CHAPTER TWO

THE UNDERSTANDING AND EXPERIENCE OF TECHNOLOGY WITHIN THE DOMAIN OF NURSING - A LITERATURE REVIEW

> ... *nurses, who for the most part neither invent nor control but rather apply medical technology, are insufficiently aware of the conceptual systems they accept when they uncritically integrate medical technology into their practice* (Sandelowski 1988:35).

This chapter is a critical review of the way in which technology is defined, described and understood within nursing literature. The literature has been interpreted within a framework that emerged during the review process. Grammatico-textual meaning was combined with contextual intimation in order to complete an analysis which encompassed best the scope and horizon of thought and explanation. In order to accomplish this goal successfully, the review drew also upon selected literature external to the field of nursing as a method of informing the process. The review of the literature is not orientated specifically towards contemporary surgical nursing as no definitive body of literature exists. The absence of a specific body of literature is addressed by a review of discourse that is orientated toward discussing technology within nursing as a collective discipline rather then any discrete specialisation, although it is noted that surgical nursing is included implicitly as a context of clinical practice.

The literature review is organised into four sections. The initial section entitled; **Researching understanding of technology in contemporary surgical nursing**, is a review of research into the experience of technology within the realm of surgical practice. Discussion, here,

highlights the lack of available research and literature.

The following three (3) sections are a critical review of the way in which nurses understand technology and are entitled: **Searching for a definition of technology**; **The primacy of progress**; **Technology is a neutral object and nurses are its master**. It is argued that definitions of technology reflect significantly the way in which individuals and groups experience and understand the phenomenon and that nursing literature emphasise an instrumental orientation towards defining technology. The second and third sections are a critical review of opinion and debate in nursing and explicitly address two important questions: How important is the notion of technological progress to the experience and understanding of nurses?, and are nurses able to remain masters of a clinical practice where all three levels of technology are fundamental to the experience of health care?

The literature review compares and contrasts critically debate in the domain of nursing. Debate has implications to interpretation of clinical practice, the expression of experience, theoretical perspectives and education. It is argued that understanding and experience of technology in nursing is a combination of instrumental ideas concerning technical, societal and human development, and opinion concerning the role technology plays in professional advancement, power and decision making. The meaning portrayed in the literature can be summarised as common to understanding technology (Barnard, 1996a; Barnard, 1996b; Barnard, 1997; Brinkman, 1971; Drucker, 1967; Ellul, 1963; Ellul, 1964; Ellul, 1968; Harding, 1980; Hood, 1972; Pacey, 1983, Postman, 1992; Purcell, 1994; Wajcman, 1991; and Winner, 1986). The literature review acknowledges those nurses who have explored the

importance of technology to nursing, but is critical of the majority of literature because of its propensity to accept uncritically the manner in which technology has emerged to influence significantly nursing practice. Literature has tended to focus on the application of machinery and equipment or be so general as to render it deficient. Overall, it is argued that nursing literature is fragmentary and analysis lacks evidence, adequate debate or conceptual mastery (Barnard, 1996a; Harding, 1980; and Pearson, 1993).

RESEARCHING UNDERSTANDING OF TECHNOLOGY IN CONTEMPORARY SURGICAL NURSING

Phenomenographic research within the domain of nursing

There has been no published phenomenographic research investigating the qualitatively different ways nurses experience and understand technology in any domain or specialty of nursing. Results of this research are unique to nursing and further understanding of technology in the discipline. In addition, phenomenography remains a new research approach in nursing and health care research (Baker, 1997; Barnard, McCosker & Gerber, 1998). There are few phenomenographic research studies published in the area of nursing or health care research. Examples of published papers are Backe, Larsson & Fridlund (1996), Ramsden, Whelan & Cooper (1989) and Wenestam (1984).

There has however been an increasing interest in phenomenography outside the disciplines of education, where the qualitative research approach was first developed. For example, under my supervision there have been a number of postgraduate students of nursing who have completed research using the qualitative approach (e.g. McCosker, 1995; Summerhayes,

1997; Venturato, 1996). In addition, the qualitative approach has been demonstrated to have benefits for understanding phenomenon in various fields of knowledge including geography (Gerber, Boulton-Lewis, & Bruce, 1995), geomatics (Young, 1994), information literacy (Bruce, 1997), and politics (Theman, 1983). Results of research have demonstrated the suitability of the approach when seeking to describe qualitative variation and similarity of experience. Phenomenographic studies have provided consistent evidence of the appropriateness of adopting a relational approach to knowledge, and the existence of a limited numbers of ways of understanding phenomena in the world around us. Even though the approach has not been used often in nursing research, it is appropriate for the study described in this thesis (see chapter three (3) for an explanation of phenomenography as an approach to qualitative research).

Research into nursing and technology

Nurses have not critiqued adequately and rarely inquired into technology and researchers have ignored the significance of its emergence to both society and their discipline. This research is the first to investigate the important area of how surgical nurses' understand the phenomenon. Notwithstanding, numerous nurses have called for the need for expanded research and better insight into the outcomes of technological development (Barnard, 1996a; Brewer, 1986; Brown, 1992; Brunt, 1985; Carnevali, 1985; Fitter, 1987b; Gillam, 1969; Golonka, 1986; Harding, 1980; Ingersoll *et al.*, 1990; Lewandowski & Kositsky, 1983; McConnell, 1990; McConnell & Murphy, 1990; Stephens, 1992; Tisdale, 1986; Walters, 1994; and Zwolski, 1989). Many note the sparseness and speculative nature of available knowledge precludes nurses from understanding better clinical practice, nurse education,

patient care and the role of nursing in the provision of health care.

The failure of nursing to investigate the emergence of technology is a deficit shared with society. Although technology has been a major influence upon cultural and social development (Bennett, 1977; DeBono, 1971; Drucker, 1967; Ellul, 1963; Ellul, 1964; Ellul, 1980; Ellul, 1990; Heidegger, 1977; Ihde, 1991; Illich, 1976; Jones, 1982; Mitcham, 1989; Mumford, 1934; Mumford, 1968; Ortega Y Gassett, 1972; Pacey, 1983; Postman, 1992; Purcell, 1994; and Winner, 1977) the experience of technology is subject to conjecture. It is noted that qualitative accounts of the way in which technology is experienced and utilised by engineers, designers, testers and institutional workers is required (Pinch, 1991). The completion of this qualitative examination constitutes a significant advance to understanding the experience of technology in nursing and is a significant contribution to the field of philosophy of technology. The common thing is to be critical of scholarship that aims to explain the experience of technology, but to do nothing about the lack of research (Ellul, 1963; Pinch, 1991; and Sklair, 1971).

Numerous nurses have written about the application of technology (machinery and equipment) to nursing practice (e.g. Alexander & Randolph, 1985; Fitter, 1987a; Hepworth & Fitter, 1981; Leatt & Schneck, 1981; Pillar and Jacox, 1991; and Wichowski & Kubsch, 1995). However, nursing literature is limited and does not address the scope of issues pertinent to the emergence of the phenomenon. This literature is dominated by a preference for making grandiose claims about the potential of technology, fashioning vague pronouncements about the effect of technology on nursing practice, and alluding to

unsubstantiated evidence concerning the experience of technology. It is common, for example, for authors to assert that technology is: advancing nursing as a profession; exciting and advantageous to nursing; dehumanising health care; and solving the problems of the planet. Nurses look to technological moments, that is, instances where particular machinery and equipment are used as criteria for both the experience and the success or failure of technology. They insufficiently reflect on what is understood by the term technology, what the experience of technology actually is, and what is the relationship between nursing and the technological environments in which they live and practice.

Technology remains a major issue for nursing, nurses, professions and society, and needs to be addressed in research and scholarship. There is limited literature addressing the relationship between technology and the professional lives of nurses and they need to understand technology as a fundamental phenomenon of concern (Walters, 1994). Harding (1980) remains one of only a few authors to discuss the importance of examining nurses understanding. The author identifies technology to be a phenomenon ubiquitous to nursing practice, politics, values and beliefs. It is noted that technology is in need of acknowledgment as a system or whole, rather than a mixed collection of discrete technological events in the form of machinery and equipment. Ideas and beliefs about technology are purported to be inadequate and able to be classified as utopian, dystopian and/or based on the belief that technology is a value-neutral phenomenon.

Although Harding (1980) did not undertake an exhaustive review of nursing literature or undertake research into nurses conceptions, the literature along with Barnard (1996a), remain

the only available sources to consider the possibility of variation in understanding and experiencing technology in nursing. Notably, the results of this research and scholarly debate outside the domain of nursing provide evidence to support Harding's (1980) argument that there is variation to nurses' experience and understanding of the phenomenon.

SEARCHING FOR A DEFINITION OF TECHNOLOGY

Fundamental to understanding the way technology is understood within the domain of nursing is the way nurses define it. This section identifies and critiques four (4) common approaches to the definition of technology. The purpose is to make clear approaches to definition and indicate limitations of current nursing literature. It is argued that not only have nurses failed to understand the development of technology in their practice, but also they have regarded insufficiently the need to identify and define the phenomenon. Failure to define technology reflects not only a common societal response to the problem of technology but a lack of conceptual insight.

Machinery, equipment and instrumentation

It is rare for nurses to define technology. Nurses disregard often the need to provide a definition of the phenomenon, even when technology is the focus of literary discussion. They display an indifference to technology as a concept and fail to transcend that which is socially impressive. The lack of perspicacity to issues of definition has led nurses to conceptualise technology in a manner insufficient and to assume a synergy of understanding between author and reader, based on a belief that technology is simply machinery and equipment. Carnevali (1985) is typical of numerous authors who conceptualise technology at its most simple

(Abbey, 1978; Anello, 1970; Ashworth, 1987; Bailey, 1969; Birckhead, 1978; Braun *et al.*, 1984; Carnevali, 1985; Chustman, 1978; Fagerhaugh, *et al.*, 1980; Farmer, 1978; Fitter, 1987a; Golonka, 1986; Handy, 1989; Hawthorne & Yurkovich, 1995; Henderson, 1985; Kristensen, 1989; Lenihan & Abbey, 1978; Mathew, 1976; Mayberry, 1985; McClure, 1991; McConnell, 1990; Miaskowski, 1990; Pillar & Jacox, 1990; Pillar & Jacox, 1991; Quivey, 1990; Reed-Ash, 1983; Wichowski & Kubsch, 1995; Wilkinson, 1992; and Wilson, 1981), however the author does recognise that the use of mechanical equipment requires knowledge and skills. Technology is defined as *the mechanical equipment and associated knowledge and procedures or activities involved in patients' health care* (Carnevali, 1985:11).

