CHAPTER ONE

TECHNOLOGY AND NURSING PRACTICE

> *The naive optimism of 1900 which expected technology to create paradise on earth would be shared by few people today. Most would also ask: What does technology do to man* [sic] *as well as for him* [sic]? (Drucker, 1967:30).

Technology is of extraordinary importance to nursing. Adequate insight into technology is vital for nursing practice, theory and education. The phenomenon is significant to understanding and interpreting nursing history, contemporary nursing practice and its future. The focus of this research is the relationship between technology and contemporary nursing practice.

Technology is an evolving phenomenon which influences values, actions and social arrangements, and has been considered either the saviour of humanity or a devil which will destroy society and individuals. It is described often in popular literature as either an indicator to our future development or a mechanistic process orientated to the domination of each person. The dichotomy of opinion has a long history and represents a familiar debate that has been inconclusive, deterministic and sparse in evidence. Opinion remains separated and is reliant upon whether, for example, technology is considered to reduce menial work, increase comfort and expand knowledge, or, undermine harmonious lifestyle, cause fragmentation, breed immorality and poison the planet. Work and business people continue to be impressed by technological innovation, whereas artists, academics and certain elements of society (e.g. greens; churches) are more responsive to non-material costs such as human freedom, dignity

and wellbeing (Marx 1975; Winner, 1977). Either opinion (saviour or devil) is to some degree an expression of class interests and valued judgements concerning technological development, and a reflection of the fact that both have a modicum of truth.

The issue of separating the two perspectives is lamentable according to Winner (1977:52), and dominated by vacuous distinctions between one and the other. Interestingly, it is noted that in recent years there has been a tendency towards an optimistic view (saviour) and premature rejection of authors who are more circumspect about technology. Pessimism would seem to be sufficient grounds to reject an argument or opinion. Notwithstanding, formation of opinion concerning technology from either perspective (saviour or devil) is a product of ideas, beliefs, facts, and illusions, as well as our thinking and experience of the surrounding world. What we believe and the way we think about and interact with technology are important indicators to what is understood about the phenomenon.

The focus of this research is to describe and critique the experience of technology in contemporary surgical nursing. Currently, there is no research evidence to indicate the different ways that contemporary surgical nurses understand technology. The central concern of the research is the question: *Are there qualitatively different conceptions of technology within surgical nursing*? The research will identify and describe the relationship of technology to nurses' professional lives not just from the perspective of saviour or devil, but from a reflective viewpoint which describes the qualitatively different ways surgical nurses experience the phenomenon.

Fundamental to the research is the belief that nurses need to make explicit their experience. Their understanding of technology influences the way they practice with, and interpret technology. In addition, their understanding can be used to assist in describing nursing practice, develop theoretical constructs and educate future nurses. It is no longer appropriate for nurses to limit debate to exchanges of individual opinion. Continuation of this approach is unrewarding as arguments are tiresome and debate has remained static.

This chapter introduces **the research purpose and question** and **issues in defining technology**. **A definition of technology** is presented as well as **background to the research**. The importance of understanding **technology within the context of nursing** is reviewed, as is the importance of this research to understanding the practice and future of nursing. The chapter concludes with summary statements concerning **the significance of the research** and a description of **the organisation of the thesis**.

THE RESEARCH PURPOSE AND QUESTION

The purpose of the research is to critique current literature and research qualitatively the experience of technology within contemporary surgical nursing. It is directed by the question: *Do surgical nurses have qualitatively different conceptions of technology?* In answering this question the research seeks to address the following issues: how is technology understood by contemporary surgical nurses?; are there qualitatively different experiences of the phenomenon?; are there logical relationships between conceptions of technology? The research examines technology from a second order perspective and pays attention to the qualities of the nurses' experience.

TECHNOLOGY: ISSUES OF DEFINITION

It is a historical truism that people have always used technology in the form of objective means such as machinery, tools and equipment. The history of human development is dominated by accounts of technological achievement, periods of discovery, invention and the dominance of people over their world. In recent years the meaning of the word **technology** [tech.nol.ogy] has become less clear due to varied usage, meaning and interpretation, and has according to Marx (1975:7) *suffered from a kind of elephantiasis*. Technology has become a catchword that engenders confusion and an aura of superiority, specialisation and professionalism. The word technology is used commonly as a descriptor for knowledge and skills such as, food technology, medical technology or information technology. It attempts to denote a socially impressive body of knowledge and know-how, and the activity of a group (technologist). An intuited understanding of technology transcends this cloud of phraseology and vague notions of practice.

An intuited understanding acknowledges also that definitions of technology are subject to historical and cultural gender bias towards men. Definitions of technology tend to be socially stereotypical and emphasise physical objects as well as political arrangements and choices. Definitions trivialise technology associated with activities such as, horticulture, childcare or cooking, in order to stereotype women (who are commonly associated with these roles) as technologically incapable and ignorant (Wajcman 1991:137). The fostering of stereotypes has led to an emphasis on impressive machinery, industrial objects, and socially sanctified machinery and equipment. The emphasis neglects a more complex and complete definition. The development of informed understanding acknowledges that which is obvious about

technology, but transcends gender bias and is cognisant of the entire technological environment in which we live.

In order to develop appropriate understanding of technology it is necessary also to define the meanings of technology and technological action. The difference between the two can be found in the simple distinction between first and second order questions. A **first order question** is one pertaining to technological practice such as: What is the most efficient procedure for obtaining an effect such as dressing a wound?, or what is the best material to be used when building a particular machine? **Second order questions** are philosophic in nature and pertain to theoretical questions such as: What is the meaning of technological efficiency and how does it relate to nursing efficiency? Is technology merely applied science? What is the relation between nursing and invention?

