UNDERSTANDING THE ADVENT OF INFORMATION TECHNOLOGY IN TEACHING AT THE UNIVERSITY: A CASE STUDY OF THE UNIVERSITY OF BRITISH COLUMBIA

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ABSTRACT

This study investigated the use of interactive information technology in teaching at the University of British Columbia in early 1997, the factors influencing it, and the changes in the University associated with it.

The use of interactive information technology in on- campus and distance education at UBC is largely limited to E-mail, World Wide Web, and to a lesser extent, CD-ROM. It seems to be a relatively recent development, the number of users of technology in teaching increasing only since 1994.

Four factors in the broader external context are driving the use of interactive information technology in teaching at the University. These are: (1) demands on higher education for greater and more flexible access, as well as for technologically literate graduates, (2) the tight fiscal context in which the University operates, (3) the culture of information technology in Canadian and British Columbian society, (4) government policies on access, funding, and the use of technology in teaching.

Within the University itself are two kinds of influence: actions by the university leadership and the changing attitudes of faculty. The leadership has put in place enabling initiatives in six areas: (1) infrastructure, (2) equipment, (3) internet access, (4) funding, (5) faculty development, (6) university publications. The attitude of faculty members towards the use of the technology in teaching is generally positive. This is different from what was found in earlier studies (Black, 1992).

Given strong external pressures for the adoption of interactive information technology in teaching, given the existence of enabling structures and mechanisms from the university leadership, and given a marked increase in the favourableness of faculty attitudes, the question arises,

why so little use seems to be made of the technology? A number of hindering factors emerge: (1) perceived or experienced pedagogical limitations of technology, (2) lack of time needed to learn or use the technology, (3) lack of professional reward for teaching by means of the technology, (4) lack of appropriate skills, and (5) lack of resources and equipment. There seem also to be three key organizational weaknesses in the technology-integration approach of the University. These are, (a) lack of coordination of the various initiatives, (b) a neglect of the motivational needs of faculty members, and (c) the assigning of technology responsibility to units that do not have academic policy-making authority.

Despite the modest use of interactive technology, there are indications that the prospects for the use of interactive information technology at the University for both on-campus and distance teaching are strong. The study shows that the University of British Columbia generally manifests features and tendencies typical of trends in the development of contemporary universities, such as increasing acceptance of interactive information technology in teaching, increasing responsiveness to societal imperatives, growing government influence, and institutional restructuring. A number of implications for policy and for research arising from the study are discussed.

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CHAPTER 1

INTRODUCTION TO THE STUDY

The Background and the Research Problem

Advances in computing and telecommunication technology have provided unprecedented opportunities for the use of interactive information technology in educational communication and transaction for both on-campus, and distance learners. Consequently, delivery approaches, such as computer conferencing, audio conferencing, video conferencing, and audiographic conferencing are almost imperceptibly becoming part of the instructional delivery repertoire of educational institutions particularly in developed countries. In the classroom, the typical traditional approach to instructional delivery where the chalkboard and chalk are the predominant tools, and where the teacher tells listening and note-taking students what they need to know, is being increasingly supplemented with, or even challenged by technology-mediated interactions between teacher and students, and student and students.

McCain and Maxwell (1994), in noting the changing mode of educational delivery, observe that the "emerging learning environment is one that features both synchronous and asynchronous interactions between the learner and sources of knowledge and information" (p. 5). Bates (1995) has also noted the trend: "there is a great deal of innovation in the use of computer-mediated communication in education, and it is also one of the fastest growing technologies in terms of the number of teachers and learners who are using it" (p. 202).

Similarly, education and learning at a distance which traditionally rested largely on the correspondence mode of delivery is now increasingly using new information technologies. As Maxwell, Richter and McCain (1994) observe, the convergence of computing, telephony and television is changing the nature of distance education" (p. 5). Succintly describing the revolutionizing impact of communication technology on distance education, Maxwell, Richter and McCain (1994) note that "What began as text-based correspondence study depending largely on the printing press and the postal system, has evolved into live-satellite broadcasts to hundreds of people, simultaneous interactive teleconferencing among multiple sites, and global computer networking among millions of pc's" (p. 5).