Technology is noted to be integral to the function of a nurse and is regarded as objective means associated with the performance of nursing duties. Technology is machinery and equipment used to maximise health care and the practice of nurses. The definition emphasises the application of technology to clinical practice and is similar to Given and Given (1969) who were very clear in their interpretation of the phenomenon. Technology was defined as *the substitution of machine labour in the performance of a given task* (Given *et al.*, 1969:74).

The majority of literature defines technology as a collection of indiscriminate machinery and equipment that have no clear relationship other than the fact that they each assist in the performance of nursing duties. Rather than conceiving of technology as a system of inter-related objective means, knowledge, skills and technique, technology is instrumental and reduced to a nebulous collection of moments of action. For example, Mayberry (1985) refers to technology as machines that record variations in temperature, blood pressure, chemical

analysis, and written communication, and McClure (1991) defines technology as:

> *...any means of delivering care using objects that are not a part of the patients own body. This means that it includes not only the vast array of machinery we have come to take for granted, but also the pharmaceuticals that are prescribed and administered* (p. 144).

Farmer (1978) in a research project undertaken to study the impact of medical technology on nursing, defined technology as *the non-passive things of economic value which stimulate a function or facilitate an action* (p. 18). In this definition the human element, knowledge, and the inter-relationship of technology with the environment of care, are relinquished as technology is assumed to be machinery and equipment of economic value. The research undertaken by Farmer (1978) is cited regularly, and her definition of technology has served to reinforce instrumentalism as a common interpretation of nursing, as explained by Hiraki (1992:5) who notes that textbooks in nursing reflect:

> *a taken for granted acceptance of instrumental rationality as the legitimate form of reasoning and a basis for nursing practice.*

Farmer (1978) does however understand technology to be influential in the functional interchange of roles and responsibilities between nursing and medicine (described by this thesis as deputisation) which has led to alterations in nursing practice. In particular, the author emphasises the importance of technology to role erosion (transference of certain roles and responsibilities of nursing practice to other professions or groups) and increases in technical aspects of nursing practice.

It is unfortunate that despite Farmer's (1978) assertion that it is unrealistic to expect nurses to appreciate the demands that technology places upon nurses and patients without

understanding the technological environment to which patients must adapt, the author has understood and researched technology only from the perspective of machinery and equipment. For example, Farmer (1978) does not address technology from the perspective of practices, procedures, policies, society and values. It must be stated that if she truly sought to accomplish the goal of *learning about the prospects and pitfalls of technology in health care* (p. 20), then technology needed to be understood, researched and defined in a holistic manner.

The definition of Farmer (1978) and other authors (Ashworth, 1987; Carnevali, 1985; Henderson, 1985; McConnell, 1990; Miaskowski, 1990; Pillar & Jacox, 1990; Wichowski & Kubsch, 1995; and Wilkinson, 1992) emphasise the machinery and equipment of technology. The authors conceive of nursing and technology from the perspective of action. Nursing is a series of activities and technology is the phenomenon that facilitates the process. The way machinery and equipment assist nurses to be more accurate and efficient in their practice is not only a measure of the success of technology, but a conceptual framework in which technology is conceived as a modern response to the needs and goals of nurses, patients and the health care sector.

Technology as a list of discovery

A second approach to defining technology is through compendiums of technological discovery. Rather than proposing a formal definition of technology, authors present the reader with a list of technological achievements (compendiums) as a way of describing the phenomenon. These compendiums are always a collection of objective means that are judged

implicitly to be both socially impressive and/or known to have impacted upon disease and treatment. Anello (1970) is typical of numerous authors (Baumgart & Larsen, 1988; Bennett, 1970; Hawthorne & Yurkovich, 1995; Laing, 1982; Lenihan & Abbey, 1978; and Miaskowski, 1990) who define technology from this perspective. The author states that:

> *...the past 20 years has brought tremendous changes both in medical knowledge, and in medical practice and professional nursing. The use of new techniques and instruments, many highly sophisticated, have provided us with insight into the mysteries of the cell structure, molecular biology, genetic studies, and a host of the other biological phenomena. We are beginning to know more about disease, the control of infection, and the propitious use of synthetic drugs. Most dramatic are the variety of transplantation's and biomedical engineering achievements that have taken place in medical science* (p. 4).

It is important to note that nurses commonly do not list technological invention and/or achievements that are specific to nursing. In fact, compendiums are significant for their absence of technology associated commonly with nursing practice. Compendiums of technology are always the advances of other professions. Even though nurses have had input into the development of significant technology such as sanitation and aseptic technique, these technologies are not listed. It is interesting to contemplate reasons for this fact, and it is fair to suggest that nurses either do not know what technology is specific to their discipline, or conversely do not rate it suitably impressive. Definition, explanation, and lists of technological achievement focus always on machinery, instruments, and those associated procedures that are sophisticated and have provided advances in domains of knowledge. Lists of technological achievement tend to include the science and technology associated with: molecular biology, genetic studies, biological phenomena, surgical intervention, and pharmacology.

These fields of development have been important to health care and society, and although they have impacted often upon the practice of nurses, it cannot be substantiated that nurses and nursing practice have been highly responsible for the development of these bodies of knowledge. It is argued that compendiums of technology are dubiously attributable to nursing as a discipline and reflect not only a fascination of nurses for that which is socially impressive, but also the fact that there has been little attempt to nominate, investigate and document the many technological developments directly attributable to the insight and expertise of nurses.

Technology as science

A third approach to defining technology is to assume it is an outcome of the development of science. Technology is conceived and defined as the application of scientific principles and knowledge to domains of practice. Salmon (1977) and Orem (1991) are typical of numerous authors who understand technology in this manner (Anello, 1970; Battistello, 1976; Brown, 1985; Carnevali, 1985; Chustman, 1978; Farmer, 1978; Hawthorne & Yurkovich, 1995; Joachim, 1988; and Zwolski, 1989). For instance, Salmon (1977:19) asserts that:

> *In the final analysis science which is the basis of technology, is just one more of the human gifts.*

and Orem (1991:92) argues that:

> *A technology is defined as an application of scientific knowledge to the practical purposes to be achieved in a field.*

The approach to defining technology misrepresents the development of technology by confusing science with technology, and fails to recognise specific knowledge, skills and activities associated with technological practices. As noted previously (see chapter one (1)),

this approach identifies inadequately technology as a discrete body of knowledge and skills which influences the practice and experience of nursing. The definition demonstrates a lack of fundamental understanding and does little to advance insight, scholarship or debate.

Technology and popular literature

Lastly, technology is defined by reference to popular literature such as Alvin Toffler's Future Shock or Aldous Huxley's Brave New World (Ashworth, 1987; Henderson, 1985; Kelly, 1984; Paulen, 1984; Phillips, 1988; Quivey, 1990; and Reed-Ash, 1983). The citation of this genre of popular literature would appear to assist nurses to conceptualise the experience of technology, and excerpts from literature are cited often as evidence of challenges to the future development of nursing and society. It is noted that popular literature has been influential in the formation of nurses' beliefs and is claimed by D'A Slevin (1993:241) to be *bibles* used by many nurses to interpret the inter-relationship between nursing and technology in a changing world. The impact of technology presented by the novels is taken seriously in relation to nursing, health care and society. Advice such as *not wanting to live in a man made stratified society* (Quivey, 1990:329) is extolled as a significant conceptual issue which forms part of the experience and definition of technology.

Summary

The understanding and experience of technology in nursing as reflected in definitions of technology have been presented and critiqued. The literature is noted to be limited and definitions reflect inadequate insight into the phenomenon. Understanding is instrumentalist and focuses predominately on the use of machinery and equipment in clinical practice. Nurses

frequently confuse science with technology and rely upon popular literature and the formulation of lists of achievement when seeking to explain technology within the domain of nursing.

Definitions are simplistic and portray inadequately the experience of nurses. The literature has revealed serious deficiencies in both the frequency to which nurses define technology and the conceptual maturity of their attempts to understand and explain the phenomenon. It is suggested that inadequate conceptualisation and ignorance of fundamental issues in the definition of technology continue to limit severely understanding, debate and the meaning of technology to nursing theory and practice.

THE PRIMACY OF PROGRESS

An important influence on the way people understand technology is the concept of progress. **Progress** is defined as *an advance; growth; and development, e.g. the progress of science* (Barnhart & Barnhart, 1994:1663). It is a compelling concept that originates from utopian writers throughout history and is one of the motivating psychological foundations of our civilisation. Utopian writers include Plato (427 - 347 BC), Sir Thomas More (-1478 - 1535), Francis Bacon (-1561 - 1626), Tommaso Campanella (-1568 - 1639) and Karl Marx (-1818 - 1883). The origins of recent ideas of progress originate particularly from the Baconian conception of knowledge as power, Augustine Comtes' philosophy of humanism, and the American conviction that there is nothing a group of doers cannot do (Brinkman, 1971; Hawthorne & Yurkovich, 1995; Mesthene, 1970; Neville-Sington & Sington, 1993; Postman, 1992; Purcell, 1994; and Winner, 1986).

The idea of progress is an important belief for nurses (Barnard, 1996b; Hawthorne & Yurkovich, 1995). Their commitment and excitement about the development of science and technology is reflected in nursing literature (most of which until recently has originated from North America). In fact, North American utopian beliefs associated with the continued advance of technology and science (Neville-Sington & Sington, 1993) have been influential in the way nurses think about the relationship between technology and nursing. Modern nursing practice and education has relied on North American research, authors and theorists and their views and cultural nuances have influenced the ideas, practice and experience of Australian nurses.

Belief in progress is an unassailable truth for many people and groups because progress in the form of invention and innovation is conceived as Western civilisation's demonstration of increasing intelligence and knowledge. The belief is unassailable in the sense that progress is technology and is observable as objective means that are a demonstration of the increasing power and dominance of people in their world. It is envisaged commonly that just as adolescents come of age and enter the realm of adult maturity, individuals and groups (e.g. nurses) through their involvement with science and technology achieve also a new stage of growth. For example, many nurses argue that because of involvement with technological and scientific progress they have grown from humble beginnings to be professionals who are acknowledged for their knowledge and skills (Boss, 1989; McClure, 1991; Salmon, 1969; and Simpson, 1990). The foundations to these claims are the machinery and equipment of technology. Technology is progress and is a phenomenon most observable as invention and

conformity to an objective reality that holds the key to all manner of challenges. It is a source of prosperity, power, professionalism and truth.