Second order questions are stimulated through the philosophy of technology and are distinct from social, economic, and political questions, which arise from technological activity. It is acknowledged that answers to philosophical questions underlie social or economic analysis, but only in so much as such an analysis relies on a the correct interpretation of the meaning or nature of technology (Mitcham and Mackey, 1972).

Technology is defined often as applied science. Science is characterised as *knowing what* and technology as *knowing how* within the framework of people attempting to understand their physical world. Informed understanding distinguishes between science and technology and rejects the reduction of technology to a finite set of neutral objects such as tools and

machinery (Barnard, 1997; Cotgrove, 1982; El ul, 1964; Harding, 1980; Pacey,1983; Purcell, 1994; and Wajcman 1991). In recent years there has been a reorientation of thinking about the relationship between science and technology. There has been a conceptual move away from a hierarchical model that treated technology as merely applied science, towards an understanding that recognises science and technology as two separate bodies of knowledge and skills. The belief that science discovers and technology applies is in steep decline (Barnard, 1996a; Ellul, 1964; Ihde, 1991; Mumford, 1934; Oretago Y Gassett, 1972; Pacey, 1983; Purcell, 1994; and Wajcman, 1991). Technologists often build upon, create, and modify technology, using specific knowledge and skills separate to science.

In fact, technology has had for much of its history a limited relationship to science. Many technological advances have originated from little or no understanding of science, and technological advance has often proceeded far beyond scientific knowledge and rationale. The development of the first aircraft and the steam engine are two commonly cited instances of technology developing separate to scientific explanation (Brinkman, 1971; Ellul, 1964; Mumford, 1934; and Purcell, 1994). Technology is more apt to develop empirical laws in practice than theoretical laws, i.e. laws that are generalisations from practice rather then laws, which are intuited and then applied to practice. Although science continues to provide technology with knowledge and means for development, science should not be conceived as essential for technological advancement from either an historical or a preconditional perspective. As Purcell notes:

> *For nearly four centuries now modern science has claimed to be the fountain which waters the garden of technology. There are sufficient dramatic stories of science based innovation to lend credence to that assertion. At the same time, class prejudice and intellectual arrogance can blind us to technological contributions that seek to*

push their way up from the bottom, rather than trickle down from the top (Purcell, 1994:143).

Technology is more than applied science. The trend this century towards a technical ideal in which efficient practicality is achieved as a general character of technology reinforces this fact. Technology is required to fit with economic and material purpose. Technology is judged often in relation to status symbols, the supply of expertise, and the development of advertisement and materialism, rather than a relationship to science. There are clear patterns of life style, socio-cultural activities and values that identify technology to be distinct.

Technology is obvious in a physical sense, as evidenced by the development of cities, the alteration of work practices and the array of gadgets that dominate our existence. But for many people who have thought about the historical, philosophical and social consequences of technological development, technology can no longer be understood merely from the perspective of technical advancement or science. Technological development must be understood also from the perspective of how we each experience technology in our daily lives and what implication technology has to human existence. Amongst many unanswered questions that relate to technology are: what are the effects of technological development on work?; what effect does technology have upon clinical practice?; and how does technology influence a profession?

BACKGROUND TO THE RESEARCH

This thesis is a work of examination and criticism, and is motivated by a search for meaning within the realm of technology and nursing practice. The research focuses on the wisdom and insight of practising nurses as well as numerous authors and critics, many of who are from

outside the discipline of nursing. Their understanding and experience is of extraordinary worth to understanding better the practice and theory of nursing. Examination and criticism is not biased by a perspective of *pro* or *anti* technology but a perspective which acknowledges the need to reflect upon technology within the context of contemporary surgical nursing.

Notwithstanding, necessary and balanced criticism needs to be proposed which differs from the common utopian view found in the majority of nursing literature. The thesis is critical of current nursing literature particularly when arguments are based on unreflective assumptions that accept uncritically the influences of technology upon nursing and society. The author conceives of technology as pervasive and significant to nursing and seeks ultimately to achieve the goal of making important the need to examine technology in nursing practice, theory and education. Therefore, in order to achieve this goal it is necessary to make clear the researcher's understanding in order to assist the process. It is asserted that critical examination of the literature, clear articulation of the authors' perspective and strict adherence to a phenomenographic approach and method, ensure the quality of both the research and thesis and the establishment of research results significant for nursing.

Technology: A definition

This section is entitled **Technology: A definition**, in order to communicate to the reader that what is presented is one interpretation or definition of technology. To define the phenomenon unreservedly is to predetermine exactness of understanding and experience. That is not the goal of this research. It is not the intention of the research or researcher to predefine technology but to explore the meaning and experience of technology from the experience of

others. Notwithstanding, it is the researcher's intention to critique understanding. Thus, there is an implied framework (held by the author) and the foundations of this framework are encapsulated in critical arguments presented in this work. Therefore, in order to ensure the quality of the thesis it is important to make obvious those assumptions which even though bracketed when establishing research design and during data collection, analysis and reporting of results, are so arranged as to influence the way in which technology is understood from the perspective of the researcher.

It is argued that technology is more than machinery and equipment arranged randomly as isolated and unrelated phenomena. Technology needs to be understood as the inter-relationship between numerous influential factors which include machinery, equipment, science, people, organisations, culture, values, and politics (Barnard, 1996a; Dunphy, 1985; Ellul, 1964; Marx 1975; Mitcham, 1989; Mitcham 1990; and Wajcman, 1991). The inter-relationship can be diagrammatically portrayed as three concentric circles (see figure one). Concentric circles are useful in portraying this definition of technology as they highlight technology at its most obvious (at the centre) as well as the many factors which are integral to its meaning and use (which constitute the outer two (2) circles). Each concentric circle is an important level of technology and together the circles represent the phenomenon (Barnard, 1996a; Ellul, 1964; Gerber, 1992; Marx, 1975; and Winner 1977).

