the role

of the Clinical Arts and Technology Centre Coordinator, and the Technicians as providing necessary support and ease of use of the facility and resources.

Whilst it is apparent that researchers have only just begun to examine psychomotor skill laboratories and the conditions which best facilitate students' psychomotor skill development, very few of the studies identified in the literature have looked at the effect of teaching methods on the ability to learn and perform these skills. The study by Beeson and Kring (1999) contends that students taught by traditional lecturer-directed methods gained significantly more factual knowledge, whilst Nixon et al (1996) reported that those who undertook self-directed learning of psychomotor skills demonstrated higher levels of competency. In contrast the study by Love et al (1989) found that ultimately there was no significant difference in outcomes in relation to the different methods of teaching and learning. The findings of the present study indicate the process of psychomotor skill development is closely associated with the students' need for "direction" and "opportunity." Initial demonstration of the psychomotor skill by the lecturer combined with access to a lecturer, resources, and a safe learning environment early in the learning process, or support in terms of a "facilitator" as student confidence, knowledge, and skill levels increased, were perceived by the students as factors which positively enhanced the learning process and ultimately the acquisition of clinical (psychomotor) skills. The research findings and the themes that emerged from the present study, provide us with insight into student perceptions of the Clinical Arts and Technology Centre facility, resources and model of self-directed learning. The emergence of theme # 3: *The need for direction and confirmation*, theme # 4: *Development of self-directed learning skills*, and theme # 5: *Working at own pace,* were similar to and supported the findings identified by Lunyk-Child et al (2001) in relation to student perceptions of self-directed learning in an undergraduate nursing programme.

5.3 Skill acquisition and competency outcomes

In terms of student competency outcomes and utilisation of the Clinical Arts and Technology Centre, the statistical results of this research, identified in detail in Chapter Four, clearly demonstrate a direct positive correlation between achievement of psychomotor skill competency and regular utilisation of the Clinical Arts and

Technology Centre facility and resources. Of the 86 year one students who enrolled in the clinical course BN5.150 Nursing Knowledge 2, 87% (n = 75) achieved competency. All students who achieved competency had attended greater than 50% of the scheduled available Clinical Arts and Technology Centre sessions. Six students (8%) required two attempts to achieve competency and of these six students five had attended less that 69% of the available sessions. Of the students who did not achieve competency, none had demonstrated attendance at more than 49% of the available scheduled sessions.

Nixon et al (1996) identified that undergraduate nursing students who took part in self-directed learning and practice demonstrated a higher level of competency in performing both cognitive and psychomotor components of nursing skills than those who did not. The statistical results of the present study have clearly demonstrated that achievement of psychomotor skill competency was shown to be directly proportional to attendance. This finding was further reinforced by respondent comments in relation to Clinical Arts and Technology Centre utilisation, accessibility, and development of student confidence in relation to psychomotor skill acquisition, and supports the hypothesis that "increased student confidence in their ability to perform psychomotor skills will have a positive impact upon their development, dexterity and achievement of psychomotor skill competency."

5.4 Limitations of the study

This evaluation research study had a number of limitations which ultimately had a bearing on the results generated.

The sample group was purposive, and convenient. Random selection was not utilised due to limited available student numbers from which to elicit participants. As respondents self-selected whether or not to participate in the research, on an anonymous basis, it was not possible to identify if the same students responded to both the July and November questionnaires. However, due to the overall distribution of respondents across the year one and year two students groups, it may be assumed that the overall respondent group is representative of the year one and year two Bachelor of Nursing Students at the Eastern Institute of Technology. It cannot be assumed that the respondents are representative of Bachelor of Nursing students in the broader New Zealand context.

The research questionnaire was developed to elicit student satisfaction and perceptions with regard to the Clinical Arts and Technology Centre, facility, resources, and model of self directed learning. It appears that the questionnaire provided students with a safe means of expressing their views anonymously and the range of data, which was received, was broad, extremely interesting and useful in terms of guiding future developments within the facility and programme. The postal self-completion questionnaire was chosen in preference to face-to-face interviews in order to maintain the confidentiality of the participants, remove any elements of perceived coercion of participants and to eliminate the possibility of interviewer bias. It is clear that issues relating to self-completion questionnaires may occur and must be acknowledged; for example the perception of the respondent is their perception on the day they complete the questionnaire and may alter over time, the respondent may have adopted what they perceive as a socially acceptable position when responding to the questionnaire or the questionnaire may have been completed by someone other than the specified recipient. Whilst there is no formal evidence of any of these examples occurring they are raised and discussed in relation to the validity of the questionnaire.

The response rate of year one students to the July questionnaire was considerably less than anticipated, and was of concern in terms of the representation of the respondent group. As discussed in Chapter Four anecdotal comments made by staff and students within the faculty indicated that the poor response rate to the July questionnaire, by year one students, may be due to the students not being aware of the research being undertaken, and not reading the initial advertising, information sheet or questionnaire which was mailed to them individually. As a poor response rate from the year one student group was identified as an issue, additional advertising by way of posters, flyers, and word-of-mouth was undertaken prior to distribution of the November questionnaire. All data resulting from each of the questionnaires was analysed to determine if there were any significant variances in results due to the low response rate in July. Analysis of all data was undertaken using the independent variables student year, questionnaire date, and respondent age. In some items the results generated by questionnaire showed significant variance however as previously discussed other contributing factors could have equally influenced the year one results. The composition of year one and year two respondents in terms of student age group remained relatively consistent between questionnaire dates.