Winner (1986:5) notes that our culture is based upon countless sophisticated techniques, systems and instruments that are not often understood in relation to our daily lives. Our lack of understanding and inability to examine the relationship of technology to our lives is found in *the astonishing hold the idea of progress has exercised on social thought during the industrial age*. Progress is noted to be a reliable source for bettering society and people and is manifest as new machinery, techniques, chemicals, systems and their inter-relationships. Abbey (1978:639) is typical of nurses who express belief in the concept of progress. She is encouraged by the potential of technology to assist the development of nursing and health care:

> *The time is ripe for nursing to actively take advantage of the capacities and potential of these tools, which slavishly and untiringly carry out tasks and relay information that can contribute to the wellbeing of patients and the advancement of nursing.*

Simpson (1985:62) is encouraged also by technology and urges nurses to embrace technology as an influential force in determining the development of nursing:

> *Technology advances are being made at an astounding rate and will have a profound impact upon nursing practice. The profession of nursing must be prepared to take advantage of this technology and use it to determine its own destiny.*

There is no doubt that technological and scientific advancements have increased responsibility for cure and enabled nurses to develop new expertise in patient care, particularly associated with their technical role. Nurses are involved with an increasing range of machinery and equipment as well as intricate numbers of assessment, diagnostic and treatment procedures. At other levels of technology nurses are involved also in organisational

and economic management, politics, the maximisation of efficiency, the establishment of policies and procedures, and the regulation of health care.

Numerous authors (Anello, 1970; Boss, 1989; James, 1983 McClure, 1991; Salmon, 1969; Salmon, 1977; Simpson & Brown, 1985; and Simpson, 1990) suggest that because of technological progress nursing has arrived at a new period of renaissance. A revolution is taking place where *old beliefs and practices* have been replaced, updated or forgotten, as nurses adapt to the challenges of a *new and exciting age*. History demonstrates that science and technology have cultivated for nursing a label of intelligence rather then blind dedication. Science and technology have increased the need for education and new leadership roles for nurses in the health care sector (Boss, 1989; Conley, 1961; Edelstein, 1966; Given & Given, 1969; Gordon, 1992; Huether, 1978; Jenkins, 1966; Johnson, 1974; Miele, 1970; Miller, 1969; Stevens, 1985; and Walker, 1970).

An outcome of the revolution has been a commitment of nurses to humanity through efficiency, equipment, electronics and machinery. According to the literature, nurses have transcended subservience to become thinkers and doers who take a leading role in the application of machinery and equipment to health care. Technological progress in the form of technology is the phenomenon that has enabled nurses to attain their long awaited professional advancement. McClure (1991:144) expresses the enthusiasm, which the process has engendered and her comments are typical of the majority of nursing discourse. It is suggested that:

> *...the steady and pervasive increase in technology advancement in health care during the twentieth century has been a source of excitement and constant pride to all of us in the field.*

Miller (1969:54) was enthusiastic also about progress and conveyed nearly three decades ago many of the ideas which continue to be found in the literature:

> *...the boundless opportunities for further learning of scientific techniques enables us to expand our knowledge beyond belief.*

In fact many nurses claim technology is not only advancing nursing as a profession by heightening self esteem, increasing knowledge and skills and allowing more time to be spent with patients, but is augmenting their intelligence. They suggest technology improves decision-making skills and leads to efficient and accurate practice (Abbey, 1978; Bailey, 1988; Bennett, 1970; Boss, 1989; Buick-Constable, 1969; Folta, 1973; Gaudinski, 1979; Harding-Price, 1990; Jenkins, 1988; Kraegal, 1972; Leach, 1990; Seward, 1969; Simpson, 1989; Simpson & Brown, 1985; Stevens, 1985; and Wilson, 1981).

Faith in Progress

There is a soothing sense of logic to the claims of nurses. However, even though the idea of progress is shared with society, the claims are grounded in limited proof and can be characterised often as utopian and based on inadequate evidence or consistent argument (Gendron, 1977; Fitter, 1987a; Folta, 1973; Harding, 1980; Henderson, 1985; Purcell, 1994; and Walker, 1970). Gendron (1977:13) notes that societal belief about progress lack unified and consistent reasoning. Arguments are fragmentary, discontinuous, and unrewarding when the body of literature is reviewed for evidence and critique. Such is the case with literature within the domain of nursing. Unsubstantiated generalisations and grandiose pronouncements dominate it. For example, Gaudinski (1979:1073) suggests that:

> *Advances in knowledge and technology have prepared nurses for critical, specialised,*

primary, aerospace, and independent nursing practice.

Whilst Salmon (1969:21) informed nurses that they:

> *...will be the Captain Cooks of the late 20th century nursing. You will often sail uncharted seas, but like the Apollo 11 astronauts, your human powers of reasoning and the ability to make decisions will become more and not less important in an automated world.*

According to Ellul (1958) and Reiser (1978) belief in progress is a myth more accurately labelled a faith. Belief is accompanied by a rational image that evokes faith and stimulates each person to action. The rationality of image derives from recorded history and recollections are affirmed by the increasing material presence of objective means. Increasing technology demonstrates a means to action. The experience of both history and material presence is shared by all. Thus, the past guarantees construction of the present and rationality of image creates belief.

Technology and science are portrayed in nursing history as phenomena recognisable for their constant development. Progress has been revealed to nurses over the slow mysterious passage of time. Shared recollections reveal to nurses a consistent reminder that the past is ensuring the future. There is a belief in a continuation of the moment. A sense of moving forward and developing. The recollections of nurses demonstrate an ever-increasing means and involvement with technology and science. Nurses certainly seem to have progressed. The development of professional organisations, the emergence of leadership, and the growing reliance of medicine and society on nurse's technical expertise would appear to be a demonstration of this fact.

Progress for nurses has evolved to become an *image force* that lies at the junction of the two fundamental beliefs of science and history. Science manifests as the development of machines and inventions that impress and cajole humanity and lead nurses from one advance to another. There is a sense of victory in science, a triumphant moment in which science, nurses and humanity forge forward. It is important to note that the issue at hand is not with scientific knowledge as a worthwhile pursuit, but with the envisioned relationship between anticipated scientific insight, the hopes and ideals of nurses, and the discovery of an ultimate truth. Whilst scientific insight has been outstanding and discovery impressive, there is at times an overwhelming sense that a great deal is expected of science. So much so that it is difficult to be questioning and to not adhere automatically to the predominant view which affirms science and technology as informing nursing of its place and future.

Ellul (1973) argues that belief in progress can be explained as one of a number of indicators that demonstrate the de-christianisation of Western society. Ellul (1973:22) argues that modern western society has reached a period of post-christianity, not in a spiritual sense where it can no longer be claimed that Jesus Christ came to earth and that from hence forth he is contemporary lord of this world and its history, but in a sociological sense. Current Western society and thought has evolved to a post-christian era in which the government and society have become separate to religion and divinity. Religion and divinity are no longer the frame of reference for a large number of people and Western societies. The church is no longer a power to be reckoned with as its principle influence upon society has been reduced to commenting on morality. From this evolution of religious influence there arises a dialectical tension in which two opposite forces are identified. On the one side there are

social, political, intellectual, scientific and artistic domains of society, which follow their own laws. Christianity is allowed a limited voice. On the other side there are the religious, spiritual and moral areas in which christianity finds a place amongst and equal to other competing ideologies (Ellul 1973:23).

The outcomes of dechristianisation are numerous. Firstly, many individuals have no interest in questions raised by God and have a limited understanding of the words and concepts presented by the church and sacred scripture. Secondly, the development of a practical materialistic view of life has evolved where principal concerns are focused upon comfort, living standards, technology, happiness, a healthy long life, etc. Belief in progress is fundamental to the practical materialistic view because it affirms that:

> *Man* [sic] *is constantly moving towards a better state and constantly making the good more of reality; he* [sic] *will reach perfection as the result of a long-range movement of material progress and can not be frustrated* (Ellul, 1973:22).

According to Pacey (1983:65), the relationship between humanity and science can also be conceived as two philosophically different worldviews of nature. Aside from simplistic puritan values concerning the prevention of social and environmental challenges through abstinence (e.g. to prevent pollution all one has to do is stop burning fuels), there is firstly the view that nature has intrinsic worth. The goal of scientific and technological development is to find ways of living in harmony with nature. By contrast, the second and dominant view in society and nursing literature engenders a confidence in human ability to overcome problems through living in harmony with technology. The second view reflects a moral judgement that suggests that the appropriate role of humanity and disciplines such as nursing, is mastery over nature (Pacey, 1983:65). Through technology and science humanity transcends its imperfect

limitations to attain its own salvation. Through mastery over nature a new reality constructed, destiny is determined and humanity establishes its own place. Anello (1970:5) explains the ideas in relation to health care and nursing:

> *If we give continued assistance to research and scientific development, the health of people in many parts of the world could be greatly improved and the gap that separates the developing countries from the rest of the world could be greatly narrowed. This commitment to research has resulted in a general feeling that all problems can be solved. The death of an infant, the diseases of the elderly, cancer and heart disease, these days are viewed as problems which can be solved.*

Through perpetuating a relationship between nursing, science and technology there emerges a faith in progress so powerful as to engender belief. A belief that control of nature is not only possible but is coming soon. A faith not only in the process of this development but an actuality that can be observed, a process in which nurses can participate, a reality those nurses can advance. In fact a faith so strong as to bring about action. The importance of the concept of progress to understanding technology in nursing and health care should not be underestimated, and is highlighted by Drought & Liaschenko (1995:298) who note that:

> *Technology has historically been viewed as one of the markers of progress in human history, and this is especially the case in medicine.*

Linear Progress

Underlying faith in progress is the belief that it should be interpreted as a linear development. Linear development is a dominant deterministic assumption which is expressed as conceiving of technological and scientific growth as continuous, smooth and steady (Ellul, 1964; Pacey, 1983; Postman, 1992; Walker, 1970; and Winner, 1977). The linear view of progress can be represented on a bar or plotted graph as a straight forty-five degree ascending line. Technological and scientific progress is conceptualised as a succession of regular and

continuous developments, discoveries, and inventions.

There is a remarkable paradox that pervades arguments concerning linear progress. From one perspective there is the idea that technology advances of its own inertia and knows few limitations. Technology possesses a character of being self propelling and sustaining. The alternative perspective that is held ironically at the same time argues that people have full conscious control and choice over technology. Nurses are viewed as masters of technological progress that develops of its own inertia. The linear view encourages a worshipful attitude towards industrialisation and modernisation. Progress is conceived as a juggernaut like advance in which an overwhelmingly powerful destiny in the form of technological development brings about a moral obligation to service and obedience (Winner, 1977:51).