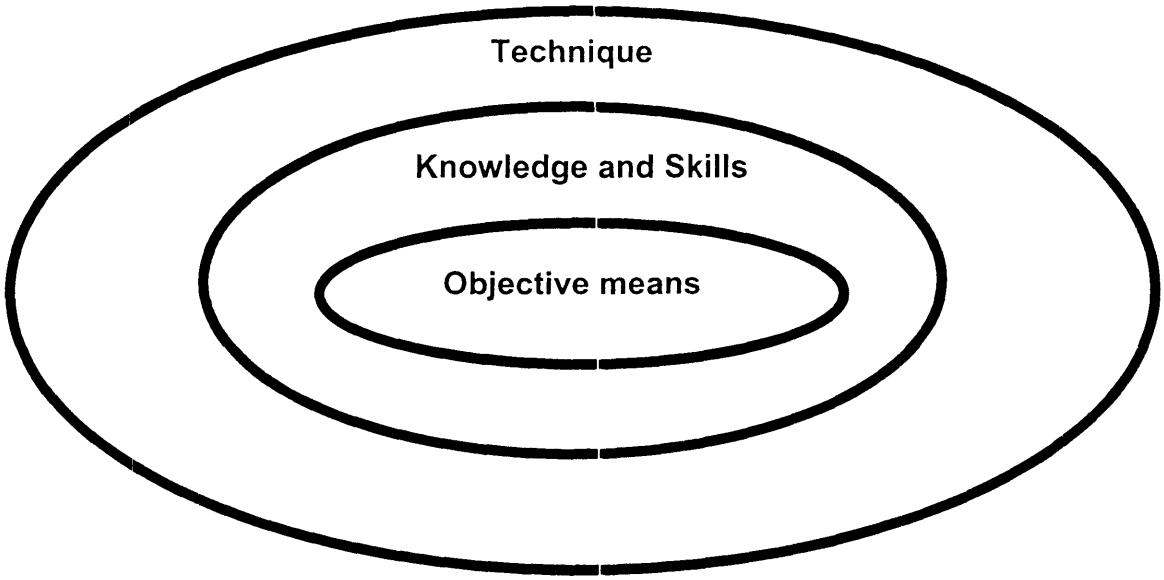

Figure 1. Technology: A definition

The smallest and central circle entitled **objective means** is technology at its most obvious and refers to equipment, machinery and physical objects. Objective means are developed for use and application in nursing (e.g. sphygmomanometers, IVAC machines, pan hoppers, dressing equipment, computers) and are noted by Gerber (1992) to be referred to commonly in other disciplines as *hard technologies*. In addition, **Hard technologies** refer to disciplines or fields of endeavour which have as their basis the use of machinery, equipment and objective means (e.g. industrial materials; biotechnology; communications technology).

The second or middle concentric circle portrays technology as **knowledge and skills.**

Meaning is conveyed to objective means by the knowledge and skills that determine the way we use, repair, design and make technology. It is at this second level that discussions on the positive and negative effects of technology evolve. It is at this level that value judgements and beliefs about the use and application of technology are conceived. The second concentric circle portrays the importance of knowledge and skills as essential in the use of machinery, equipment and physical objects. They are as much technology as the objects themselves. A machine is as much technology as the knowledge and skills necessary for its use. Without knowledge and skills the physical object has no meaning or use. For example, without the knowledge and skills necessary to use a computer the machine is nothing more than plastic, metal and electricity.

The third and most inclusive concentric circle refers to the concept of **technique** and the hypothetical challenges it places before every person and profession with regards to life in our technological society. It is at this level that the definition of technology is completed. Technique is fundamental to many of the arrangements, beliefs, practices and goals of the first two levels of technology. Technique organises and structures the other two levels of technology in an effort to obtain efficiency in action, and is directed by rationality and consciousness. Technique reduces means, whether they be machines, tools, skills, knowledge or people, to that which is most technological (i e. efficient and rational) and creates what has been referred to as an ensemble of means (Ellul, 1964).

It is argued that technology needs to be understood as an inter-relationship between a complex set of human activities. It needs to be understood as the creation of a technical

phenomenon (technique) in which all that has been tentative, unconscious and spontaneous is transformed to the realm of clear, voluntary and rational concepts and actions (Ellul, 1964:20). The third level of meaning transcends the first two levels and includes systems, politics, economics, morals, ethics, organisational management and human behaviour. The way in which our world is organised for, as well as by machinery and tools etc., is as much technology as the first and second levels of meaning. Although the origin of understanding technology as organisational management, systems and economics, etc., began with the work of Ellul (1964), it is noted that after synthesising conceptions of technology in technology education, Gerber (1992:283) highlighted that the third level of technology is described often as *soft technologies* (although the definition does not include politics, values, people, morality, etc.). **Soft technologies** are forms of technology that include organisational arrangements and thinking, which enable hard technologies to become effective and efficient. Soft technologies include phenomena such as communication strategies, systems learning, management methods and pattern recognition.

Thus, in defining technology three levels of the phenomenon are identified. These levels include machinery, objectives and objective means, our knowledge and skills associated with their use, design, repair, etc., and the interrelationship of the first two levels with arrangements which are described best as the rationality, efficiency and consciousness of technique within our technological society.