Issues concerning the use of interactive information technology in instructional delivery are clearly among the leading topics in contemporary education (Means, 1994; Pettersson, 1994; Tiffin & Rajasingham, 1995). Educational institutions seem to be under pressure to adopt interactive information technology in teaching. The pressure is grounded in the social, cultural, and economic realities of modern society, as well as in the potential of new information technologies to effectively support teaching and learning (Harasim, 1990; McCain & Maxwell, 1994; Bates, 1995; Tiffin & Rajasingham, 1995).

With the increasing pervasiveness of information technology in society, the view is widely held that the use of the technology in the teaching and learning process will familiarize students with these devices which are becoming a dominant part of modern culture. The integration of interactive information technology in education is seen as an attempt to bring educational processes and outcomes more in synchrony with society (Kearsley & Lynch, 1994).

The use of interactive information technology in teaching is also considered an effective strategy for pursuing democratization of educational access which is a major social policy goal in most societies. The effectiveness of the application of interactive information technology to instructional delivery in pursuing democratization of access is predicated on the capability of the technology to facilitate distributed learning, as well as place- and time-independent educational transactions (Harasim, 1990; Jill, 1994; Tiffin & Rajasingham, 1995). To the extent that the use of interactive information technology in teaching overcomes the barriers of time and place, many more people than hitherto now have real opportunities to participate in education.

It is also argued that the use of the technology enhances educational quality (Harasim, 1990; Jill, 1994; McCain & Maxwell, 1994; Bates, 1995; Warschauer, 1995). This view is largely grounded in the claim that the technology affords generous opportunities for interactive and collaborative learning, as well as access to data bases world-wide. In speaking to the notion that the use of interactive information technology in teaching can facilitate quality education, McCain and Maxwell (1994) are of the view that the teaching mode supports the development of advanced forms of learning, such as reasoning, comprehension, composition, and experimentation.

It is, however, often noted in the literature that the realizability of the social and pedagogical advantages associated with the use of interactive information technology in teaching depends on the ability of educational institutions to adapt in ways that will provide a philosophical and operational environment conducive to the use of the new teaching mode. In this regard, Bates (1995) observes:

> Successful technology applications usually require more than just the purchase and installation of equipment, hiring of technical

> staff, and the training of teaching staff. Successful implementation also requires some major structural or organizational changes within an institution (p. 57).

In spite of the advantages claimed to be associated with the use of interactive information technology in teaching, there are those who appear unenthusiastic about the use of technology in education (Cabal, 1993), and others who do not sound optimistic about the possibility of its becoming an integral part of educational delivery repertoire (Cohen, 1988; Cuban, 1986; Postman, 1992; Weizenbaum, 1976).

Critics of the use of interactive information technology in education caution against uncritical embrace of the technology. The critics express scepticism, if not distrust, about the virtues attributed to technology in education. They contend that 'technology romantics' and vested economic interests exaggerate social and educational potentials of technology. As Mackay (1991) puts it:

> We feel that it is possible to develop a better account than the 'mythinformation' and the 'technoromanticism' which so pervade the field of technology, particularly IT [information technology]: there are myths associated with the technology; teachers need to read the myths as adults, appreciating their hidden meanings rather than being taken in by the story. The attractive glitter of new technology must not lead to its unthinking acceptance (p. 3).

The critics question the rather widely held view that the use of interactive information technology in educational delivery democratizes access. They also doubt the pedagogical superiority of technology-mediated mode of instructional delivery over the face-to-face mode.

With regard to the claim that the use of interactive information technology democratizes access, critics are of the view that the claim is largely untenable. In this regard, they argue that even though prices of computers

and other electronic communication gadgets are said to be coming down, not all prospective learners can afford these devices which are necessary tools for participation in education in a dispensation in which the teaching-learning process is technologically mediated. Apple (1987) sees the technology as the latest threat to democratic education. He contends that the growth of information technology in education is likely to increase educational inequality with respect to class, gender, and race.