The sample size for this evaluation research was adequate to allow descriptive analysis, multivariate comparison and interpretation of the findings. A number of themes emerged during analysis of the comments made by individual students. However, due to the anonymous nature of the questionnaire, the comments and resulting themes were unable to be shared with the respondents in order to confirm interpretation of perceptions and meanings. It was unfortunate that as a result of my change in position within the faculty and therefore relationship with the student group, that I was unable to include student focus groups into this research. I believe the information, which may have been elicited through this process, would have provided deeper understanding of the students' perspectives.

A comparative analysis of the model of learning with an external agency was not possible due to the inability to identify a corresponding Bachelor of Nursing curriculum, and the absence of a similar facility and model of learning within the context of other New Zealand Bachelor of Nursing programmes. Ethical constraints in relation to instituting a control group of Bachelor of Nursing students (who would be taught clinical skills in a traditional teacher-directed mode and excluded from accessing the Clinical Arts and Technology Centre) from within the nursing programme at the Eastern Institute of Technology, meant utilisation of comparative analysis with students within the EIT Bachelor of Nursing programme was not an option.

This study was undertaken to assess the validity of current practice in relation to student learning and the Clinical Arts and Technology Centre at the Eastern Institute of Technology. Recommendations arising from this study will be used, by the Eastern Institute of Technology, to inform future development of the Clinical Arts and Technology Centre and the EIT Bachelor of Nursing programme. Due to the absence of literature focusing on the evaluation of multifunctional simulation laboratories in terms of facilitating clinical skill acquisition of undergraduate nursing students, the approach taken in the present study remains to be tested by other institutions and learning centres prior to making any comments that might address the external validity of this study in a broader context.

5.5 Summary

Despite the limitations of this study the overall statistical and qualitative results clearly demonstrate achievement of the research aims. Student satisfaction with the Clinical Arts and Technology Centre and the cooperative model of self-directed learning were shown to be of a consistently high level across all aspects of the study. The large number of student comments enhanced the quality of the statistical results and assisted to identify and clearly articulate the student experience with regard to the Clinical Arts and Technology Centre concept, and to determine aspects for future development and ongoing quality improvement. The effectiveness of the Clinical Arts and Technology Centre and cooperative model of self-directed learning in terms of the clinical skill acquisition of year one Bachelor of Nursing students was clearly demonstrated by the high level of clinical competency achievement in relation to attendance and utilisation of the Clinical Arts and Technology Centre.

The Clinical Arts and Technology Centre is a tool, which supports EIT undergraduate Bachelor of Nursing students to acquire, develop, practice and achieve clinical skill competency. The recommendations posed in relation to future development and ongoing quality improvement initiatives have been drawn from the research findings are further discussed in Chapter Six.

CHAPTER 6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The purpose of this study was to determine if the Clinical Arts and Technology Centre, and the associated "co-operative model" of self directed learning, are effective in facilitating and enhancing clinical (psychomotor) skill acquisition and clinical skill competency of undergraduate Bachelor of Nursing students at the Eastern Institute of Technology. In order to answer this question it was important to ascertain students' satisfaction with, and perceptions of, the Clinical Arts and Technology Centre facility, resources and model of self directed learning, and to determine overall student competency outcomes in relation to their utilisation of the Clinical Arts and Technology Centre. As identified at the commencement of this study, the findings and recommendations derived from the research, would be used by the Faculty of Health and Sport Science, to inform future facility, resource and programme development, and ongoing quality improvement initiatives.

To achieve this aim an evaluation research approach was undertaken and a range of qualitative and quantitative data was collected which formed the basis of a statistical and thematic analysis of student satisfaction, year one student competency outcomes, facility utilisation, and overall student perceptions of the Clinical Arts and Technology Centre. Collection of data for this study was focused on year one and year two Bachelor of Nursing students undertaking practicum courses during the 2001 academic year. Data collection commenced in July 2001 and concluded in December 2001 with an overall respondent group of 156 undergraduate student nurses participating in the study.

This chapter will present the conclusions of the research study followed by recommendations for ongoing programme improvement, facility and resource development and areas for future research.

6.2 Conclusions

As discussed in Chapter Five the analysis of the data revealed an extremely high level of student satisfaction with regard to the facility, resources, access, and model of self-

directed learning. The effectiveness of the Clinical Arts and Technology Centre concept in terms of year one student competency outcomes, in association with workshop attendance provided favourable confirmation of the success of the "cooperative model of self-directed learning" which had been implemented into the Bachelor of Nursing curriculum in 2000. The high level of student satisfaction with the facility, resources and model of self-directed learning was demonstrated by the outcomes of the statistical data analysis and supported by individual student comments in response to the research questionnaire and the thematic analysis of the students' perceptions. Conclusions which have been draw from this study are:

1. Students are generally satisfied with the Clinical Arts and Technology Centre facility, resources and model of self-directed learning however, the following areas for improvement where identified:

    - Improved access to the Clinical Arts and Technology Centre for year two Bachelor of Nursing Students

    - Improved advertising and more timely scheduling of guest speaker workshop sessions

    - Improved student access to, and assistance in using the interactive computer resources housed in the Clinical Arts and Technology Centre

    - More frequent audit and vigilance to ensure appropriate levels of consumable equipment/resource items are maintained

    - Improved student and lecturer awareness and understanding of what is meant by the "cooperative model of self-directed learning" in terms of clinical skill acquisition and utilisation of the Clinical Arts and Technology Centre

2. Students value, and derive benefit from the opportunity to access the Clinical Arts and Technology Centre facility and resources in order to practice, develop and refine core clinical skills.

3. The concept of "self-directed learning" is contingent upon students being provided with adequate opportunity, and direction, appropriate to their level of knowledge,

in order that they remain motivated to utilise the facility and resources to practice and develop and acquire clinical skills and nursing knowledge.