Technological Society

Adequate understanding of what is meant by the term *technological society* is missing even in

literature which aspires to critique the term. It is a common idiom for western society and originates from a book by Jacques Ellul (1964) entitled *The Technological Society*. In his book Ellul (1964) presents a sociological analysis of society in which it is argued that there is a relationship between machinery, equipment and the establishment of processes designed to make efficient and rational their development and use. He wants us to consider the challenges of machine technology. However his theoretical position has more to do with the relationship between technique and politics, economics, people and theology, than it has to do with any fear of machinery and equipment. Despite this emphasis his arguments are misunderstood often as anti-technology and his opinion is labelled commonly as deterministic. However, characterisation of Ellul as a determinist is harsh given the fact that any perspective (saviour or devil) can be labelled deterministic. That is, events are conceived as being determined by antecedent causes. It can be argued that any author whether critical or less circumspect about technology can be labelled deterministic when arguments view technology as assisting or restricting humanity. Both views are equally aligned to an antecedent cause. Unfortunately, critical views are the only perspectives that are awarded the derogatory distinction of being deterministic.

Regardless of whether a person prefers dystopian claims concerning the dehumanisation of people or utopian excitement concerning control of nature, most people are aware of the growing universality of society linked by information systems, multinational corporations and rapid transport. We have become used to a busy life style within a labyrinth of connecting roads, computer systems, economic agreements and sprawling cities. In recent years the response of most people to technology has been concern about society and

excitement secretly about the future.

Even though technology is increasingly influential in our lives (Ellul, 1964; Ellul, 1980; Ellul, 1990; Gerber, 1992; Ihde, 1991; Pacey, 1983; Purcell, 1994; Winner, 1977; and Winner, 1986), it is important to focus not only on machines, inventions, cities and communication systems as the reasons to label modern society as technological. Focusing upon machines, inventions, etc., identifies that which is impressive and exciting, but inadequately informs us of what is unique about modern times. Technology as machinery, equipment and tools (objective means) has to a greater or lesser extent always been present in history. The existence of objective means at this time even though it is more advanced and appears to be more pervasive, does not constitute a criterion for defining modern society as technological. If the existence of technology in the form of objective means is the reason for referring to society as technological, then all civilisations both past, present and future can be included under the term.

Technique

In our technological society the world has entered a new stage of development. In a literal sense, people are constructing the world anew. Science has revealed many structures, processes and laws of nature, and opened to us knowledge previously known only to God. Examples of knowledge cited commonly are the genetic structure of the human body and knowledge of the universe. In addition, tradition is being replaced by discovery, and nature is being replaced by a world system that is rationalised into an efficient logical order. For example, forests and wild life have been considered in recent years to be natural resources to

be managed, ordered and protected when the numbers of specific plants and animals are reduced (as a result of pollution, destruction or natural attrition), rather than forestry, animals and creatures etc., which come and go according to the order of things. Resources, facts, natural systems and even values and people become ordered within efficient and effective systematic arrangements.

Central to this description is the realisation that society is taking shape from a technological perspective. The description is less a deterministic assertion than an account of what can be observed, experienced and defined as technique. **Technique** is the creation of the kind of social arrangements necessary for technology to develop. Technique clarifies, arranges, reduces, rationalises and makes efficient many aspects of life. Through the emergence of technique, technological society concentrates on the proliferation of a system of means to attain certain ends and the creation of technical phenomena. According to Ellul (1964) technical phenomena encompass not only machines, tools, knowledge and skills, but the proliferation of a new relationship between society and technology which has seven characteristics:

> *The key features of the relationship according to Ellul, are 1) rationality, 2) artificiality, 3) technical automation, 4) self-augmentation, 5) monism, 6) universalism, and 7) autonomy* (Mitcham and Mackey, 1971).

The relationship between technical phenomena and a technological society focuses on the establishment of technique and the transformation of all that has been instinctive, reflexive, natural and particular of individuals and cultures. Technique is technological society. There evolves an emphasis on standardisation, method and instruction. The emphasis influences numerous parts of society and includes education, economics, organisations, politics and

people (Ellul 1963; Ellul, 1964; Ellul, 1980; Sklair, 1971; and Winner, 1977). Technique determines a causal process which demands primacy of means over ends, the reduction of individual differences, the maximisation of efficiency, the development of universal conformity and a sameness to product, processes, and thought. Examples of technique are economic rationality, efficiency drives, time and motion studies, best practice models and policy and procedure manuals.

Technique and Work

Technology has evolved from being a component of life that reflected the cultural, spiritual and contextual processes of unique societies, to a phenomenon that inextricably influences our lives, behaviour, values and goals. It has evolved to be a complex phenomenon that places before us an abundance of puzzles and questions. Its impact on work has been of such significance as to transform the workplace, not only in terms of the machinery and equipment used, but how we do things, why we do it, and how significant it is to our lives and society. What is needed, according to Dunphy (1985), is an ideological awareness movement in which we are all re-educated about the relationship between technology, national economic survival and the culture of individual societies and groups.

Dunphy (1985) notes the gap between the blue-collar and white-collar worker is reducing due to technological development. Technology replaces the directives of a supervisor but the worker is less autonomous because policies and practices (technique) predetermine actions and choices. In order to accommodate to the process, occupational groups (such as nurses) are transformed into sub-specialties where they are organised and defined according to

bureaucratic, economic and behavioural criteria. Examples of this process are evident in the development of policy and procedure criteria for particular technical or behavioural processes and the separation of professions and trades into smaller groups on the basis of technical knowledge and skills.