Numerous nurses (who notably are cited regularly in the literature) explicitly envisage progress to be linear (e.g. Boss, 1989; Farmer, 1978; McClure, 1991; Reed-Ash, 1983; Simpson, 1989; and Simpson, 1990). According to Pacey (1983), linear development is a dominant view that underpins the attitude that humans have lordship over nature, and fosters the perception that progress is best characterised by control and predictability. Typical of nurses who assume progress to be linear is Farmer (1978:17), who suggests that:

> *With the revival in the sixteenth century of learning, the application of technology to medicine began earnestly. Since then, the collaboration of doctors, scientists, and engineers in the construction of theoretical models of man (using the currently fashionable technology in analogy to biological structures) has been rewarded in a steady and substantial accumulation of knowledge.*

The claims of Farmer (1978) misrepresent progress and lead to serious weaknesses when conceptualising technology. The claims are based on the simplistic notion that human

development is reflected primarily in the achievements of science and technology and should be accompanied by an unsubstantiated optimism regarding its eventual outcome. Undoubtedly in recent years there have been substantial changes in medical technology and scientific knowledge. However, claims of steady accumulation are an exaggeration.

Arguments associated with the linear view can be critiqued by firstly recognising that it has a tendency to encourage analysis of progress to be over-selective. It deceives us into ignoring the fact that improvements in any one area can and do often have less desirable outcomes elsewhere (e.g. the side effects of pharmacology). Secondly, technology has as much to do with the discovery of technical know-how as it has to do with the performance of people. Technology only develops as fast as humans can adapt to the demands of technology (as long as technological development depends upon human input and use). Therefore, technology is subject to technical effectiveness and efficiency as well as human intervention and is thus susceptible to impediment. It may be the case that technology can assist nurses to be more efficient and foster new skills, but claims assume nurses are able to respond to the requirements of technological invention and can assimilate technology into their practice. Additionally, nurses must be willing to accept changes to their practice, take on the responsibility of new processes and procedures, and become suitably educated, interested and deft, so as to not impede the usefulness of machinery and equipment.

Thirdly, technological development is not linear, but geometrical. Technology does not advance arithmetically through a linear addition of constant differences (e.g. 0, 5, 10, 15, 20, etc). Discovery and invention accumulate and advance through cultural foundation and the

subsequent multiplication of constant factors (e.g. 2, 8, 32, 128, etc). Technological advance does not result only from an accumulation of knowledge and skills within one field of research, but the collection of many factors and bodies of knowledge which regularly but indiscriminately come together. Numerous other factors also influence technological progress. Many discoveries and inventions have been ignored or forgotten due to politics, economics, religion, jealousy, fear or ignorance. Therefore, it can be argued that technological progress and specific fields of endeavour are subject to variable increases in development and periods of respite.

Suffice it to say, there is dynamism to technological change that can be characterised as self-augmenting. There is a sense that technology and science progress with little explicit planning or collectivity. Growth is automatic. Many varied discoveries and inventions are not collectively planned or calculated and sometimes are not desired. In addition, the value of technological development can rarely be decided on the basis of its consequences in one area of application. There is always a degree of uncertainty and uncontrollability to science and technology and the full outcome of discovery and invention is rarely known. It is impossible to establish rationality in a technological sense, since the ends to which means may be put are never fully conceived. Conversely, technical means can be more productive than initially planned.

Progress is not smooth but irregular, and is the endless combination and recombination of numerous factors that include technology and science. Progress is influenced by cultural, economic and political forces as well as technical know how and spiritual beliefs. Progress is

characterised best as an autonomous process possessing technical, intellectual and cultural evolutionary lag. It does not rely generally on one person, but with collective knowledge and skills and a rationality sufficient to identify what is to follow (Ellul, 1964; Koestler, 1964; Mumford, 1934; Pacey, 1983; Walker, 1970; and Winner, 1977). Technological progress is represented best on a bar or plotted graph as a line which is randomly ascending and descending.

Lastly, the linear view of progress proliferates an interpretation of technology that serves a deeper political purpose. Belief in linear progress creates willingness for nurses to accept the advice of *experts* and continue to wait for technological and scientific discovery to create the kind of world and practice which they envisage. Through nurses believing that scientific and technological progress is a process of steady upward development it is less likely that they will want to participate in decisions concerning technology funding and policy. Faith in an ultimate goal, whether it be reality or illusion, would seem to appease any effort to franchise nurses in political decisions (Barnard, 1997; Harding, 1980; Pacey, 1983; Wajcman, 1991; Walker 1970; and Winner, 1977).

The Elimination of Scarcity

According to many nurses technological progress is bringing about the development of a post-scarcity society. In the future our lack of resources, wealth, knowledge and skills will be eliminated, as will social degradation and suffering. Challenges to society such as poverty, exploitation, capitalism, war, crime, disease, pollution and alienation will be resolved (Anello, 1970; Bennett, 1970; Folta, 1973; Lenihan, 1978; Reed-Ash, 1983; Simpson, 1990;

Sotejo, 1971; and Stevens, 1985). Through participating in the use of health care technology nurse's assist to solve every problem, eliminate every need, and fulfil human destiny. Participation in progress (manifest as machines and equipment) helps humanity transcend restrictions and ensure its prosperity. Typical of a post-scarcity view are the assertions of Salmon (1977:19), who claimed that:

> *Technology can erase disease, hunger, poverty, brutality. It can change the quality of life by freeing man* [sic].

Folta (1973) personifies also the post-scarcity view of disease and treatment. Views expressed are simplistic and ethnocentric (regarding one's own cultural group as superior to others even in matters of religion, values and meaning) and suggest the experience of Western technology and science to be one of superior personal and social advancement. It is asserted that:

> *In primitive conditions there is no place for the inept, the chronically ill, even the bedfast patient. Neither the economy, technology nor culture can support non-productivity for any length of time. Only highly developed societies can produce the technology to aid and cure such unfortunates. Ironically only with advanced technology can man* [sic] *support a system of values that insist that such humans should be cared for* (Folta, 1973:39).

According to Pacey (1983) and Winner (1986), post scarcity is typical of a technological interventionist or technological fix approach to problems, and is common to technologists and latter decades of the twentieth century. Economics rather than energy is the central concern and nature is viewed as a biological machine which can be manipulated and controlled to suite the purposes of humanity and groups such as nurses. Technology is conceptualised as construction, innovation and progress, and the reduction of scarcity is achieved through scientific discovery.

Allan and Hall (1988:29) highlight that one of the principal reasons for the technological interventionist or technological fix approach in nursing is a particular epistemological tradition within science in which empirical issues are separate to metaphysical. Nursing and bio-medicine are governed by the *longstanding American belief in the efficacy of science and technology underpinned by a mechanistic view of the universe and faith in the rationality of humans to battle between the person and nature*. Central to the approach are values and beliefs that espouse the view that disease is something to be killed and is separate to people and many of the measures of quality of life.

Technological fix is a dominant view that determines both social policy and the allocation of economic resources with a religious fervour described by Winner (1986) as mythinformation. Through the technological interventionist approach, technology proportionately increases as attempts are made to control and manipulate the environment around us. Each technological and scientific discovery engenders an air of success, which reinforces the dominant view.

Despite the fact that industrial technology has added to national wealth and to a reduction in economic scarcity in so called technologically advanced countries, there have been dramatic increases in other forms of scarcity. The distance between rich and poor has increased, as have the number of poor. Natural resources such as uncontaminated water and air have been depleted, as have forests and wildlife. Many infectious diseases have been treated and cured, but new diseases continue to emerge. People continue to extend their life span, but live in environments and foster social behaviours which cause them to be more susceptible to

disease and fatigue. There are also other challenges associated with our technological society, which relate to social despair (e.g. drug abuse, crime and loneliness).

Even though nursing literature argues for post-scarcity as a consequence of involvement with contemporary objective means, the achievement of this goal is questionable and certainly unsubstantiated. Although technology has reduced some forms of scarcity and there have been enormous reductions to many of societies challenges, the view that technology provides the answer for the future is excessive. Although some challenges confronting humanity will be solved through technological intervention, the dominance of nursing literature extolling progress as compared to literature seeking debate concerning issues such as pollution, cities and social degradation is lamentable because alternative and important approaches to these challenges are ignored. Additionally, the limited number of authors willing to address iatrogenic disease, the industrialisation of health care and the biomedical model as a reductionist illness focussed dominant view, is of extreme concern and in need of rapid correction (Allan & Hall, 1988; Illich, 1976; Starr, 1982). The need for a balanced view regarding the potential of technological progress and the need to assess the benefits and costs of various developments are important to understanding society and health care. The relationship between technology and iatrogenosis, industrialisation and the biomedical model is linked inextricably to machinery, equipment and the proliferation of the sort of health care environment and society which fosters acceptance of the outcomes of their development. Failure to recognise the relationship curtails adequate debate.

Then again, who really wants to hear about the challenges of technology? It is far more

interesting to consider its achievements and possibilities. However, given that one of the principles of nursing practice is a commitment to care for individuals and society, there is need for nurses to reflect on the post-scarcity view. Nurses are important participants in the delivery of health care and need to be involved more in critiquing the progress of technological development and its relationship to the health of people and society.

Technological imperatives: Technology is the answer but what was the question?

Unfortunately, many nurses are less circumspect about progress. They argue for nursing to be involved appropriately with technological development and accuse nurses prepared to be critical of technology of failing to come to terms with the goals and philosophies of contemporary nursing practice and health care. They suggest technological progress (as a developmental process) is an advancement for nursing and conceptual and philosophical debates which introduce a diversity of views only entice employers to replace nurses with other health care groups (Adams, 1986; Aniello, 1970; Bennett, 1970; Buick-Constable, 1969; Christman; 1970; Clark, 1968; Folta, 1973; Kristensen, 1989; Lenihan & Abbey, 1978; Maloney, 1968; McClure, 1991; Pillar, 1991; Reed-Ash, 1983; Simpson & Brown, 1985; Simpson, 1990; Stevens, 1985; and Tunstill, 1972). The literature contends that unless contemporary nurses act to become involved more in embracing machinery and equipment there will be significant evolutionary changes against nursing. They argue the outcome of technological development must be a nursing discipline which continues to be reactive to technological change whilst being concerned for people, society and the advancement of specialised roles and responsibilities.