4. Acquisition of clinical core skills and achievement of clinical competency by year one Bachelor of Nursing students has a positive correlation with attendance and utilisation of the Clinical Arts and Technology Centre facility and resources.

6.3 Recommendations

As a result of, and underpinned by the outcomes of this research the following recommendations are made for future development and improvement of the Clinical Arts and Technology Centre.

- Access to the Clinical Arts and Technology Centre:
  - Extend the Monday – Friday open hours for the Clinical Arts and Technology Centre from 8.00am – 7.30pm for a three-month trial period and monitor utilisation patterns.
  - Limit and monitor the ability of classes to book the Clinical Arts and Technology Centre facility for regular scheduled class activities.
- Budget and resources
  - Increase the allocation level of minor capital budgetary resource, to ensure adequate maintenance of core equipment requirements and consumables, for example, intravenous infusion sets, and basic dressing equipment.
  - Develop a capital equipment plan with regard to future Clinical Arts and Technology Centre development and purchase of major equipment / resource items.
  - Update the existing computer resources and install additional independent networked, CD ROM compatible computers with internet access.
  - Continue to monitor utilisation of the facility and resources by faculty and students.

- Guest speakers: Allocate a regular day and time when guest speaker sessions occur and advertise the programme at least three weeks in advance by intranet, student and Clinical Arts and Technology Centre notice boards.

- Orientation to the facility and resources:

    - The Clinical Arts and Technology Centre Coordinator schedules and facilitates induction sessions at the Clinical Arts and Technology Centre for students and lecturers at the commencement of each academic year which include training on how to use the interactive computer resources.

- Recommendations for future research:

  Whilst internationally researchers have begun to investigate and examine the development of clinical psychomotor skill laboratories, it is evident that more local research in relation to their development and implementation, within the context of New Zealand nursing education is required. Further research is required to explore, identify and test the effectiveness of concepts such as the "cooperative model" of self-directed learning in facilitating the process of clinical skill acquisition for undergraduate nursing students, particularly in relation to the emergence of simulated learning environments, simulated practice and computer based interactive learning. Areas for future research might include:

    - The effectiveness of self-directed learning and psychomotor skill laboratories, in the teaching of clinical skills to undergraduate nursing students – the lecturer's perspective.

    - A repeat evaluation of student satisfaction with the EIT Clinical Arts and Technology Centre, facility, resources and model of self-directed learning in 2005.

6.4 Concluding comments

In conclusion, it is evident that the implementation of the Clinical Arts and Technology Centre and the associated model of self-directed learning has been an initiative, which students believe has benefited their learning process. It appears to be an appropriate conduit to enhance the link between theoretical and clinical knowledge. Student

satisfaction with the facility and resources were of a consistently high level throughout all aspects of the research process. The data clearly identified an increase in student utilisation of the facility during the period in which data collection was undertaken. The high utilisation rates combined with the students' evident desire to have the facility and resources available for extended hours, supports the contention that the Clinical Arts and Technology Centre is indeed an important aspect of the Bachelor of Nursing programme at the Eastern Institute of Technology.

Development and implementation of the Clinical Arts and Technology Centre and the associated model of self-directed learning have demonstrated the Faculty's responsiveness to international curriculum developments, an innovative approach to health education and practice and a commitment to nursing education. Cognisance and enactment of the findings and recommendations that have resulted from this research will demonstrate an ongoing responsiveness to consumer expectations and commitment to quality improvement.

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Appendix I

EIT - Permission to Undertake Research

EIT HAWKE'S BAY

Te Whare Takiura o Kahungunu

5 May 2001

Dr. Cheryl Benn
School of Health Science
Massey University
Private Bag
Palmerston North

Dear Cheryl

RE: Master's research project-Rachael Vernon

Rachael and I have discussed her proposal for the evaluative research project involving EIT year 1 and 2 Bachelor of Nursing students. We have discussed her plans for informed consent, distribution, return and collation of the student questionnaire, and the use of anonymous, collated summative student results.

I am satisfied that her proposal meets EIT's Research Ethics Code. Rachael has my full support to carry out this project as part of her requirements for her M.Phil.

Yours sincerely

Susan Jacobs
Dean
Faculty of Health and Sport Science

EASTERN INSTITUTE OF TECHNOLOGY
MAIN CAMPUS *Gloucester Street, Private Bag 1201, Taradale, New Zealand. Telephone 06 844 8710, Facsimile 06 844 1910*
HASTINGS CENTRE *Cnr Lyndon & Railway Roads, PO Box 1477, Hastings. Telephone 06 878 4738, Facsimile 06 878 2965*
CENTRAL HAWKE'S BAY CENTRE *53 Russell Street, PO Box 230, Waipukurau. Telephone 06 858 7009, Facsimile 06 858 7018*

Appendix II

Letter of Approval from the Massey University Human Ethics Committee

Massey University Human Ethics Committee: Palmerston North (MUHEC: PN)
Room 2.02, Main Building, Turitea
http://www.massey.ac.nz/~muhec
Telephone: 64 6 350 5799 extn 2625
Fax: 64 6 350 5622
Email: M.Tolich@massey.ac.nz

Massey University

Private Bag 11 222,
Palmerston North,
New Zealand
Telephone: 64 6 356 9099

21 June 2001

Ms Rachael Vernon
[redacted]

Dear Rachael

Re: MUHEC: PN Protocol – 01/70
Developing clinical skill competency of undergraduate nursing students utilising a simulated psychomotor skill laboratory and model of self indirected learning: An evaluative study

Thank you for your letter dated 7 June 2001.

The amendments you have made and explanations you have given now meet the requirements of the Massey University Human Ethics Committee and the ethics of your protocol are approved.