Notwithstanding, in most forms of employment there is failure by employers, governments, unions, educators, employees and managers to recognise the importance of the transformation in order to understand better the influential effects of technology upon the work place. Winner (1977:207) argues that although people are aware of their changing world and the development of new organisational systems, the awareness is at the level of intuition and passivity and their understanding is linked rarely to the development of technique:

> *We live with the costs and do not make the connections to their origins.*

Technological society encourages participation in the process of change and subtly rejects those individuals and groups who fail to respond appropriately to the requirements of technology in their lives and work. Acceptance is not compulsory. However, rejection places each person in an inferior position as his or her lack of conformity makes him or her less responsive to the rationality required. It is therefore important to reflect on the influence of technology on occupational groups and individuals in order to understand its meaning and experience.

TECHNOLOGY AND NURSING

Technology has been examined inadequately within the context of nursing practice, despite the influence of technology on professional and social life. There is limited research reported in the literature and there are no qualitative examinations of nurses understanding of the phenomenon. Nursing history, theory, education and accounts of clinical practice, do not examine appropriately the experience, significance and meaning of technology.

Brinkman (1971:122) claimed more than two decades ago, that many professions were attempting to understand better the experience of technology, with specific reference to how technology influences employment and decisions making:

> *Today technology penetrates the whole realm of human life to an extent and depth never before attained. Thus it is understandable that even engineers are beginning to think about technology, in order to make sure of the presuppositions and consequences of their actions.*

Seeking to understand the experience of technology and questioning presumptions and consequences has not been a focus of nursing. Inadequate insights into the experience of technology and simplistic explanation of the phenomenon have continued to restrict the development of nursing as a discipline. Adequate understanding will emerge only when nurses define technology as influential in the organisation of human labour and fundamental to its moral and political goals (Barnard, 1996a; Barnard, 1997; Donahue, 1985; Harding, 1980; and Walters, 1995). An informed explanation of technology in nursing is needed because current practice contributes to *ineffective and destructive interactions with nature and also supports privileged access to the social benefits of technological change* (Harding, 1980:56).

Nurses have always used tools and techniques in valued ways in order to achieve valued ends. Prior to this century nursing was essentially as it had been throughout history, a craft practised by individuals of whom the majority were women. They gained experience in care giving from religious and secular orders or through families. Knowledge and skills developed by trial and error and were passed down through generations. Nursing practice relied upon rule of thumb, experience and faith, and was isolated to groups of individuals and geographic areas. Skills included magical and aesthetic components that equated with moral and psychic life. Nursing care was carried out by appropriately trusted and pure hearted individuals who effected treatment that was less able to be translated into scientific language or rationale. Nurses relied less on scientific knowledge than on a personal and intuitive understanding developed and refined through practice (Abel-Smith, 1960; Baly, 1986; Dock & Stewart, 1925; Donahue, 1985; Reverby, 1982; Reverby, 1987; and Roberts, 1954)

Additionally, technology did not present Western society with many challenges associated with social adaptation, morality, or ethics, prior to the beginning of the third industrial revolution. The third industrial revolution is generally argued to be associated with advances in commerce and industry in the eighteenth century. Societal changes from this revolution have been both qualitative and quantitative, and relate particularly to advances in science and technology and their implications for economic and social life. The period marked a change from agrarian handicraft economies to economies dominated by industry and machine manufacture. Landes (1969:1) distinguished the period as noteworthy for three spheres of change: (1) mechanical devices began to replace human skills; (2) non-human power (steam

followed by fossil fuel and atomic energy) dominated human strength; and (3) raw materials increased leading to rapid developments in metallurgical and chemical industries. Prior to this period, evolution of technology was slow and expertise was based on the know-how of a person who used an expert eye and was distinguishable for his or her particular style and precision. The slow evolution meant that technical advance rarely threatened social equilibrium and was assimilated into society (Ellul, 1964; Landes, 1969; Kranzberg & Pursell, 1967; and Mumford, 1934).

The rapid growth of scientific and technological knowledge in Western society since the eighteenth century has produced enormous changes in nursing and health care (Allan & Hall, 1988; Cooper, 1993; Donahue, 1985; Maggs, 1983; Miaskowski, 1990; Shryock, 1959; and Wilkinson, 1992). Science and technology have affected many facets of practice, awareness and experience. In addition, their rapid growth has led to numerous social challenges particularly associated with: adapting precepts to a rapidly changing social milieu, the exploitation of people, the division of classes and increases in poverty. However, like society, nurses have encouraged an adoration of technological progress and have both welcomed and encouraged continued involvement with technological change. In fact, Cooper (1993:25) goes so far as to assert that the process has advanced to an extent that the environments of nursing practice are no longer defined by human caring but by machine technology. Objective means is foremost in many nurses' experience of health care and nursing practice.

However, despite the significance of each level of technology to the experience of nursing, the phenomenon has been examined inadequately within the context of nursing practice.

There is minimal historical awareness of the influence of technology or understanding of the philosophical and social significance of its emergence (Allan & Hall, 1988; Barnard, 1996a; Folta, 1973; Harding, 1980; Reverby, 1987; and Walker, 1970). Christman (1970:13) suggested, that the history of nursing has been one in which nurses have concentrated on looking inward and viewing the remainder of the world as hostile:

> ... *since the advent of modern science and technology, health care professionals have dealt with philosophical problems by ignoring them* (Folta, 1973:35).

Historical accounts of nursing emphasise achievements in professional standing, administrative acumen, educational development and purposeful unity. Whilst these achievements are of note, their emphases have over-riden serious review of the origin and impact of political, economic and social trends. Consequently, the inter-relationship between contemporary practice and numerous historical origins have been excluded from the literature and debate. History is however more significant than many nurses realise. It provides a link to the present. The later depends upon the former because history engenders meaning and provides a key to the past, present and future of nursing.