With regard to technology and pedagogy, critics appear to be unimpressed by the view that the application of interactive information technology to instructional delivery is pedagogically superior to the conventional face-to-face mode of education. They hold that the emerging learning environment in which technology may largely mediate teacher-learner interaction has adverse implications for educational quality (Weizenbaum, 1976; Cuban, 1986; Postman, 1992). Such a learning environment -- online learning environment (Harasim, 1990) -- according to critics, fosters "instrumental reasoning" (Weizenbaum, 1976), and "unemotional" learnings "divorced from the richness of human experience" (Cuban, 1986). Postman (1992) has also addressed the pedagogical implications of the use of technology in educational delivery. In noting that 'orality', which is the delivery mechanism in the face-to-face mode tends to foster gregariousness, group learning, cooperation, and a sense of social responsibility, he then wonders whether technology-mediated educational transaction will not raise egocentrism to the status of a virtue. In effect, critics fear that the increasing technologization of the process of teaching and learning may imperceptibly result in a dehumanized educational culture in which intuition, feeling, and socialization have little or no place.

Nevertheless, it would appear that a major rationale for the use of interactive information technology in teaching is the need for educational institutions, through the teaching and learning process, to familiarize students with the technology which is increasingly becoming a key workplace tool in the modern economy.

> Technology in education today shares with the whole host of movements for vocationalizing education: the premise that (in this case) technology needs to be a part of the school curriculum because of some assumed needs of the labour market. The economic future ... many have argued, depends on microelectronics, and most jobs will require IT [information technology] skills; hence, schools should be teaching these skills (Mackay, 1991, pp. 3-4).

Critics of technology in education regard this rationale with some suspicion. They contend that a situation where the use of technology in education is driven by the need to achieve workplace-education alignment, amounts to unprincipled pandering to vested economic interests that luxuriate in, and profit from industrialism. Mackay (1991) presents the following line of argument typically advanced by critics of technology in education:

> This broader context, of IT [information technology] being an instrument of capitalist restructuring and thus operating to the detriment of workers, has led some to dismiss IT in education, and to advocate its rejection .... Computer literacy and the technologization of education are seen as key components of a policy to vocationalize the education system -- with the ideological aim of inculcating people with notions of flexibility and passivity (p. 5).

In general, writers on technology in education tend to come across as either technology enthusiasts or sceptics. Not many attempt balanced perspectives on the use of technology in the teaching and learning process. Nevertheless, while the debate about the virtues and shortcomings of the use of interactive information technology in instructional delivery goes on in the literature, the

use of the mode appears to be increasing inexorably (Jill, 1994; Warschauer, 1995). However, the apparent inevitability of this trend does not mean that within educational institutions, the use of the technology in the teaching and learning process meets no resistance.

It is particularly noted in the literature that teachers tend to resist educational use of technology (Cuban, 1986; Carl, 1988; Cohen, 1988). Apparently, teachers tend to resist because they perceive technology as a threat to their accustomed ways of conducting instruction. They see technology to be bringing with it a different kind of teaching and learning culture that requires them to adjust in fundamental ways, in terms of principles and practice. Cuban (1986) observes that teachers believe that interpersonal relations is critical in learning. Consequently, according to Cuban (1986), they tend to resist any use of technology that threatens to "displace, interrupt, or minimize" the interpersonal relationship between them and their students.

In higher education institutions, especially universities, the tendency of faculty to resist technology, and other innovations that do not originate from the imperatives of disciplinary development is often referred to in the literature. It would seem that this tendency is due to the inertia that appears to characterize academic and disciplinary cultures (Clark, 1983; Becher, 1989; Becher & Kogan, 1992).

Interestingly, even though, in general, it would appear that faculty members tend to resist technology in education, the use of interactive information technology in educational delivery is on the increase. There is, however, a paucity of research studies that provide insights into the factors influencing this trend, and into the various ways institutions are changing as a result of the application of interactive information technology to teaching

(Papagiannis, Douglas, Williamson & Le Mon, 1987; Carl, 1988; Moore & Kearsley, 1996; Perraton, 1997). Research studies focus largely on the attitudes of faculty toward the use of technology (Rishante, 1985; Stinehart, 1988; Black, 1992), and on the pedagogical capabilities of technology (Hiltz, 1986, 1989; Harasim, 1987; Burge, 1994).