Any departure from the approved protocol will require the researcher to return this project to the Massey University Human Ethics Committee for further consideration and approval.

A reminder to include the following statement on all public documents "This project has been reviewed and approved by the Massey University Human Ethics Committee, PN Protocol 01/70".

Please clarify who will have access to the 'Assignment Post' apart from yourself?

Yours sincerely

pp

Dr Martin Tolich, Deputy Chair
Massey University Human Ethics Committee: Palmerston North

cc Associate Professor Cheryl A Benn
Health Sciences
TURITEA

Benn, Cheryl

From: Karen Kahukoti [K.A.Kahukoti@massey.ac.nz]
Sent: Tuesday, June 05, 2001 5:30 PM
To: rvernon@eit.ac.nz
Cc: C.A.Benn@massey.ac.nz
Subject: MUHEC: PN Protocol 01/70
Importance: High

01/70 Developing clinical skill competency of undergraduate nursing students utilising a simulated psychomotor skill laboratory and model of self indirected learning: An evaluative study

Ms Rachael Vernon (MUHEC: PN Protocol 01/70)

Department: Health Sciences - TURITEA

Supervisor(s): Associate Professor Cheryl A Benn

Thank you for the above protocol that was received and considered by the Massey University Human Ethics Committee: Palmerston North at their meeting held on Thursday 24 May 2001.

The protocol was approved, subject to approval by Professor Sylvia V Rumball (Chair) of the reply to the following questions and comments:

1.7 Arrangements for storage and security, return, disposal or destruction of data

clarify what the 'summative data' is,

note that material should be retained for at least five years from publication as outlined in the Massey University Policy on Research Practice, Section 2.2,

Information Sheet

introduce Researcher/Supervisor and include contact details in paragraph one,

include information on the nature of the project in paragraph one,

reword last sentence and ask that the Questionnaire be enclosed in the reply-paid envelope provided and returned to the Researcher,

once approval is granted, include the following statement on all public documents "This project has been reviewed and approved by the Massey University Human Ethics Committee, PN Protocol 01/70".

Please supply to Miss Karen A Kahukoti (Secretary), one copy of your reply.

Any departure from the approved protocol will require the researcher to return this project to the Massey University Human Ethics Committee for further consideration and approval.

Yours sincerely

Professor Sylvia V Rumball, Chair

Massey University Human Ethics Committee: Palmerston North

****

Miss Karen A Kahukoti - Ethics Secretary

Massey University Animal & Human Ethics Committees

Main Building, Turitea

Massey University/Te Kunenga ki Purehuroa

Private Bag 11222, Palmerston North

NEW ZEALAND

[redacted]

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Email - K.A.Kahukoti@massey.ac.nz

MUAEC WWW http://www.massey.ac.nz/~muaec

MUHEC WWW http://www.massey.ac.nz/~muhec

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Appendix III

Participant Information Sheet

Massey University

Private Bag 11 222,
Palmerston North,
New Zealand
Telephone: 64 6 356 9099

Developing clinical skill competency of undergraduate nursing students utilising a simulated psychomotor skill laboratory and model of self directed learning: An evaluative study

INFORMATION SHEET

The purpose of this research study is to "evaluate the effectiveness of the Clinical Arts and Technology Centre and its associated model of self directed learning, in facilitating clinical skill acquisition of undergraduate BN students."

My name is Rachael Vernon. This evaluative research study will form the thesis component of my Masters, and is being undertaken in conjunction with Massey University, Palmerston North. My supervisor for this research study is Dr Cheryl Benn, Associate Professor, School of Health Sciences, Massey University. My contact details are as follows:

Rachael Vernon
Nursing Section Manager
Faculty of Health & Sport Science
Eastern Institute of Technology, Hawke's Bay
Private Bag 1201, Taradale

Phone: (06) 844 8710 ext. 5037
Facsimile: (06) 8441910
Email : rvernon@eit.ac.nz

Background to the study

In 1998 the Faculty of Health Studies at EIT Hawke's Bay initiated a project which investigated the feasibility of implementing a clinical simulation (psychomotor skill) laboratory for undergraduate student nurses. This project was initiated in response to the ongoing changes local health sector, increased complexity of care, reduced numbers of venues for clinical practicum, increased financial costs associated with attaining quality student practicum placements and student feedback which identified a need for increased opportunity to practice and gain mastery in core clinical skills. Recommendations made by this group resulted in an eight-week trial of the psychomotor skill laboratory concept in August and September of 1999. In January 2000 the Clinical Arts and Technology Centre (CAT Centre), at EIT Hawke's Bay was officially opened. The CAT Centre builds upon the clinical simulation (psychomotor) laboratory concept to include a fully equipped, simulated hospital environment, with a combination of learning aids such as video taping/recording facilities, interactive computer assisted learning packages, self-directed learning modules, and is based upon a philosophy of student learning and discovery. Now eighteen months on, we believe it is timely to evaluate the effectiveness of the Clinical Arts and Technology Centre and the associated programme of student learning.

The attached questionnaire has been sent to all students enrolled in the first and/or second year of the undergraduate Bachelor of Nursing programme at EIT Hawke's Bay.

You are invited to participate in this evaluative research study. In doing so you will have the opportunity to express your point of view and to have a role in influencing the ongoing planning and development of both the CAT Centre, and the programme of clinical skill acquisition for nursing students of the future.

In order to participate, all you are required to do is to fill in and return the attached anonymous questionnaire.

The questionnaire will take you approximately 20 minutes to complete and comprises of questions relating to ***your*** experiences of learning in the Clinical Arts and Technology Centre. I invite you to add additional comments if you wish. Participation is on a voluntary basis.