Therefore, when particular historical factors important to the development of nursing are not given credence (as they possibly should be) it becomes difficult to consider nursing in a complete and accurate way (Baly, 1986; Folta, 1973; Henderson, 1985; Maggs, 1983; Reverby, 1987; and Sandelowski, 1988). Factors that have been overlooked become less significant in the creation of meaning. For example, it is recognised commonly that the experience and specifics of clinical practice have received little prestige or comment until more recent times, except for guidance as to the way a nurse *ought to practice* (Reverby,

1987). Professional visibility has been awarded to those nurses who have pursued careers in administration or education. There is no doubt that administrators and educators have influenced nursing significantly and their achievements are duly noted. But the bypassing of clinical (bedside) nurses who are generally less noteworthy for their influence is a significant deficit, particularly to understanding nursing as a discipline.

A further example of lack of historical credence, and one more directly associated with the purpose of this thesis, is the fact that historical texts, nursing literature and manuals of nursing practice have failed to reflect upon or adequately critique the social and professional impact of technology. Kranzberg and Pursell (1967) claimed three decades ago that these inadequacies are a common historical and sociological issue. Individuals and occupational groups continue to ignore both the social outcomes of technological development and the way individuals think about technology. Analysis of technology is restricted generally to opinion and description of internal history (e.g. machinery; periods of technological advance; industrial revolutions). Outcomes of the emergence of technology such as the evolution of moral and ethical debate, the experience of technology and its impact upon a discipline are absent.

Nursing texts which purport to analyse historical trends, particularly those written during the early second half of this century (e.g. Abel-Smith, 1960; Jamieson, 1966; Roberts, 1954; Shryock, 1959; and Stewart & Austin, 1962), are utopian concerning the issue of technology. The history and experience of technological development is ignored and technology is conceived uncritically as an instrumental phenomenon that is advancing the profession.

Whilst advancement may or may not be true, the lack of historical perspicacity and subsequent failure to provide historical meaning to technology within the context of nursing, has led nursing literature to be dominated by immature understanding and unreflected experience. Further to this it has been demonstrated by Hiraki (1992) in an examination of four (4) introductory textbooks in nursing, that little is known about the social, ideological and political issues that influence textbook development. Dominant themes found in nursing texts are rationality of language, a propensity to over-emphasise the pseudo scientific approach called nursing process and instrumentalism. Hiraki (1992:11) argues that:

> *The world of the text book discloses how nurses interpret their professional autonomy and how normative structures inform what constitutes authority and responsibility in research, education and practice .... the language and rationality of all four textbooks limit the possibility of self-critique and reflection.*

Hospitals and Nursing

An important factor in understanding the relationship between technology and the history of nursing is the hospital. Few institutions have undergone such rapid and radical change as hospitals have throughout this century. Hospitals have evolved from being institutions responsible for the care of the destitute to a visible embodiment of the health care sector and corporate development. Rapid development in science and technology and the expansion of institutionalised medicine have meant that hospitals have become responsible for the provision and development of medical investigation, treatment and research. Centralised resources, specialist staff and technique have evolved to become features of hospitals. Diagnosis, treatment and research of acute illness have become their primary purposes and have prevailed over issues of religious and moral concern (Carpenter, 1977; Maggs, 1983; Reiser, 1978; Reverby, 1987; and Starr, 1982).

Even though credit is awarded to nursing schools for their role in stimulating the emergence of nursing as an occupation this century, equal emphasis must be awarded to the evolution of the hospital. According to numerous authors, the emergence of nursing as an occupation has come from increases in work opportunities within hospitals, rather then any specific political coup or planned development for nursing (Baly, 1986; Carpenter, 1977; Donahue, 1985; Maggs, 1983; Maggs, 1987; Reiser, 1978; Reverby, 1987; Shryock, 1959; and Simpson, 1964). Even though Florence Nightingale was highly influential in reforming nurse education and changing abysmal sanitary conditions within hospitals through the introduction of major changes to physical environments and the practices of both doctors and nurses, nursing evolved to become a subservient occupation whose major role was to work within the hospital sector. Nurses continue to be controlled often by medicine in an institutionalised health care sector where the central concern is efficiency and the advancement of medical science and technology. To this day nurses continue to struggle for power and recognition and have sought to produce good practitioners for clinical environments where technical performance is prized highly.

The Deputisation of Nursing

With the development of the hospital this century, nurses have accepted new roles and responsibilities that have originated from the introduction of new technologies to nursing practice and the reassignment of duties from medicine and administrators. The reassignment of roles and responsibilities is a process that can be defined as deputisation. The word **deputisation** means: *depute (di pyut'); to appoint to do one's work or to act in one's place;*

delegate (Barnhart & Barnhart, 1994:562)). Deputisation is an ongoing process in nursing and is characterised by the acceptance of various technical and administrative roles and responsibilities from other health care providers who retain a supervisory capacity and some professional responsibility (i.e. decision making and governorship). Dock and Stewart (1925:304) identified the beginning of the process early this century:

> *Many nurses specialise in various forms of therapeutics, X-ray and electrical treatment, hydrotherapy, massage, etc. Others assist in the new field of laboratory work in the study of metabolism. There is, also, a tendency to give to the nurse some of the hospital duties formerly assigned to the intern, as, the giving of anaesthetics, keeping of records, and other clinical ward work.*

Notwithstanding, as a result of the reassignment of duties nurses have discerned a sense of involvement with science and technology. The health care sector is increasingly technological and relies on nurses to fulfil an instrumental role. Their increasing inclusion in the use of objective means is interpreted often by nurses as a demonstration of their role in the success of science and technology and their skills are a visible embodiment of technological development (e.g. Boss, 1989; McClure, 1991; Orem, 1991; Salmon, 1977; Simpson, 1990; and Stevens, 1985).