Undoubtedly, nurses must adapt to change. Technology requires them to alter their practice. Machinery, procedures, policies and organisational systems are ineffectual unless linked also to the array of interconnecting people, machinery, information, resources, etc. There has evolved a reciprocal relationship between each part of the technological ensemble that requires overlap and inter-connectiveness. Each part of the system relies on the cooperation of the next. Nurses as practitioners in the health care sector have become an important inter-connecting factor and are a means to obtain certain ends. Goshen (1972:62) highlights the contemporary relationship between nursing and technology noting that they must assimilate knowledge and skills necessary for the use of machinery and equipment to their clinical practice. The author avoids however encouraging nurses to reflect on changes to their discipline. Instead, she asserts that a failure to embrace technology will lead to loss and takeover:

> *the nursing profession is one of several which is rapidly approaching a time when it must become technologically sophisticated or, failing to do so, go out of business.*

The quotation highlights two arguments found typically in nursing literature which are designed to ensure participation as inter-connecting elements in the process of making efficient the technological system. Authors encourage a fear of redundancy and a primacy of progress. Fear of redundancy is a common focus (i.e. being replaced by technology and/or other health care workers) which curtails significantly intellectual debate and the development of a practice discipline aware fully of the experience and meaning of technology. Discourse alludes to the replacement of nurses by other health care workers and other potential negative outcomes associated with future roles and responsibilities which may (or may not) occur. Primacy of progress alludes to the ability of nurses to recognise and

respond to the importance of adapting their practice to technological development and change. Adaptation is argued to be more important than any other issue the nursing profession is facing currently. But how are nurses to win? On the one hand, they need to remain up to date and technologically relevant. There is increasing translation of human physiology and diagnostic techniques into the language and actions of machinery, etc., and on the other hand, there is a need to guard against fragmentation, dehumanisation and de-evolution of their discipline.

Regardless of the legitimacy of any prediction, it is apparent that the majority of the nursing literature is orientated towards dampening analysis and creating an imperative to action. Authors appear motivated by an attitude that believes that nurses must be responsive to technology, rather than technology being responsive to the needs of nursing. The writings of Simpson (1985; 1989; 1990) are an excellent example of authors who seek to dampen analysis and present an attitude that fosters the need to participate. The author, who is not only a nurse but also corporate manager of a computer company called *Nursing Systems and Systems Research*, uses language typical of a utopian belief in progress and clearly intends to create a technological imperative. Although many of the author's comments are reasonable, particularly those related to the need for nurses to be aware more of the development of objective means, the discourse is biased, uncritical and dominated by unsubstantiated assertions concerning the experience and future of nursing. Participate or perish is the explicit theme of the literature. Acceptance of this view is contended strongly to be the only appropriate response to progress and is highly threatening (Simpson, 1985; Simpson, 1989; and Simpson, 1990). It is suggested that nurses are being left behind; nurses need to manage

or be managed; and nurses may be failing to determine their own destiny.

The only ingredient missing from the literature is advertisement for computer systems. Not only is the existence of conflicting interests blatant, but the discourse is misleading. There is a clear intention to stimulate questions such as: What if I don't participate?; Will I be redundant in a few years?; Am I less a nurse if I am not enthusiastic or at least prepared to take a balanced view with regard to technology?. The writings are deterministic and are a call to action. Nurses who are less enthusiastic about technology are accused of having limited professional insight:

> *Nurses must learn to manage technology - or they will end up being managed by technology* (Simpson, 1990).

An additional reason for the existence of discourse encouraging an avoidance of redundancy and a primacy of progress is the need to affirm the belief that people must always be positive. A positive attitude supports the development of technology. In our society it is necessary to welcome progress and to be firmly reinforced by a belief in contemporary thought. To be critical of that which is judged to be progress and to be negative about our world contaminates others and objects with an unhelpful attitude. Anyone who questions technology or critiques beliefs about progress is at least a technophobe, a determinist or luddite, and probably has an innate desire to live in the country (Ellul 1968:251). Such people are labelled marginal to society and certainly not knowledgeable and professional nurses.

Mooney (1956:55) was one of many nurses who quickly adopted a positive attitude and suggested more than four decades ago that reflection on the place of technology in nursing

was not necessary. The author was intolerant of any person questioning the evolution of technology and suggested that:

> *There are a few people who still are sceptical about its possibilities. Some of them just don't want to believe in it. Most of these critics probably are adverse to change of any kind. Such a person should ask himself* [sic] *how he* [sic] *would like to live under eighteenth century conditions - before the industrial revolution raised our entire standard of living.*

Even modestly informed opinion concerning the effects of the third industrial revolution would be hesitant in claiming value for all. Exploitation of many by a few, societal degradation, poverty and pollution are but a few outcomes which are acknowledged commonly. But despite the lack of balanced argument, informed opinion and evidence, many nurses have continued to espouse technology as the future of nursing. Folta (1973:39) is typical of authors and poses the rhetorical question:

> *Is our problem in health care, not a problem of technology fear but merely a fear or a refusal to accept responsibility for our future?*

Critiquing progress, critiquing the role nurse's play in health care, researching the experience of technology and critiquing our technological society have not been the issues addressed generally in nursing literature. The fundamental concern has been how to propel nurses towards being better participants in the process of using machinery and equipment in the health care sector. In fact, there is a growing body of literature specifically directed towards furthering the process of applying technology. Researchers have sought to identify: reasons for nurses' resistance to the introduction of technology (Hepworth & Fitter, 1981; Rosenberg *et al.* 1967); reasons for nurses' stress associated with introduction of new technology (Fitter, 1987a; Fitter, 1987b; and Kristensen, 1989); the need for further education and support for nurses (Bongartz, 1988; McConnell, 1990; and Wichowski & Kubsch, 1995); and the use of

technology as an indicator for the staffing and administration of nursing departments (Alexander & Randolph, 1985; Henry, 1982; Leach, 1990; Leatt & Schneck, 1981; and Overton, Schneck & Hazlett, 1977).

Although some nurses highlight the need for involvement in the planning, design and evaluation of technology (Fitter, 1987b; Harding, 1980; Henderson, 1985; Joachim, 1988; Lewandowski & Kositsky, 1983; and Miele, 1970), instrumentalism underpins research and understanding. Authors emphasise the development of knowledge, skills, efficiency, effectiveness and educational strategies to foster appropriate work force development and productivity. For example, Pillar and Jacox (1991) suggest that an appropriate strategy for the introduction of technology and advancement in the use of machinery and equipment are educational programs where nurses are told what to do, and they do it. They explain that when conducting an educational program nurses need to be taught to accept uncritically the reality that they have to use new technology. Educators should emphasise that nurses must build their practice on a commitment to the greater good of the profession even if this means bending to the demands of other people and technology:

> *Inherent in these approaches are motivators for planning the educational and training sessions that accompany the introduction of new technology such as appeals to rational self interest, professional commitment, or the respect for expert authority* (Pillar & Jacox, 1991:50).

Unfortunately, responsibility for the future involves more than a few machines and a technological dynamism in which acceptance of change is a logical aspiration. The degree of adaptation necessary in order for nurses to participate in the technological ensemble is more than instrumental. Winner (1977:103) highlights that evidence demonstrates that

technological innovation influences every aspect of society. Customs, values, ideas, language, behaviour, attitudes, etc. are swept up in accommodating to the process. Actions must alter, customs and practices must give way, and certain values must be rejected in preference for new ideas. Whilst some change to nursing practice will always be an improvement, ignorance to the full extent and influence of technological development on society and the nursing profession is a concerning characteristic of the literature.

Technological progress is presented as always necessary and relevant. Arguments lack analysis, critique and research. Language is intimidating often and seeks to support a technological imperative. It is unfortunate that at a time when more is needed to inform nurses of unanswered questions concerning their practice and technology, the literature does little to further understanding and reflection.

Technology advances nursing as a profession

Nursing discourse introduces rarely issues associated with critiquing the responsibility of nurses to participate in advancing technological progress. In fact many authors appear to believe that questioning technological development will threaten the whole edifice to which nursing is aligned. They argue that debating the benefits and costs of technology will lead to the failure of nurses to obtain their legitimate and ultimate rewards. Technology makes nursing a professional and powerful health care group and progress is therefore very beneficial to its development (Bongartz, 1988; Cooper, 1993; Dennison, 1942; Edelstein, 1966; Fitter, 1987a; Given & Given, 1969; Gaudinski, 1976; Gordon, 1992; Harding-Price, 1990; Hepworth & Fitter, 1981; Huether, 1978; Johnson, 1974; Kristensen, 1989; Mayberry,

1985; McConnell, 1990; McConnell, 1991; Miele, 1970; Moloney, 1968; Rosenberg *et al.* 1967; Simpson, 1985; Simpson, 1989; Simpson, 1990; Walker, 1970; and Walker, 1980).

It is argued that because of technological progress (in particular the use of machinery and equipment in nursing practice) nurses are less subservient to the demands of medicine. Through machinery and equipment use they have obtained franchisement in decision-making, and have the opportunity to share in the fruits of technological development. Issues associated with the experience and understanding of technology in nursing are important, but secondary to active participation in its application. Technology not only reverses the scarcity of nations and people but also cures nursing of a chronic sense of inferiority. It creates a professional basis for the future.

The literature argues that in order to guarantee nurses a valued place in the health care sector linked to decision making and professional practice, their participation in the application of technology is a key element. Technological progress requires a commitment to develop appropriate knowledge, skills and experience:

> *If nursing is to survive as an entity primary consideration must be given to the acquisition of tools and attitudes that will enable it to identify and describe its uniqueness* (Walker, 1970:338).

Edelstein (1966) was so impressed by the potential and value of technical expertise to nursing that it was advocated that nurses who use modern technology (machinery, equipment and gadgets), should receive greater professional recognition in the form of higher salaries, favoured opportunities for continuing education and accelerated promotion. The author acknowledged the social and professional prestige associated with the application of machine

technology and attempted to demarcate involvement with objective means as a higher level of nursing practice (requiring specific knowledge and skills). Knowledge and skills associated with machinery and equipment were understood to demonstrate higher order ability compared to the knowledge and skills of personal care, etc. The proclamation made more than three decades ago indicates clearly that there exists a hierarchy based on machinery and equipment use and a practice bias which identifies the use of technology to be of superior value to nursing and the health care sector. The use of machinery and equipment is believed to demonstrate the increasing knowledge and skills of nurses and their growing power and professional development.