The studies pay little or no attention to organizational and societal levels of factors, the identification and analyses of which would improve the state of knowledge regarding the factors that tend to enhance or impede the use of technology in education. This limitation has been pointed out by several authors (Papagiannis, Douglas, Williamson & Le Mon, 1987; Carl, 1988; Moore & Kearsley, 1996; Perraton, 1997). Papagiannis, et al. (1987), note that "purposeful use of technology occurs in some historical-structural context" (p. 13). They, therefore, urge that research should go beyond examining "the promise and intended purpose" of technology in education and attempt to provide knowledge concerning the political, economic and cultural context of the educational use of technology. Carl (1988), following her review of the literature makes a similar observation. She sees the need for a framework for understanding the "integration of educational technology into the university" (p. 124). More recently, Moore and Kearsley (1996), and Perraton (1997) have noted the persistent paucity of research on the policy context of the use of technology in educational delivery.

Social and organizational research theorists are almost united in stressing the need for studies that seek to provide robust and comprehensive understanding of phenomena to take approaches that seek explanation of the relationships or connections between micro and macro levels of factors. This is because: "institutional or structural features of society are intimately interwoven with behaviour and activity" (Layder, 1993, p. 55). The

implication of this is that attempts to comprehensively understand phenomena should entail taking account of factors at individual, organizational, and societal levels.

In higher education research in particular, this approach receives strong support (Clark, 1983; Becher & Kogan, 1992). Becher and Kogan (1992), while generally examining faculty attitudes and values note that:

> Academics are amenable to outside influences impinging on their beliefs and values in the normative mode and conditioning their activities and practices in the operational mode. The normative dimension includes professional norms as well as social, economic and cultural forces (p. 117).

If, as Becher and Kogan (1992) postulate, faculty beliefs, values and occupational practices are susceptible to societal influences -- a postulate that is, of course, in consonance with the rationale undergirding the micro-macro theory in social research -- then an analytical framework for understanding the changing mode of educational delivery, which is chiefly characterized by the use of interactive information technology in teaching, should seek to include the influence of relevant societal factors, as well as the influence of pertinent factors within institutions.

As a consequence of the limitation of the theoretical approach of studies that have investigated the use of technology in educational delivery, little is known, on the basis of systematic research, regarding the factors influencing the adoption and integration of interactive information technology in higher education. In addition, apparently because of the narrow theoretical approach of the studies, there is a dearth of knowledge derived from systematic field research about the structural or organizational changes occurring in higher education institutions, especially universities, as a consequence of the increasing use of technology in instructional delivery.

Most of the accounts of how universities are adapting are largely anecdotes, essays, and prospective conjectures.

It is in view of the foregoing gaps in the literature that the present study was developed.

The Purpose of the Study

The purpose of this study was to identify and analyze the factors that influence the use of interactive information technology in teaching at the University of British Columbia, as well as to describe and analyze the changes the use of technology is inducing at the University, during the period 1990 to 1996.

The Significance of the Study

This study is significant for a number of reasons. It contributes to knowledge about developments at the University of British Columbia, to higher education research generally, and, in particular, to research on issues concerning the use of technology in university teaching.

The approach of this study which entailed investigating the factors influencing the use of interactive information technology in university teaching by contextualizing the problem not just within the confines of the university but also in the wider society is a process contribution to the relatively new but growing areas of higher education, and educational technology research. Previous studies on the use of technology in education tend to concern themselves largely with the analyses of faculty attitudes, as

well as the pedagogical capabilities of technology. By delineating factors internal and external to the university which are influencing the use of interactive information technology in university teaching, the conceptual framework developed for this study provides an analytical tool for improving understanding about the developing trend.

In more substantive terms, the study has generated knowledge about the interface between the university and society, particularly in British Columbia, and how structures and processes in the university are influenced by societal forces. Furthermore, the research is a contribution to innovation studies in higher education, in that, it provides evidence of, and analytical insights into the external and internal factors facilitating or impeding innovation in the university, in this case, the use of interactive information technology in instructional delivery. Considering that most of the accounts in the literature regarding the various ways universities are changing or adapting as a result of the growing use of interactive information technology in teaching are, for the most part, not based on field research, this study is significant to the extent that it provides field research-based evidence regarding such changes.