Despite the ongoing evolution of deputisation and the need to accept increasing roles and responsibilities, issues concerning technology in nursing have been stated rarely in terms of changes to nursing goals, technological dominance or the alteration of nursing practice (Sanford, 1967:726). Nurses have been interested less in questioning the prestige and power of science and technology, than embellishing their development. Nurses have displayed no resistance to assuming responsibility for all manner of tasks and knowledge associated with the emergence of technology, and have subsequently absorbed roles and responsibilities into

their day and professional structure (Castledine, 1995; Donahue, 1985; Jacox, Pillar & Redman, 1990; Katz, 1976; and Walker, 1970). As a consequence, medicine has delegated to nurses time consuming and repetitious tasks, particularly tasks associated with routine treatment, monitoring, observation and investigation (Baumbart, 1988; Brown, 1992; Castledine, 1995; Christman, 1970; Donahue, 1985; Dock & Stewart, 1925; Farmer, 1978; Lian, 1984; Mihle, 1970; Reiser, 1978; Reverby, 1987; Salmon, 1977; and Walker, 1970).

Walker (1970:332) was cognisant however of the process of change and the delegation of duties to nurses:

> *Physicians looking for a way to extend themselves - that way that will enable them to use to the fullest extent the intellectual armamentaria and expertise of their profession - look to nursing to assume the professional responsibility for carrying out specified tasks which they would like to relinquish. They expect nurses to assume these tasks either under direct medical supervision in the present day systems of health care delivery or by means of a reassignment of professional responsibilities within new health agency structures.*

Reiser (1978) also recognised the process of change and identified three general areas of delegation occurring from within medicine. The first area of delegation has been the transference of responsibility for education, guidance and advice to other carers. The second area of delegation has been the transference of responsibility for laboratory testing and diagnosis of disease to technicians. The third area of delegation has been the transference of certain other responsibilities to assistants (commonly known as *nurses*). It is noted that delegation of responsibility is *proper and necessary in carrying out work on a large scale* because the doctor can:

> *...determine whether the work was conducted in the proper manner, and he* [sic] *accepted responsibility for it. This was the case when the physician delegated his* [sic] *duties to the resident staff of the hospital, the director of laboratory to his* [sic] *staff, or the practitioner to his* [sic] *nurse* (Reiser, 1978:172).

As a consequence of this process of change nurses have reached a point in their development where they need to examine their practice (Gillam, 1969; Harding, 1980; Jacox *et al.*, 1990; Pellegrino, 1961; and Pellegrino & Thomasma, 1981). It is argued that critical examination of nursing highlights the extent to which medicine, administrators and nurses have abraded the practice of nursing. It is claimed (Briggs, 1991; Brown, 1992; Donahue, 1985; and Jacox *et al.*, 1990) that the independent roles of nursing (those aspects of nursing practice which are unique to nursing) are being subsumed by inter-dependent roles (roles shared by two or more health care professionals) and dependent functions (functions and activities that are performed for other health care professionals). Examples of inter-dependent roles are noted to be monitoring medication effects, physiotherapy, administrative duties, mechanical equipment, ordering stock, administering medications and making appointments for various health professionals. Briggs (1991: 224) and Brown (1992:15) both characterise the evolution as a power imbalance in which nursing has extended its doctor's hand maiden role and is less accountable for its actions than it believes.

Winner (1986:32) confirms this characterisation explaining that many authors, most notably Engels, argue that when technology develops so do social environments and hierarchies of control which are required to keep participants acting in a desired manner. The meaning of **required** is in a practical sense. Just as Plato argued that a ship at sea by practical necessity needs a captain and an obedient crew, so do other technological forms. Technological systems and social patterns must be guided always by the reality that despite any pretence of a balance between workers and freedom, power relations and authority remain an essential

component. It is suggested that when moral arguments associated with workers (or in Plato's example, sailors) sharing equally in decision making and power emerge, the weight of economic and political argument prevails over the moral position. After all, *that's no way to run a business* and arguments in favour of equality are mere folly and idealism.

Therefore, deputisation of nursing can be described as extending medicine and de-emphasising the unique independent roles of nursing, particularly the care of the person (e.g. hygiene, therapeutic relationship). Nursing can be characterised as being *gobbled up* and devalued by other health care professions and those nurses who seek professional respect as a result of the use of objective means. They do so at the cost of promoting nursing as a distinctive field of endeavour and de-emphasise important principles of nursing practice. Briggs (1991:226) agrees with this assessment and suggests that experience and evidence is demonstrating for example, that because of technology the:

> *...technical skills associated with nursing a patient just after an operation were* [are] *far more prestigious than the nursing skills involved in caring for the longer term patients.*

Jacox *et al.* (1990:84) also suggest that the process of deputisation has continued to a stage where there is confusion and political tension between health care professionals concerning the specifics of individual roles. It is argued that a taxonomy or classification of nursing technology (machinery and equipment) that acknowledges and recognises both specific and interdependent roles and functions is needed to resolve the issue. Briggs (1991) shares these concerns, arguing that practicing nurses must be able to make informed decisions about nursing roles and must look towards more education and research to assist in the process of coming to terms with an evolving practice.