A poster highlighting this research study, will be posted on the Clinical Arts and Technology Centre notice board as a reminder to participants to return the completed questionnaire. A reminder postcard will be sent to you, by the faculty Administration Secretary, one week prior to the due return date of the questionnaire.

It is assumed that filling in and returning this 'anonymous' questionnaire implies your consent. You have the right to:

- Decline to participate in this study (which means you not need to fill in or return the questionnaire);
- Decline to answer any questions;
- Withdraw from the study at any time until the questionnaire has been returned;
- Ask any questions about the study at any time during participation;
- Provide information on the understanding that your name will not be used unless you give permission to the researcher (the questionnaire is anonymous and does not require you to provide your name);
- Be given access to a summary of the findings of the study when it is concluded.

The following are answers to some questions you may have:

1. ***How the information will be used?***
   The researcher, for this evaluative research study, will use data from the questionnaire to compile the final research report/thesis and may also incorporate components in any publications arising from this research project. The Faculty of Health and Sport Science will utilize the data collected to inform quality decision-making and improvements regarding ongoing programme and facility developments and/or necessary programme and facility changes.
2. ***What will happen to the information when it is obtained?***
   All questionnaires collected during this study will be kept in a locked file in the researcher's office. The researcher's confidential password is required to access any data stored on the researcher's personal computer.
3. ***What will happen to the data on completion of the project?***
   When the final research report has been completed and examined, all questionnaires will be destroyed.

This project has been reviewed and approved by the Massey University Human Ethics Committee, PN protocol 01/70.

If you would like to discuss any aspects of this study in more detail please contact me.

Please return your completed questionnaire, in the self-addressed, reply-paid envelope provided, to the Researcher or place in the 'Assignment post box' in the Administration Office, Faculty of Health and Sport Science, EIT Hawke's Bay, by Friday 27 July 2001.

Appendix IV

Research Questionnaire

Clinical Arts and Technology Centre Questionnaire

It is assumed that filling in and returning this 'anonymous' questionnaire implies your consent.

Please tick one of the following:

Student Year 1 ☐ 2 ☐ 3 ☐ Age 17-20 20-30 30-40 40 plus

Are you a full time student *Yes* ☐ *No* ☐

Are you a part time student *Yes* ☐ *No* ☐

Learning Style

Which style of learning works best for you?
Tick the boxes that best apply to you:

☐ Lecturer directed

☐ Self directed / group

☐ Self directed / individual

☐ Self directed / discovery lecturer assistance when identified by the student

☐ One on one lecturer assistance

Comments

_____

_____

_____

_____

Clinical Arts and Technology (CAT) Centre Facility and Resources

Please circle the number which best reflects your satisfaction regarding the CAT Centre facility, resources and philosophy.
Overall does the facility resources support you to:

	Low				*High*
Think on your feet?	1	2	3	4	5
Develop and use critical thinking?	1	2	3	4	5
Develop and use focused communication?	1	2	3	4	5
Identify and practice appropriate therapeutic interventions?	1	2	3	4	5
Reinforce prior learning?	1	2	3	4	5

Comments

_____

_____

_____

	Yes	*No*
Overall are you satisfied with the CAT Centre facility?	☐	☐

If no, what improvements would be useful?

_____

_____

_____

_____

Overall are you satisfied with the CAT Centre resources?	☐	☐

If no, what additional/other resources would be useful?

_____

_____

_____

_____

Do you have adequate access to the CAT Centre facility?	☐	☐

If no please comment.

_____

_____

_____

_____

Would you utilise the CAT centre if it were open for extended hours?	☐	☐

Saturday AM ☐ PM ☐ Monday - Friday 4.30 - 7pm ☐

Computer Resources

	Low				*High*
Do you find the CAT Centre computers user friendly?	1	2	3	4	5
Do you find the CD ROMS stimulate and enhance your learning?	1	2	3	4	5
Do you find the subject choice on the CD ROMS appropriate and adequate?	1	2	3	4	5

Comments

_____

_____

_____

_____

Lunch-time Speakers and In-service Education held in CAT

	Low				*High*
Do you find these sessions informative and interesting?	1	2	3	4	5

	Yes	*No*
Is the advertising for these sessions adequate?	☐	☐

Comments

_____

_____

_____

_____

Learning Environment

Please circle the number which best reflects your satisfaction regarding the CAT Centre learning environment (including the CAT Centre Coordination):

	Low				*High*
Supportive and encouraging	1	2	3	4	5
Environment was conducive to either group activities or individual practice check	1	2	3	4	5
Presents an appropriate/accessible environment to practice, refine core skills	1	2	3	4	5
Appropriate resources and learning activities were available	1	2	3	4	5
Positive learning environment	1	2	3	4	5

Comments

_____

_____

_____

_____

Preferred Learning Style

As a student what does the CAT Centre mean to you:

	Low				*High*
Are you challenged to explore/expand your clinical knowledge and skills?	1	2	3	4	5
How important do you think self-directed discovery and independent learning are for the professional nurse?	1	2	3	4	5

Comments

_____

_____

_____

	Yes	*No*
Do you enjoy self-discovery and independent learning?	☐	☐

Comments

_____

_____

_____

Do you access the CAT centre for:

	Yes	*No*
Independent practice	☐	☐
Independent peer / group activities	☐	☐
Computer resources	☐	☐
Individual tutor assisted learning	☐	☐
Is the facility readily available to you at the times that you would have liked?	☐	☐
Has tutor supervision and /or assistance been readily available to you?	☐	☐

How often do you use the Cat Centre facility:	*Never*	*Monthly*	*Weekly*	*Daily*	*Other*
For self directed independent or group practice?	☐	☐	☐	☐	☐
For timetabled workshop sessions?	☐	☐	☐	☐	☐

	Yes	*No*
Would you have liked to use the facility more often?	☐	☐

What changes/improvements would you recommend?