Finally, the study is significant for higher education systems and institutional policy development. Improved understanding is essential for effective organization and administration (Stark et al., 1986). In this regard, given that this study affords some insights into the factors internal and external to the university that enhance or impede the use of interactive information technology in teaching, the insights will, hopefully, inform the development of higher education policy at the system level, as well as the development of institutional policy and operational mechanisms at the local level.

Structure of the Thesis

This chapter has sketched the background for, and the significance of the study and has described the purpose. Chapter 2 presents a review of the relevant literature and concludes with its synthesis in the form of a conceptual framework which guided the conduct of the study. Chapter 3 describes the research design. Chapter 4 deals with the results of a survey showing the extent to which interactive information technology seems to be used in teaching at the University of British Columbia. Chapter 5 analyses the contextual and institutional factors which appear to have promoted the use of technology. Chapter 6 shows the nature of a number of constraining factors. Chapter 7 concludes the thesis by presenting a summary, conclusions and implications.

CHAPTER 2

UNDERSTANDING THE USE OF TECHNOLOGY IN TEACHING AT THE UNIVERSITY: A LITERATURE REVIEW

Postman (1992) argues that:

> New technologies alter the structure of our interests: the things we think about. They alter the character of our symbols: the things we think with. And they alter the nature of community: the arena in which thoughts develop (p. 20).

If Postman is correct, such alterations are far from mere technical innovations. The alterations of which he speaks can be felt in the micro world of the classroom and also across the entire university organization and across the whole societal context in which the university operates. To understand the use of information technology in university teaching, it is necessary to understand not only the technological change itself, but also the way in which it is influenced by these broader contexts.

The chapter is divided into four sections. The first section examines the use of information technology in university teaching. The second and third sections deal with the broader context and the factors which seem to affect technology use in higher education. Section two focuses on what may be called the internal context, the organization of the university itself. Section three reviews work relating to the external context and its influences. The fourth and final section of the chapter summarizes the literature reviewed by presenting a conceptual framework for the study.

The Use of Information Technology in University Teaching

The educational application of information technology (IT) is a relatively recent phenomenon. Since the emergence of educational radio in the 1920s, other kinds of information technology, such as film, teaching machine, programmed instruction, television, computer-assisted instruction have been part of the educational scene. However, the history of educational applications of technology is largely that of unmet expectations (Saettler, 1990). Evidence in the literature indicates that the enthusiasm and expectations that attended the adoption of virtually every new educational technology were not only short-lived, but were also followed by disappointment. In almost every instance, the difference each new technology was expected to make was largely unrealized (Tyack & Hansot, 1985). A major report in the United States in 1970 indicated that technology had very little impact on education:

> Today technology touches only a fraction of instruction. Colleges, universities, and schools have been using television, film, computers, or programmed texts in instruction, but to a limited extent. The results are mixed, with some institutions making a creative and sustained use of the new media while others, after an initial burst of enthusiasm quickly lose interest (Tickton, 1970, p. 9).

The report identified a number of factors that accounted for the low use and quality of educational technology. The factors included indifference or antipathy towards the use of technology in education, poor programs available via television, programmed instruction, and through other media, inadequate and inappropriate equipment (Tickton, 1970).

Notwithstanding this disappointing history, there is a widely held view that the future of educational use of the new kinds of information

technology will be different. The view is based on the capabilities of the "new technologies" to support educational transactions in ways beyond the capabilities of the "older technologies", as well as on the structure and characteristics of contemporary economy (Tiffin & Rajasingham, 1995).

Advances in computer and telecommunication technology are resulting in different kinds of interactive information technology that are increasingly being used in teaching and learning. Consequently, the application of information technology to instructional delivery is a dominant topic in the literature of contemporary education.

The following paragraphs first examine the rationales that accompany calls for the use of information technology and some of the conflicts and issues associated with it. Thereafter two major themes in the current literature, distributed learning and distance education, are briefly discussed. In a third sub-section is provided an overview of the research on the use of technology in teaching.

Rationales, Conflicts and Issues

From discussions and debates in the literature, it would appear that the educational application of technology can be based on three key rationales, namely, that the technology can expand access, enhance quality, and reduce costs (Boh, 1994; Sell, 1996; Daniel, 1997). However, the notion of educational application of technology as a "magic bullet" to attack these crises of access, quality, and cost is challenged in the literature.