Suffice it to say, even though nurses are involved increasingly in the use of machinery and equipment and enjoy better educational opportunities, they have rarely had the power to control the development and introduction of technology and have experienced variation in professional independence and recognition. There remains currently a tension between technical instrumentalism and professional responsibility for the phenomenon (Allan & Hall, 1988; Barnard, 1997; Katz *et al.*, 1976; Sandelowski, 1988; Starr, 1982; and Walters, 1994).

Technology Dehumanises the Practice of Nursing

Despite the predominance of optimistic views in the literature, there are nurses who are convinced less of the benefits of technology to nursing and patient care. They claim that nurses have lost their commitment and ability to care for people as a result of increasing machinery and equipment. Technology encourages nurses to value objective means over human experience. Nursing care is noted to be increasingly automated, controlled and

quantified. It is suggested that the experience of technology is one of alienation and dehumanisation as nurses are forced to adjust their day, values, practice and professional lives to an increasingly machine orientated health care system (Calne, 1994). Patients become secondary to the needs of technology particularly when efficiency, specialisation, machinery, procedures and protocol are emphasised in dehumanised clinical environments. It is argued that technology has become the primary focus of society and health care and has impacted detrimentally upon nursing practice, values, goals and ideals (Allan & Hall, 1988; Barnard, 1997; Berthold, 1969; Braun *et al.*, 1984; Calne, 1994; Chustman, 1978; Cooper, 1993; Curtin, 1978; Donley, 1991; Fagerhaugh *et al.*, 1980; Frances, 1948; Hawthorne & Yurkovich, 1995; Pellegrino & Thomasma, 1981; Reily & Behrens-Hanna, 1991; and Rowan, 1966). The comments of Strauss (1968:8) are typical of the type of cold-hearted, uncaring, lack of concern for humanity that many authors associate with the effect of technology on nursing:

> *The ICU's have developed as special locales for certain types of very critically ill patients: for those who have high potential for dying, or for suffering retrogression unless cared for closely and carefully - but only if they are worth saving or can be prevented from worsening. Moderately ill patients usually are not sent to the intensive care unit; neither are patients who are too far gone for anyone to wish to save them.*

Winner (1977:212) argues that the concept of dehumanisation is a common but unhelpful way of thinking about technological society and claims concerning dehumanisation are not accompanied often by explanation of what is *truly human*. It is suggested that a better approach to expressing the notion of **dehumanisation** is: *More highly developed, rational-artificial structures tend to overwhelm and replace less well developed forms of life*. That is, the organised and efficient world of technology has a tendency to dominate over the less conscious and spontaneous world of nursing.

When nurses define dehumanisation in the literature they highlight either the diversion of attention away from patients to machinery and equipment, or they concentrate on measures of dehumanisation such as: unfamiliar clothing and personal belongings; reduced ability to communicate; altered physical appearance; or a lack of individuality. Dehumanisation is defined by a loss of identity through a process of objectification or denial of attributes associated with self and personality. The outcome is a loss of humanness and the fostering of a perception that people are understood best as machinery or animals (Calne, 1994; Harvey, 1985). Postman (1992:105) highlights also that dehumanisation is a common way of understanding the effect of technology and notes to be a process that is observable in medicine. It is asserted that very few doctors are satisfied with the effect technology has upon medical practice. They are concerned about the autonomous nature of technology and it ability to create its own social and professional imperatives. Technology is believed to support its own existence and in the process it redefines what doctors are, alters what they do, and changes how they view people and illness.

Reiser (1978:228) also expressed disquiet about the influence of machine technology on medical practice. It is claimed that technology is associated with: reductions in clinical skills due to decreased emphasis on personal insight and judgement; an emphasis on the scientific laboratory rather than the patient; a propensity to view people as objects of study rather than individuals; the use of technology to shield practitioner anxiety concerning the critically ill; reliance on technology rather than physical examination and history taking; and a rejection of subjective evidence from the patient (i.e. reliance on technological evidence i.e. *what the*

machine says).

In like manner, nursing literature argues also that the impact of technology upon nursing practice has led nurses to be little more than technicians in an inhuman world where people are secondary to the needs of institutions and the technology which controls it (Braun *et al.*, 1984; Brown, 1985; Calne, 1994; Cooper, 1977; Cooper, 1993; Donley, 1991; Giuffra, 1980; Henderson, 1980; Levine, 1971; Paulen, 1984; Pellegrino, 1961; Raatikainen, 1989; Sandelowski, 1988; and Wilson, 1991). Nurses are accused of being influenced significantly by technological development and being aware insufficiently of the ethical responsibility associated with their actions and practice. Discourse suggests that in recent years the technology of the health care system has had more impact upon nursing then nursing has had upon it (Barnard, 1994; Barnard, 1996a; Braun *et al.*, 1984; Briggs, 1991; Castledine, 1995; Clifford, 1986; Curtin, 1978; Harding, 1980; and Sandelowski, 1988). Technology has advanced a health care system that can be characterised as depersonalising potentially and staffed by health care workers who are distracted often by the technological demands of care. Patients are paranoid increasingly and care lacks fundamental concerns associated with trust, compassion and interpersonal contact. It is asserted that the caring traditions of nursing (a commitment to placing the person as the central focus) are being challenged by the rapidly expanding influence of the phenomenon. In addition, the moral, ethical, interpersonal and financial challenges associated with the proliferation of technology are the dark clouds in the silver lining of health care, and nurses rarely have the autonomy and power to impact upon them (Barnard, 1996a; Harding, 1980; and Walters, 1994).

According to the literature, shorter stays in hospitals along with reduced staffing have led to an emphasis on repetition, time constraints and physical care. Clinical environments struggle to provide emotional support for patients and families which transcend superficial reassurance about machinery, procedures and policies. There has been depreciation and marginalisation of chronic illness, an increasing demands for efficiency and effectiveness, and an over-reliance on machinery and equipment. These effects combined with increasing legal liability associated with health care and the maintenance of machinery, etc. produce an emphasis on function, policy, safety, protocol and specialisation.

Reiser (1978:228) notes that health care practices and medical intervention are associated increasingly with the two qualities of reproducibility and standardisation. Reproducibility of practice treatment leads to accuracy and permanency, and standardisation enhances uniformity of interpretation and measurement. As a consequence technology has converted patient treatment and assessment into numbers, graphs and pictures. The conversion has decreased controversy, removed subjectivity, and established measures that are checked easily in order to make clinical practice reliable. The features of health care and clinical practice described by Reiser (1978) are similar to the features of technique noted previously as monism, universality, artificiality, technical automation, rationality and autonomy (Ellul, 1964).

According to Laing (1982) and Salyer & Stuart (1985) machine technology creates also an emotional distance between the nurse and patient. It is claimed that many nurses escape the need to engage in human relationships on a personal level through their involvement with

machine technology. Emphasising their roles and responsibilities with machinery and equipment removes the emotional basis for relationships and the subsequent distancing enables the nurse to avoid involvement with the person. Technology replaces the patient as the central focus of care:

> *Concentrating upon the neutral machine provides protection from emotional involvement. The incessant, repetitive routine of checking the instrumentation is paradoxically soothing* (Laing, 1982:242).

The soothing sense of involvement with machine technology is examined also by Pacey (1983) and Cooper (1993) who suggest that expertise which leads to control over technical means creates a sense of existential joy originating from mastery of technical action. The sense of joy is shared with the machine as a friend and colleague. Technology is viewed as an extension of the patient for whom the machine is assisting. To control the machinery and equipment is in effect the same as caring for the person. Care becomes inflexible as work is standardised, services are automated and an emphasis is established on objectification, problem solving, disease and treatment (Allan & Hall, 1988; Battistello, 1976; Braun *et al.*, 1984; Cooper, 1977; Cooper, 1993; Farlee, 1978; Henderson, 1980; Sinclair, 1988; Strauss, 1966; Wilson, 1991; and Yates, 1983).

Notwithstanding, some nurses argue they can transcend distancing and fragmentation of care as well as an emphasis on technical roles and responsibilities in order to provide psychological, emotional and cognitive support for both patients and families. It is argued that nurses adjoin the patient to technology and are the human element, the interpreter, between the machine and the patient. Nurses coordinate and link the patients' experience and the machine's response (McConnell, 1991; Moloney, 1968). With the development of

technical skills and knowledge nurses have become a critical element in joining the person and objective means (i.e. the human-machine interface). They adjoin the two elements of nature and artificiality. They are the middle person, the mediator between technology with its inhuman artificial presence and the real world (McConnell, 1991; Rowan, 1966). Each nurse takes time from a busy schedule to allay anxiety through explanation, professionalism and companionship (Edelstein, 1966; Gordon, 1992; Huether, 1978; Johnson, 1974; and Miller, 1969).

It is asserted that their participation in technological progress has established for nurses the role of saviour in a strange and frightening world. The experienced person who really understands nursing looks past the machine to focus on the patient. All nurses have the:

> *...ability to communicate with the patient, because she* [sic] *will be his* [sic] *link with the personal, human world, within an impersonal, electronic world* (Rowan, 1966:2199).

Reiser (1978:229) disagrees with this claim and argues that the belief that increased machine and computer technology leads to improved nurse-patient relationships is a myth manifest commonly as the perception that technology allows more time to be spent with patients. It is contended that arguments which claim technology assists human relationships are unreflective and deny the realities of the technological environments, in which nurses live and work. Numerous nurses claim also that machinery draws the nurse practitioner away from human relationships (e.g. Allan & Hall, 1988; Calne, 1994; Harvey, 1985; Henderson, 1980; Raatikainen, 1989; and Sandelowski, 1988) and their experience may be comparable to a process observed in medicine which has developed through a series of stages since the nineteenth century. Medical practice has evolved from having direct involvement with the

patients' experience through an emphasis on verbal communication and information gathering, to direct examination of a patient's body by techniques of physical examination, and finally to the current stage of indirect communication with patients via machines and technical experts. It is noted that following each stage, the earlier skills and knowledge of the discipline have declined with important loss of insight into what previous approaches provided. Although no evidence is available to confirm that nurses have experienced similar stages of evolution, it is reasonable to speculate that given the inter-relationship between medicine and nursing (particularly the deputisation of roles and responsibilities) and their increasing involvement with health care technology, similar changes may be occurring.

Even though nursing literature is largely deterministic (i.e. technology is causing the dehumanisation of care), it does present the reader with frightening claims about nursing and medical practice. Importantly, it is noted that although technology is claimed to cause stress, burnout, dehumanisation and fragmentation of care (Birckhead, 1978; Brunt, 1985; Reiser, 1978; and Sayler & Stewart, 1985), the evidence to support or refute the claims is sparse and speculative. Claims are not based on research and are either accepted or rejected generally on the basis of personal opinion.