_____

_____

_____

Any other comments about how the CAT Centre has or has not assisted in your learning and clinical skill acquisition:

_____

_____

_____

Thank you for your participation.

Please return your completed questionnaire, in the self-addressed, reply paid envelope provided, to the Researcher or place in the 'Assignment Post Box in the Administration Office, Faculty of Health and Sport Science, EIT Hawke's Bay, by 23 November 2001.

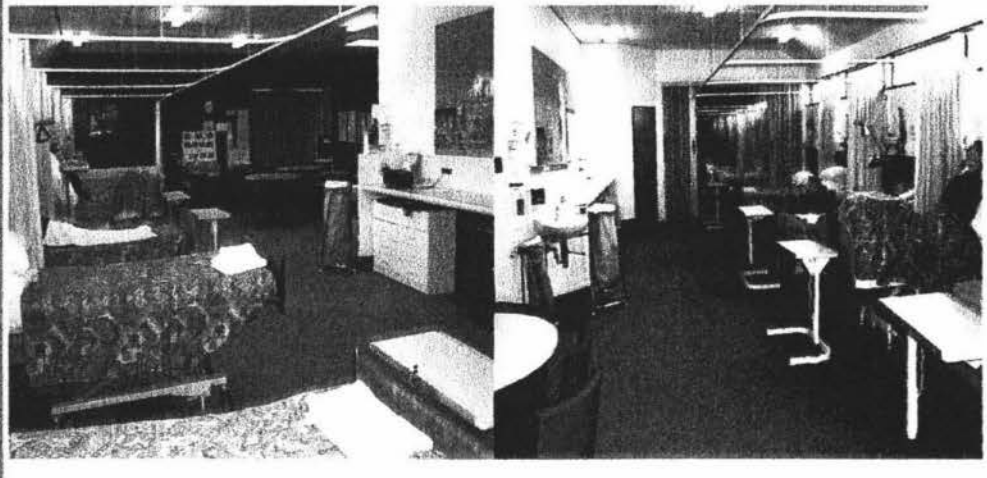
Appendix V

Research Poster

EIT HAWKE'S BAY

Te Whare Takiura o Kahungunu

CLINICAL ARTS & TECHNOLOGY CENTRE QUESTIONNAIRE



Massey University

This evaluation research study is being carried out in conjunction with Massey University, Palmerston North and forms a component of my Master of Philosophy (Nursing) Degree thesis. My supervisor for this research project is: Dr Cheryl Benn, School of Health Scienæs, Massey University.

For further information please contact:
Rachael Vernon
Faculty of Health & Sport Science
EIT Hawke's Bay
Private Bag 1201
Taradale

Phone: 974 8000 ext. 5037
Email: rvernon@eit.ac.nz

Are you a Bachelor of Nursing Student enrolled in clinical courses during 2001?

We value your opinion

This is your opportunity to participate in the future development of the

CLINICAL ARTS & TECHNOLOGY CENTRE

If you want the opportunity to express your point of view and to have a role in influencing the ongoing planning and development within the CAT Centre, and the clinical skill acquisition programme for EIT nursing students of the future, please return your research questionnaire in the envelope provided, to the:

'Assignment Post Box' in the Administration Office, Faculty of Health & Sport Science, EIT Hawke's Bay, by 27 November 2001.

Appendix VI

Reminder Postcard

REMINDER

CLINICAL ARTS & TECHNOLOGY CENTRE QUESTIONNAIRE

We value your opinion

This is your opportunity to participate in the future development of the

CLINICAL ARTS & TECHNOLOGY CENTRE

If so have you remembered to fill in and return your questionnaire?

If you want the opportunity to express your point of view and to have a role in influencing the ongoing planning and development within the CAT Centre, and the clinical skill acquisition programme for EIT nursing students of the future, please return your questionnaire in the envelope provided, to the:

'Assignment Post Box' in the Administration Office, Faculty of Health & Sport Science, EIT Hawke's Bay, by 27 July 2001.

THANK YOU TO THOSE OF YOU WHO HAVE ALREADY RESPONDED

REMINDER

CLINICAL ARTS & TECHNOLOGY CENTRE QUESTIONNAIRE

We value your opinion

This is your opportunity to participate in the future development of the

CLINICAL ARTS & TECHNOLOGY CENTRE

If so have you remembered to fill in and return your questionnaire?

If you want the opportunity to express your point of view and to have a role in influencing the ongoing planning and development within the CAT Centre, and the clinical skill acquisition programme for EIT nursing students of the future, please return your questionnaire in the envelope provided, to the:

'Assignment Post Box' in the Administration Office, Faculty of Health & Sport Science, EIT Hawke's Bay, by 23 November 2001.