Concerning the access rationale, proponents of the educational use of technology argue that the capability of interactive information technology to support time and place independent educational transactions provides an opportunity to "meet growing and previously unmet demand for education"

(Boh, 1994, p. 2). Claims, such as this which tend to suggest that technology democratizes access, are challenged in the literature by critics, or presented rather gingerly by more cautious proponents on the grounds that not all can afford access to technology (Niemi & Gooler, 1987; Bates, 1996). For instance, while espousing the view that technology widens educational access, Bates, nevertheless, presents a scenario in which access can be denied even in a system that uses technology: "a university requiring all students to have access to the Internet can at an administrator's stroke deny access to all those students who cannot afford a computer, who are not skilled or confident in using a computer, or who cannot get Internet access where they live" (1996, p. 3). A similar point is made by Verdiun and Clark (1991, p. 207):

> It is easy to wax rhapsodic about the future of educational media, predicting that there will be a workstation or hypermedia system in every den and that a plethora of telecommunications carrier systems will make possible virtually instantaneous audio, video, and computer communication around the world. The problem with such a rosy scenario is that only a small portion of the world's population will be able to afford such services.

Thus, the key questions raised by the access-expanding rationale centre around the affordability of the technology and the possession of appropriate skills by those who need educational access. The capability of interactive information to support educational transactions to, at least, a considerable extent, is, however, hardly questioned.

With regard to the quality-enhancing rationale, there are claims in the literature that quality of education can be improved through the use of technology (Hiltz, 1986; Niemi & Gooler, 1987; Harasim, 1987, 1990; Bates, 1995; Tiffin & Rajasingham, 1995). The claims are based on the capabilities of the "new technologies,". For instance, the capability of the Web to afford access to world-wide learning resources on the Internet is frequently cited in

the literature as a tremendous potential for improving educational quality. The opportunity which e-mail provides for time and place independent teacher-student and student-student communication is also seen as having a quality-improving potential. Furthermore, the one-to-one, one-to-many, and many-to-many opportunity for educational transaction which computer conferencing affords is said to provide an environment for both individualized and collaborative learning. In addition, the quality-enhancing rationale is underscored by what can be referred to as the relevancy thesis -- that through the use of technology in the process of teaching and learning, learners acquire the technological skills needed in the technology-based modern economy. As Kearsley and Lynch (1994) put it:

> The use of technology in the classroom puts them [learners] more in synchrony with the needs of most employers. For example, when students learn to use word processing or spreadsheet software in their classes, they are better prepared to enter the workforce, not necessarily because of the specific skills that they possess, but because of the sense of potential productivity that such skills represent (p. 10).

Critics of the educational application of technology challenge the various claims made with regard to the quality-enhancing rationale. Criticism of the rationale, however, appears to be based on two key grounds. First, critics hold that technology-mediated communication is necessarily of poor quality (Weizenbaum, 1976; Postman, 1992). They contend that it is bereft of authentic human contact, and suffers from aridity of conversational nuances. On this basis, according to critics, technology cannot support rich human interaction from which meaningful learning can occur (Cuban, 1986). Second, these critics hold that the notion of an education-economy synchrony is motivated by economic exploitation (Mackay, 1991). In this regard, Newson (1994) observes that:

> Large computer manufacturers like IBM and other corporations involved with the production of computerized media and communication technologies have targeted educational institutions, particularly colleges and universities as primary markets for and of their products .... In Canada and the United States, companies such as IBM have donated to a number of institutions of higher learning not only money but also the latest 'state of the art' technology to facilitate the spread of computer use of on campus (p. 38).

The third rationale for the use of technology in teaching and learning relates to the cost-reduction potential of the tool. Proponents of the rationale hold that the capability of interactive information technology to support distributed learning allows for the reaping of benefits that can accrue from economies of scale if large numbers of learners are served. Besides, the use of interactive information technology "can save instructors or students travel time, and other transaction costs" (Boh, 1994, p. 3).