Although none would argue against the need for nursing to be responsive to the demands of the health care sector, limited knowledge is available to acknowledge or refute arguments concerning the extent, effect and experience of role change and technology. Nurses are today responsible for an increasingly machinery orientated health care system dominated by administrative and bureaucratic structures. Nurses in all specialties of practice are required to care for their patients, develop technical knowledge and skills and fulfil the requirements of technique. They are required to not only manipulate machinery and interpret the world around them but take on increasingly varied and complex roles and responsibilities associated with the emergence of technology (Allan & Hall, 1988; Barnard, 1997; Carnevali, 1985; Harding, 1980; Pearson, 1993; and Wichowski & Kubsch, 1995). The meaning and consequences of this emergence to nursing practice are not yet known.

Nurses need to make choices in their commitment to objective means and recognise the importance of becoming aware more and appropriately critical of technology. If nursing practice is influenced directly by the values of society and groups (Wilkinson, 1992), then more needs to be done to understand the relationship between technology and contemporary nursing. The most important place to begin is with the experience and understanding of nurses themselves.

WHY RESEARCH SURGICAL RATHER THAN INTENSIVE CARE NURSING?

There has been limited research of the experience of technology or its significance to nursing particularly in specialties outside of the intensive care unit (I.C.U). Although there is less

emphasis on machinery and equipment in areas outside the I.C.U, there continues to be a growing presence and influence of technology on nursing practice.

Surgical nursing (as an example) is as much a part of the technological health care system as any other area of health practice. Hence, it is an ideal group to research because its practice is evolving from a traditional perspective in which patient care as a human interaction has been emphasised, to a perspective in which technological invention is becoming increasingly important. Practice is in transition and is increasingly technical. The reasons for these changes to surgical nursing are numerous and include; specialisation, increasing presence of machinery, increasing numbers of seriously ill patients in surgical wards, variation in patient complexity, increasing presence and importance of computerisation in the daily care and administration of nursing, and increasing numbers of policies, protocols and practices.

The surgical nursing context is experiencing currently a transitional period in which all levels of technology are increasingly influential in the daily routine of the surgical nurse. Nurses working in intensive care are immersed already within a technologically orientated environment. Even though many conceptions of technology identified by this research may be shared with I.C.U nurses, the intensive care environment is not the focus. The goal of the research is to utilise a contextual environment (surgical nursing) in which there is rapid and ongoing technological change. The decision to use the context of surgical nursing has been intuitive and based on the researcher's experience and reflection on current surgical practice. It is the first known research of its kind in this context.

SIGNIFICANCE OF THE RESEARCH

The research described makes a significant contribution to nursing because it:

1) Inaugurates research into conceptions of technology in the context of surgical nursing. The research is the first known study to analyse qualitatively nurses' conceptions of the phenomenon.

2) Contributes to an understanding of technology in the domain of nursing. Descriptions of the experience of technology make known the qualitatively different ways nurses understand technology and assist the future development of nursing practice, education and theory. The research provides insight valuable to understanding better the experience of nursing practice and is a major advancement in understanding the discipline.

3) Adds to the body of research completed within the sphere of phenomenography and extends the qualitative approach to the health care field. It is noted that the qualitative research approach of phenomenography has been utilised infrequently in health care and its application in this research is significant to identifying its potential.

4) Adds to the body of research within the sphere of philosophy of technology. Philosophy of technology has attracted scholarly argument, but limited research particularly in the health care field. The outcomes of technological development have been debated, the implications of technological change to society have been

discussed, but the influence of a technological society upon human experience has been investigated infrequently. This research is a significant entry into understanding better the experience of technology and is an important addition to current knowledge.

5) Provides evidence to address questions and issues raised in nursing literature. Numerous questions related to the relationship between technology and nursing remain unanswered and this research begins the process of establishing how surgical nurses' experience and understand the phenomenon.

6) Identifies key areas for further research. The research identifies experience and understanding of technology, which require further research and debate.

SUMMARY

This chapter has outlined the research question and significance of the research being undertaken. A definition of technology has been proposed which reflects the inter-relationship between three (3) levels of the phenomenon. The three levels are objective means, knowledge and skills, and technique. Current research in nursing is noted to be inadequate and significant because it has lacked explication, research and critique. It has been argued that the desire for political and professional success and ignorance of the significance of technology to the modern hospital and the deputisation of roles and responsibilities in nursing have prevailed over adequate examination of technology, despite it being a major factor influencing society, health care, and nursing practice. The research is a major development to nursing knowledge and an advancement in both describing and interpreting

the experience and understanding of technology in contemporary surgical nursing.

ORGANISATION OF THE THESIS

Chapter two (2) of this thesis is a review of relevant literature. The chapter examines the ways technology is defined by nurses and makes clear limitations to nursing scholarship. It argues that adequate identification of issues pertinent to defining technology assist to understand better technology within the context of nursing literature and practice. The review of literature extends also to a critical examination of the way in which nurses describe the relationship between technology and nursing. Although there is limited literature explaining the way technology is experienced by nurses, there is a large body of literature debating/discussing the impact of technology on nursing and health care. The literature is reviewed for its conceptual clarity and ability to explain the phenomenon. The chapter highlights the lack of research currently available and the limitation of continued reliance upon both the notions of progress and neutrality when seeking to explain technology in contemporary nursing.

The research approach of Phenomenography is outlined in chapter three (3). Research methods are presented, as are explanations of assumptions pertinent to undertaking phenomenographic inquiry.

Chapter four (4) reveals the results of the research and describes the way surgical nurses understand and experience technology. The chapter is an explanation of eight categories of description identified by the research and a presentation of an outcome space for the

qualitatively different ways of experiencing technology in contemporary surgical nursing.

The thesis concludes in chapter five (5) where results, implications and recommendations arising from the research are addressed.