THANK YOU TO THOSE OF YOU WHO HAVE ALREADY RESPONDED

Appendix VII

Descriptive Statistical Frequencies

Frequencies

Statistics

		Student Year	Age	fulltime student	parttime student	lecture directed	self directed/group
N	Valid	156	155	156	156	156	156
	Missing	0	1	0	0	0	0

Statistics

		self directed individual	self directed discovery	one on one	Think on your feet	Develop use critical thinking	Develop use focused communication
N	Valid	156	156	156	155	155	155
	Missing	0	0	0	1	1	1

Statistics

		Practice therapeutic interventions	Reinforce learning	Satisfied with CAT Centre	Satisfied with CAT Centre Resources	Adequate access to CAT Centre	Utilise extended hours
N	Valid	155	155	156	156	156	143
	Missing	1	1	0	0	0	13

Statistics

		Saturday AM	Saturday PM	Monday - Friday 4.30 - 7pm	CAT Computers user friendly	CD ROM's stimulate and enhance learning	CD Rom subject choices appropriate
N	Valid	142	142	142	153	152	152
	Missing	14	14	14	3	4	4

Statistics

		Inservice education sessions informative	Advertising adequate	Learning environment supportive	Learning environment condusive	Learning environment appropriate/accessable, refine skills
N	Valid	151	155	156	156	156
	Missing	5	1	0	0	0

Statistics

		Resources and learning activities available	Positive learning environment	Challenged to expand knowledge	Importance of self directed discovery	enjoy self directed discovery	Independent practice
N	Valid	156	156	156	152	154	153
	Missing	0	0	0	4	2	3

Statistics

		Peer/group activities	Computer resources	Tutor assisted learning	CAT Centre availablity	Tutor supervision available	Use for independant practice
N	Valid	153	154	151	153	153	155
	Missing	3	2	5	3	3	1

Statistics

		Use for timetabled workshop	Use CAT more often
N	Valid	152	153
	Missing	4	3

Frequency Table

Student Year

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	first years	83	53.2	53.2	53.2
	second year	73	46.8	46.8	100.0
	Total	156	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	17-20 years	35	22.4	22.6	22.6
	21-30 years	49	31.4	31.6	54.2
	31-40 years	49	31.4	31.6	85.8
	41 plus years	22	14.1	14.2	100.0
	Total	155	99.4	100.0	
Missing	System Missing	1	.6		
Total		156	100.0		

fulltime student

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	136	87.2	87.2	87.2
	no	20	12.8	12.8	100.0
	Total	156	100.0	100.0	

parttime student

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	20	12.8	12.8	12.8
	no	136	87.2	87.2	100.0
	Total	156	100.0	100.0	

lecture directed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	mentioned	109	69.9	69.9	69.9
	not mentioned	47	30.1	30.1	100.0
	Total	156	100.0	100.0	

self directed/group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	mentioned	77	49.4	49.4	49.4
	not mentioned	79	50.6	50.6	100.0
	Total	156	100.0	100.0	

self directed individual

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	mentioned	57	36.5	36.5	36.5
	not mentioned	99	63.5	63.5	100.0
	Total	156	100.0	100.0	

self directed discovery

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	mentioned	62	39.7	39.7	39.7
	not mentioned	94	60.3	60.3	100.0
	Total	156	100.0	100.0	

one on one

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	mentioned	35	22.4	22.4	22.4
	not mentioned	121	77.6	77.6	100.0
	Total	156	100.0	100.0	

Think on your feet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	xx	9	5.8	5.8	5.8
	xxx	48	30.8	31.0	36.8
	xxxx	57	36.5	36.8	73.5
	high	41	26.3	26.5	100.0
	Total	155	99.4	100.0	
Missing	System Missing	1	.6		
Total		156	100.0		

Develop use critical thinking

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	xx	8	5.1	5.2	5.2
	xxx	38	24.4	24.5	29.7
	xxxx	72	46.2	46.5	76.1
	high	37	23.7	23.9	100.0
	Total	155	99.4	100.0	
Missing	System Missing	1	.6		
Total		156	100.0		

Develop use focused communication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	low	1	.6	.6	.6
	xx	13	8.3	8.4	9.0
	xxx	45	28.8	29.0	38.1
	xxxx	47	30.1	30.3	68.4
	high	49	31.4	31.6	100.0
	Total	155	99.4	100.0	
Missing	System Missing	1	.6		
Total		156	100.0		

Practice therapeutic interventions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	xx	2	1.3	1.3	1.3
	xxx	24	15.4	15.5	16.8
	xxxx	49	31.4	31.6	48.4
	high	80	51.3	51.6	100.0
	Total	155	99.4	100.0	
Missing	System Missing	1	.6		
Total		156	100.0		

Reinforce learning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	xx	2	1.3	1.3	1.3
	xxx	17	10.9	11.0	12.3
	xxxx	45	28.8	29.0	41.3
	high	91	58.3	58.7	100.0
	Total	155	99.4	100.0	
Missing	System Missing	1	.6		
Total		156	100.0		

Satisfied with CAT Centre

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	153	98.1	98.1	98.1
	no	3	1.9	1.9	100.0
	Total	156	100.0	100.0	

Satisfied with CAT Centre Resources

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	151	96.8	96.8	96.8
	no	5	3.2	3.2	100.0
	Total	156	100.0	100.0	

Adequate access to CAT Centre

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	144	92.3	92.3	92.3
	no	12	7.7	7.7	100.0
	Total	156	100.0	100.0	

Utilise extended hours

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	117	75.0	81.8	81.8
	no	26	16.7	18.2	100.0
	Total	143	91.7	100.0	
Missing	System Missing	13	8.3		
Total		156	100.0		

Saturday AM

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	mentioned	47	30.1	33.1	33.1
	not mentioned	95	60.9	66.9	100.0
	Total	142	91.0	100.0	
Missing	System Missing	14	9.0		
Total		156	100.0		

Saturday PM

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	mentioned	36	23.1	25.4	25.4
	not mentioned	106	67.9	74.6	100.0
	Total	142	91.0	100.0	
Missing	System Missing	14	9.0		
Total		156	100.0		

Monday - Friday 4.30 - 7pm

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	mentioned	90	57.7	63.4	63.4
	not mentioned	52	33.3	36.6	100.0
	Total	142	91.0	100.0	
Missing	System Missing	14	9.0		
Total		156	100.0		