It should be noted also that despite the concerns of many nurses regarding the dehumanisation of nursing practice, none of the literature argues against faith in progress. The dilemma nurses seek to address is not the need to critique common views concerning progress, but the need to for better nursing care within the process of technological change. Nurses argue for supportive environments that maximise the skills of educated nurses who are concerned for

humanity. It is believed that when concern for patients is not eroded then even the more sceptical members of the nursing profession will be less concerned about their involvement with machinery and equipment. Despite the threat of dehumanisation technology remains an important phenomenon because not only does it improve health care treatment but it furthers the power and practice of nursing (Birckhead, 1978; Braun *et al.*, 1984; Clifford, 1986; Cooper, 1977; Curtin, 1978; Giuffra, 1980; Hawthorne & Yurkovich, 1995; Raatikainen, 1989; Sinclair, 1988; Wilson, 1981; and Yates, 1983). Being aware of problems associated with technology (e.g. dehumanisation) encourages progress while maximising understanding of the need for a caring attitude. A caring attitude and better insight into the impact of technology counter balance any threat the phenomenon poses to nursing care and practice:

> *As long as it is harnessed by man's rational intellect and tempered by the warmth of his* [sic] *humanness, technology can indeed serve the advancement of humanity* (Giuffra, 1980:17).

Despite experiencing difficulties maintaining a nurse-patient relationship the need to encourage technological progress is not highlighted as an issue for debate and reflection. The experience of dehumanisation and claims concerning its effect on nursing and the patient are counterbalanced by an ideological contention that caring nurses transcend the challenges of objective means. Through appropriate education, insight, and a commitment to practice nursing as it *ought to be practiced*, nurses have the ability and potential to reverse dehumanisation in order to focus on each patient.

Notwithstanding, technology is described as an insidious influence upon both the practice of nursing and the experience of health care. Technology de-emphasises the human experience, distracts the practice of nurses, overemphasises objective means and weakens the goals of

nursing. Dehumanisation is argued to be a process related directly to the inclusion of increasing machinery and equipment in the daily practice of nursing and each nurse is charged with acknowledging the process and transcending the influence of the phenomenon. What is unclear is whether the experiences, arguments and claims of nurses reflect reality.

Summary

The concept of progress is influential to both society and health care. Nurses are influenced particularly by arguments associated with the concept and are encouraged by the idea of developing further roles and responsibilities in a rapidly evolving health care sector which benefits patients and nursing. Fundamental to their portrayal of technology is understanding which emphasises advancement of an imperative to action, the power and prestige of technical skills and knowledge and the linear view. They are beliefs that are cornerstones by which contemporary nurses conceive of their future practice.

Notwithstanding, there are numerous tensions in the literature that are devoid of resolution and evidence. For example, technology in contemporary nursing is described as both improving and deteriorating the relationship between the patient and the nurse. Technology is argued to both save time and use time. Technology is understood to advance nursing as a profession and distract nurses from their roles and responsibilities. Technology betters the accuracy and practices of nursing by making treatment and assessment more objective, yet makes the subjective experience less important. Technology is advancing nursing practice yet the profession remains subservient to medicine.

Overall, it is apparent that the idea of progress continues to be a major influence that determines significantly the way nurses' think about contemporary practice. Nursing discourse seeks to foster nurses' involvement with technology and better the practice of nursing through judicious control of technology as a neutral phenomenon. Improved education and a commitment to care for humanity regardless of the amount of machinery and equipment in clinical practice is the predominant argument. Discourse relies on the conviction that concerned and committed professionals transcend technology in order to focus both on the patient and the advancement of nursing. Unfortunately, the literature lacks research evidence, critical argument and adequate debate.

TECHNOLOGY IS A NEUTRAL OBJECT AND NURSES ARE ITS MASTER

The neutral argument is an important and common belief or assumption influencing the experience and understanding of technology. According to the neutral argument each nurse is able to control the influence of technology upon people, groups and society. This section argues against this commonplace belief and demonstrates that technology is more pervasive an influence on politics, values, nursing practices, and decision making than many nurses identify. It is asserted that adequate understanding and critique of the relationship between technology and nursing practice will not occur until nurses forego their reliance on the assumption that technology is a neutral object and nurses are its master.

Technology as a neutral object

Belief that technology is a neutral object and nurses are its master is the basis of assertions such as: machines do not make decisions they only solve problems; humans discover

problems and mechanise efficient resolutions; and technology intervenes after thinking has been completed in order to serve us. It encourages nurses to believe that objective means are understood best as agents of use which are physically and philosophically independent of human action and choice. Thus, any problem experienced in nursing practice associated with technology reflects inadequacy in the way machinery and equipment are used rather than any inadequacy inherent to the phenomenon (i.e. good workers never blame their tools). In addition, any issue of concern related to politics, ethics, morals and individual action should be addressed separate to technology by appropriately qualified individuals and professions. Machinery and equipment are always unrelated neutral objects (neutral in the sense of being responsive totally to human preference and decisions) which are controlled by nurses in their daily activities (control meaning nurses having lordship or mastery of technology in order to decide upon use and preference).

The neutral belief is commonplace and central to many peoples understanding of their relationship with technology even though it is rarely recognised, understood or discussed. The belief is central to understanding technology and science within the context of nursing (Barnard, 1997; Harding, 1980; Hiraki, 1992) and there is additional literature outside the domain of nursing which emphasises the importance of the belief to our contemporary lives. For example, Jacques Ellul (1968) adopts a sarcastic attitude towards to the belief and cautions those who seek to critique it because it is accepted implicitly by society and criticism attracts complaint and ridicule:

> *It is fearful to attack this commonplace, for it represents the base, the foundation, the cornerstone of the whole edifice within which all average men* [sic], *taking this clue from social thinkers (an optimistic group), likes to include technology, its glories, and its achievements, humanise it, and, in so doing, reassures himself* [sic]. *Of course, we maintain our poise by deciding that this commonplace is unassailable, solid as*

granite. For after all, what could be more certain? (p. 226).

Ellul (1968) is unconvinced by the belief and acknowledges it has been challenged and critiqued rarely even though it frequently informs thought and opinion. It is argued that the failure of society and groups to identify and confront adequately the neutral belief is central to not understanding the influence of technology on the environments in which we live and work (Barnard, 1997; Brinkman, 1971; Cotgrove, 1982; Mander, 1978; Pacey, 1983; Postman, 1992; Purcell, 1994; Wajcman, 1991; Winner, 1977; Winner, 1986; and Zerzan & Carnes, 1991). According to Cotgrove (1982) the belief is a dominant sociological paradigm which emphasises domination and mastery and strengthens the argument that humans have the right and ability to manipulate nature for their desired ends and purposes. It demands a faith in technology, science and scientific method, and has led nurses to view technology uncritically as the champion of health care services and professional development. Technology as a neutral phenomenon allows objective means to remain separate to considerations of correct practice or the daily lives of nurses and patients. Carnevali (1985) is typical of nurses who share the belief. She explains that:

> *...for the sake of both the client and clinician it would seem sound to consider technology a basic, neutral concept* (p. 12).

Other nurses express views similar and emphasise both the instrumental nature of machinery and equipment and the ability of nurses to integrate technology into their daily practice. It is believed that:

> *...increasingly, machines can be seen as useful tools which can be employed and controlled by nurses and patients in ways which benefit both, as good 'mechanical servants'- or even friends* (Ashworth, 1987:2).

Technology is understood to be mechanical means that are socially, culturally and morally neutral. In fact, technology is understood to be amoral (amoral in the sense of having no value of moral consideration). Technology is understood to be nothing more or less than a resource to be used by nurses as an extension to their discipline:

> *Nursing's ability to ensure that technology remains a tool to enhance the delivery of nursing care is directly related to the individual nurse's ability to approach and accept technology as simply an adjunct to his* [sic] *or her* [sic] *nursing knowledge. Only when nurses view technology in the same light as their stethoscopes will nursing's future as a humane and caring profession in a highly technological society be ensured* (Adams, 1986:32).

Adams (1986) understands very little about what is, and is not, technology. She is typical of those nurses who confuse technology in the form of electronic machinery (referred to commonly as advanced or modern technology) with manual technology such as a stethoscopes (i.e. according to Adams (1986) a stethoscope is not technology because it is unsophisticated, etc.). The author naively argues that nurses must relax and appreciate technology as nothing more than objective means available for the care of people. There is nothing intrinsic to the circumstances of the phenomenon's emergence or purpose that predetermines values, morals, how it is used and controlled, or the effect of technology on groups, individuals or the political processes around us. In fact, Adams (1986), Lenihan & Abbey (1978) and Wilkinson (1992) all suggest that direct responsibility for appropriate use of technology and decision making lies with each nurse. Nursing practice transcends technology and appropriate practice is within the insight and control of professional responsibility, education and judgement:

> *The experienced critical care nurse focuses on the patient, respecting his* [sic] *humanity, dignity, and privacy. The nurse takes time to identify the equipment and explain its function to the patient and his* [sic] *family. Even the most complex and potentially intimidating machine is seen in its proper role as a clinical tool* (Laing, 1982:242).

Nursing discourse suggests generally that the belief is unassailable. Nurses are implored individually and collectively to form *correct* decisions concerning the use of technology. Appropriate nursing practice is based upon *correct* values and clinical judgment. Nurses are characterised as capable of transcending bias, politics, economics, disinterest and even disenfranchisement to influence adequately the use of technology. They are able to focus upon shaping the use of technology to meet best the needs of human beings and nursing practice (Adams, 1986; Berthold, 1969; Birckhead, 1978; Clark, 1968; Fitter, 1987a; Folta, 1973; Handy, 1989; James, 1983; Kristensen, 1989; Laing, 1982; Maloney, 1968; McConnell, 1991; Rowan, 1966; Salmon, 1969; Sotejo, 1971; Stevens, 1985; and Wichowski & Kubsch, 1995).

However, contrary to nursing literature the belief is assailable and is in need of appropriate critique. Technology is a complex phenomenon that can be understood only when nurses examine it as more than a neutral adjunct to their practice. Appropriate examination begins with a critical review of assumptions which collectively assist to foster the belief.