CAT Computers user friendly

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	low	3	1.9	2.0	2.0
	xx	7	4.5	4.6	6.5
	xxx	28	17.9	18.3	24.8
	xxxx	66	42.3	43.1	68.0
	high	49	31.4	32.0	100.0
	Total	153	98.1	100.0	
Missing	System Missing	3	1.9		
Total		156	100.0		

CD ROM's stimulate and enhance learning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	low	5	3.2	3.3	3.3
	xx	3	1.9	2.0	5.3
	xxx	15	9.6	9.9	15.1
	xxxx	64	41.0	42.1	57.2
	high	65	41.7	42.8	100.0
	Total	152	97.4	100.0	
Missing	System Missing	4	2.6		
Total		156	100.0		

CD Rom subject choices appropriate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	xx	3	1.9	2.0	2.0
	xxx	18	11.5	11.8	13.8
	xxxx	55	35.3	36.2	50.0
	high	76	48.7	50.0	100.0
	Total	152	97.4	100.0	
Missing	System Missing	4	2.6		
Total		156	100.0		

Inservice education sessions informative

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	low	2	1.3	1.3	1.3
	xx	6	3.8	4.0	5.3
	xxx	26	16.7	17.2	22.5
	xxxx	60	38.5	39.7	62.3
	high	57	36.5	37.7	100.0
	Total	151	96.8	100.0	
Missing	System Missing	5	3.2		
Total		156	100.0		

Advertising adequate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	106	67.9	68.4	68.4
	no	49	31.4	31.6	100.0
	Total	155	99.4	100.0	
Missing	System Missing	1	.6		
Total		156	100.0		

Learning environment supportive

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	xx	2	1.3	1.3	1.3
	xxx	13	8.3	8.3	9.6
	xxxx	51	32.7	32.7	42.3
	high	90	57.7	57.7	100.0
	Total	156	100.0	100.0	

Learning environment condusive

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	xx	6	3.8	3.8	3.8
	xxx	18	11.5	11.5	15.4
	xxxx	59	37.8	37.8	53.2
	high	73	46.8	46.8	100.0
	Total	156	100.0	100.0	

Learning environment appropriate/accessable, refine skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	xx	3	1.9	1.9	1.9
	xxx	24	15.4	15.4	17.3
	xxxx	40	25.6	25.6	42.9
	high	89	57.1	57.1	100.0
	Total	156	100.0	100.0	

Resources and learning activities available

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	xx	1	.6	.6	.6
	xxx	17	10.9	10.9	11.5
	xxxx	63	40.4	40.4	51.9
	high	75	48.1	48.1	100.0
	Total	156	100.0	100.0	

Positive learning environment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	xx	2	1.3	1.3	1.3
	xxx	11	7.1	7.1	8.3
	xxxx	45	28.8	28.8	37.2
	high	98	62.8	62.8	100.0
	Total	156	100.0	100.0	

Challenged to expand knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	low	1	.6	.6	.6
	xx	4	2.6	2.6	3.2
	xxx	34	21.8	21.8	25.0
	xxxx	57	36.5	36.5	61.5
	high	60	38.5	38.5	100.0
	Total	156	100.0	100.0	

Importance of self directed discovery

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	xxx	7	4.5	4.6	4.6
	xxxx	51	32.7	33.6	38.2
	high	94	60.3	61.8	100.0
	Total	152	97.4	100.0	
Missing	System Missing	4	2.6		
Total		156	100.0		

enjoy self directed discovery

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	129	82.7	83.8	83.8
	no	25	16.0	16.2	100.0
	Total	154	98.7	100.0	
Missing	System Missing	2	1.3		
Total		156	100.0		

Independent practice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	104	66.7	68.0	68.0
	no	49	31.4	32.0	100.0
	Total	153	98.1	100.0	
Missing	System Missing	3	1.9		
Total		156	100.0		

Peer/group activities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	125	80.1	81.7	81.7
	no	28	17.9	18.3	100.0
	Total	153	98.1	100.0	
Missing	System Missing	3	1.9		
Total		156	100.0		

Computer resources

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	113	72.4	73.4	73.4
	no	41	26.3	26.6	100.0
	Total	154	98.7	100.0	
Missing	System Missing	2	1.3		
Total		156	100.0		

Tutor assisted learning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	75	48.1	49.7	49.7
	no	76	48.7	50.3	100.0
	Total	151	96.8	100.0	
Missing	System Missing	5	3.2		
Total		156	100.0		

CAT Centre availablity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	121	77.6	79.1	79.1
	no	32	20.5	20.9	100.0
	Total	153	98.1	100.0	
Missing	System Missing	3	1.9		
Total		156	100.0		

Tutor supervision available

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	128	82.1	83.7	83.7
	no	25	16.0	16.3	100.0
	Total	153	98.1	100.0	
Missing	System Missing	3	1.9		
Total		156	100.0		

Use for independant practice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never	10	6.4	6.5	6.5
	monthly	60	38.5	38.7	45.2
	weekly	60	38.5	38.7	83.9
	daily	10	6.4	6.5	90.3
	other	15	9.6	9.7	100.0
	Total	155	99.4	100.0	
Missing	System Missing	1	.6		
Total		156	100.0		

Use for timetabled workshop

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never	5	3.2	3.3	3.3
	monthly	23	14.7	15.1	18.4
	weekly	51	32.7	33.6	52.0
	daily	50	32.1	32.9	84.9
	other	23	14.7	15.1	100.0
	Total	152	97.4	100.0	
Missing	System Missing	4	2.6		
Total		156	100.0		

Use CAT more often

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	120	76.9	78.4	78.4
	no	33	21.2	21.6	100.0
	Total	153	98.1	100.0	
Missing	System Missing	3	1.9		
Total		156	100.0		