Decisions and Technology

Discourse fails to address adequately the fact that decisions concerning the appropriate use of technology are subject to alteration and evolution. What was appropriate in the 1950s may bear little resemblance to our present time. Decisions concerning the use of technology are subject to cultural and social nuances, and are less likely to be neutral than to have significant effects upon individuals, groups and psychic life. Choice of means always has consequences

that do not equate with original purpose. Technology manifests in certain social relations and is a reflection of cultural orientation, symbolism and division of power. The use of technology may have a *good* or *bad* outcome, but most certainly not an outcome that is neutral. Examples of decisions within the domain of nursing that are subject to cultural and social evolutionary change are wound care, care of the body and birthing.

The Technological Society

Belief that technology is neutral machinery and equipment demonstrates little acknowledgment or insight into the technological character of the society in which we live. Societal values and expectations influence each of us. These values and expectations influence the way we react to technology, conceive of technology, and organise our world. Nurses give minimal credence to the potential reality that the logic of our mechanical environment alters habits, intentions, judgements, prejudices, thoughts, needs, ambition and obedience. Literature asserts that nurses need merely to act upon machines at their disposal, and if every nurse performs the same role and shares the common value system then nurses need not be concerned about technology. Ellul (1968) disagrees with this view arguing it is impossible for each person in our society to separate him- or her-self from technology as he or she is incapable of acting independent of it:

> *...it is absolutely superficial to say that on the one hand there is a man* [sic]*, a daughtless and blameless knight, an object, a lifeless tool. What exists in reality is a constant a stable interrelation between man* [sic] *and the machine: constant because man* [sic] *spends his life going from one machine to another, stable because the same relation is always established between man and each machine* (p. 229).

Just as Western society has become immersed within a social and cultural milieu that has embraced technology, so has the practice of nursing. Examples of embracement include

machinery replacing assessment skills and manual dexterity, computerised record keeping and a growing reliance on formalised policies and procedures. A nurse who is master of one or a few machines at any one time is possible, but control of a technological whole is far more suspect a claim. Nurses are required to be efficient in their work, to manipulate multiple numbers of machines and tools and to initiate and participate in fulfilling the requirements of increasing numbers of protocols, policies and organisational arrangements. Can nurses truly be the masters when the complexity of technology is examined in its entirety? Can nurses say they are free to modify technology wher the network of machines, procedures, protocols, tools, organisations, politics, and people are collectively reviewed? In reality, the relationship between nursing and technology is far to complex for simple and unsubstantiated claims, and the practice environment of nurses has been long modified prior to any pretence of independence, control, choice or good practice.

A Mood of Indifference

Nursing discourse engenders a mood of indifference to what many see as the realities of life and the purpose of technology (e.g. efficiency, rationalism, universality, and monism). Brinkman (1971) asserted that arguments supporting value-neutral technology are the beginning of nihilistic tendencies. The belief emphasises the immediateness of the technological event without adequate reflection upon the breadth of technological development and influence. Neutrality releases technology from a value of worth or worthlessness. There evolves a propensity to shift the burden of consequence and decision making to other factors and people, even technology itself, as noted in the following quote from Salmon (1969) who explained that:

The computers ability to process information can, for the first time, tell us exactly

> *what the quality is. In other words it can tell us with great accuracy how well or how badly we are doing* (p. 21).

The shifting of burden for decision making is an agenetic shift. It occurs when a person transfers responsibility for an outcome originating from personal action to a more abstract agent, in order to relinquish control and the burden of responsibility. For example, goals and activities in health care that lead to pain or inhuman treatment can be located within the responsibility of technology rather than the health care provider. Kelman (1973) noted that when behaviour and actions are explicitly ordered, implicitly encouraged, tacitly approved or legitimised by authorities, our readiness and ability to condone and commit behaviours and actions that may be against our moral judgement are enhanced. Authorisation of behaviour and action by authority obviates making choices and forming judgements. It is suggested that normal moral principles can become weakened particularly when linked to duty, orders, protocol and environments where legitimacy is placed with the decisions of others:

> *An important corollary to the basic structure of the authority situation is that the individual does not see himself* [sic] *as personally responsible for the consequences of his* [sic] *action. Again, there are individual differences, depending upon one's capacity and readiness to evaluate the legitimacy of orders received. Insofar as the person sees himself* [sic], *however, as having no choice in the action, he* [sic] *does not feel personally responsible for it. He* [sic] *was not a personal agent but merely an extension of the authority. Thus when his* [sic] *action causes harm to others, he* [sic] *can feel relatively free of guilt* (Kelman, 1973:39).

Individual reactions to authority and its impact upon decision making can take one of two forms. A normative reaction originates from being so far removed from the centre of power that the nurse is overwhelmed by authority and acts out of accountability or fear. A functionary reaction originates from being so close to the centre of power and decisions that the nurse identifies with the authority system and is swept up by glory and mystique. The

outcome of both reactions to authority is a tendency to expect not to be personally responsible for the consequences of actions. There is a tendency towards unquestioning obedience, a routinisation of duties, a replacement of personal morality with corporate principles, and the dehumanisation of people and the community (Kelman, 1973).

Walters (1994) reinforces this point noting that it is possible to consider the technological environment of nursing (the author highlights the Intensive Care Unit, but it must be noted that all areas of nursing are involved with technology) as socially deterministic. It is suggested that most technology is controlled and purchased by the medical profession even though nurses are the health care workers who use machinery and equipment. The practice of nursing is dominated by a patho-physiological and biomedical primacy governed by a power elite. The dominant power relationship confronts nursing and controls the practices and procedures of its discipline.

The outcome of this power imbalance is very disturbing for nursing because dominance over nursing and acceptance of the neutral belief robs nurses of the chance to affect the direction of nursing and health care. The outcome is evidenced for example, by the lack of nursing participation in institutional decisions regarding machine technology and a lack of professional recognition in the wider community. Further to this it is argued that the neutral belief encourages nurses to bypass technology as a powerful political impose and an important factor in determining relationships between disciplines. Proliferation and continuation of the belief halts any threat nurses may pose to the political supremacy of others and shelters nurses from any sense of uneasiness or suspicion.

Nurses are encouraged to have confidence in each practitioner's ability to use technology and to make decisions that are *good* for both the patient and nurses. However, the encouragement is misguided because it is rare that any one individual makes decisions about the use of technology. Decisions made concerning use, policies, procedures, etc., are made often by institutions and committees. When it comes to technology, current practices and expert opinion have been appropriately weighed up (often by people of unknown origin) in order to recommend/ stipulate appropriate use. Clinical practice under these conditions is directed by institutional arrangements and policies, and nurses presume someone has understood crucial issues, developments and practice, just as it is presumed that each nurse is capable always of adhering to the requirements of guidelines. But unfortunately, decisions are based always on competitive motives, knowledge, experience, values, beliefs, etc. In addition, the use of technology is shared with other health care professionals and employers who sometimes release nurses and nursing from responsibility.

Controlling Technology

The literature assumes that nurses transcend the demands of technology for more important humanitarian roles. Through better education, experience and judicious control of technology, nurses are perceived as being able to decide upon the use of objective means in order to suite best the needs of patients and the health care sector:

> *Whether it is for the "best use" of the patient or not will depend on ourselves as nurses - what nursing really means to us and how we prepare our future nurses* (Clark, 1968:106).

It is argued that education, experience and adequate preparation for professional practice,

enable nurses to become aware of forces which influence nursing and society. The literature claims that nurses have the ability to control technology in order to deliver both advanced and individualised care. The achievement of control is purported to be a demonstration of the maturity of nursing as a profession, and a basis for the right of nurses to be characterised as informed practitioners who are concerned for the integrity of clinical practice and human relationships. It is asserted that through processes of judicious consideration and experience technological development is and can be monitored, managed and arranged to suite people, nursing and health care (Adams, 1986; Ashworth, 1987; Bailey, 1969; Carnevali, 1985; Christman, 1970; Clark, 1968; Handy, 1989; Henderson, 1985; Laing, 1982; McClure, 1991; Orem, 1991; Payton, 1984; Quivey, 1990; Reilly & Behrens-Hanna, 1991; Salmon, 1969; and Wilson, 1981). There is no doubt that insight into nursing practice can arise from experience and education. Nurses develop their understanding through appropriate learning and reflection. But exactly who monitors the influence of technology on nursing and what a suitable analysis should entail is absent. The claims of nurses are honourable but evidence of successful processes is required.

Current discourse expresses a faith in the ability of nurses to control technology through education and moral/ethical commitment without seeking equally to address the need to understand better the phenomenon. Ellul (1968) irreverently described belief in control of technology as both hypocritical and foolish. The belief is hypocritical because it is an effort of extraordinary awareness, power and judgement to master the technological milieu around us, and it is naive to demand this effort of every person. The belief is foolish also because regardless of our ability to achieve technical domination and formulate *good* decisions,

nothing is resolved. The dilemma of coming to terms with progress as a whole still remains. Technology within nursing practice is more than a few machines. Each nurse engages constantly with machinery, objects, tools, procedures, policies, people and an enormous number of systems and processes on a daily basis. If nurses are masters of technology and if technology is a neutral system of means, then the total technological environment is the criterion for judgement and success.

Summary

The belief that technology is a neutral object is noted to be an interpretation of technology distinct to both society and nursing. It is highlighted as a determining belief which influences the way nurses interpret technology and is manifest in statements such as: *technology only does what I tell it to do*. Arguments counter to the belief have been presented which highlight the limitation of current literature and demonstrate the need to understand better the relationship between nursing and the technological environment in which nurses live and practice. It has been argued that technology is not a neutral object but a complex arrangement of machinery, processes, people and systems which continue to influence practice, attitudes, environments, politics and the way nurses experience and understand their practice. For many nurses technology may not be a neutral servant of their will but a pervasive reality which leads to positive and negative outcomes capable of significantly influencing nursing. A reality which changes nursing and nurses without due recognition of the importance of the transformation.

CONCLUSION

This chapter has presented a critical analysis of nursing literature. It is noted that there is no body of nursing research investigating conceptions of technology and existing literature seeking to address technology and contemporary nursing practice is inadequate. Analysis has identified that there are limitations to nursing literature with particular emphasis on the way conceptual understanding influence portrayal of experience. It has been demonstrated that nurses understand technology from an instrumental perspective and focus often on the potential of technological progress to advance their profession rather than the implications of their increasingly technological environment to their practice, knowledge, values, etc. Overall, nursing discourse is significant for its propensity to rely upon commonplace assumptions and does not explain the experience of technology or foster appropriate insight or appreciation of the phenomenon.

The next chapter presents an explanation of the research approach of phenomenography. The chapter describes the approach utilised to investigate conceptions of technology in contemporary surgical nursing and explains the research method, analysis and interpretation.