It would, however, appear that the cost-reduction rationale is the most shaky of the three. It is often presented in the literature with caveats that sound problematic. For instance, some hold that for there to be a reasonable reduction in cost, there has to be considerable labour retrenchment:

> Using IT for more-with-less productivity enhancement requires that technology replace some activities now being performed by faculty, teaching assistants, and support personnel. With labor accounting for seventy percent or more of current operating cost, there is simply no other way (Massy & Zemsky, 1995, p. 8).

Daniel (1997), as well couches the cost-reduction potential of educational application of technology in a proviso that implies a radical departure from what predominantly obtains at present: "Technology can raise productivity, but only through a reorganization of the teaching-learning process based on the development of a technology infrastructure" (p. 16).

The use of interactive information technology in teaching and learning in higher education has generated a number of issues. The issues arise from the conflict between the culture of technology-based teaching and that of the much more entrenched conventional face-to-face teaching.

Newson (1994) has stated that the use of interactive information technology has led to the emergence of an ideology of teaching and learning which she refers to as "technopedagogy." She argues that the ideology of technopedagogy is being propagated by faculty members who use interactive information technology, by policy makers, and by corporate interests who advocate the educational application of technology.

Technopedagogy claims that technology-based teaching is more efficient and more effective than the face-to-face mode, as well as less bound by time and place. The ideology holds that teaching by interactive information technology overcomes a number of interactional problems that arise in human-mediated teaching/learning process. One of the imperatives of technology-based teaching is the change in faculty role. The mode demands that learning be less directive and more facilitative. Technopedagogy also claims that technology-based teaching liberates students from culturally, racially, and socially based limitations, as well as from some personal inhibitions.

These claims of technopedagogy are widely associated with technology-based teaching (Harasim, 1990). It seems that technology-based teaching is fast gaining ground as a powerful culture in academe. Speaking to this, Newson (1994) states that the emergence of the ideology of technopedagogy indicates that resistance to the use of interactive information technology in teaching "is not only being challenged but perhaps also that the 'resisters' are in a more defensive position" (p. 38). Even though it may seem that the resisters are

defensive, there are, nevertheless, powerful voices charging that the use of interactive information technology in teaching depersonalizes education which is traditionally conceived as a personal relationship between teacher and student (Cuban, 1986).

In discussing technopedagogy however, Newson (1994) identifies some of the more practical issues associated with it. The role of the teacher is one such issue. The teacher becomes more of a facilitator in the new teaching paradigm than is the case in face-to-face conventional teaching. The imperative of this shift in the role of the faculty consistently features in the literature as one of the cardinal conflicts or issues associated with the emergence of teaching by interactive information technology (Menges, 1994). Teaching within the mode requires teachers to be managers of information instead of authoritative experts.

Another issue concerns faculty development. In this regard, it is held that for faculty members to teach well in the technology-based mode, they have to have appropriate technological skills, as well as instructional design capabilities based on pedagogical principles. They also need an appreciation of how technology affects the dynamics of the teaching and learning process. It is, however, acknowledged in the literature that faculty members need time and institutional support to develop such competencies (Sell, 1996).

Related to the question of skills is the issue of access to technology by both faculty and students. It is reiterated in the literature that the new teaching paradigm requires that technology be available and accessible to faculty and students. There are indications that in most higher education institutions this issue is rising to the dimension of a major concern. Considering that virtually every college or university faces enormous financial pressures, not many institutions are able to ensure access to

technology for their faculty and students. Moreover, not all students can afford to buy or access the technology. In the circumstances, the prospect of a new kind of inequality in education -- inequality of access to technology -- looms large.

The reward structure in higher education comes up rather frequently in virtually every discussion in the literature on issues concerning the emergence of technology-based teaching. It is argued that the reward structure in higher education does not encourage in any professionally meaningful way achievements in activities related to teaching by interactive information technology, such as courseware and software development, or excellence in teaching by technology. To redress this situation, Baker (1994, p. 15) urges: "as the teaching and learning paradigm, and the culture itself begin to change in higher education, some restructuring of some traditional personnel policies may be needed to recognize expanding opportunities for faculty."

Fears have been expressed that the increasing use of interactive information technology in teaching might result in retrenchment of faculty (Massy & Zemsky, 1995). Even though the possibility for technology to displace personnel in some situations may exist, the fear of large scale job loss for faculty is countered with the typical argument that interactive information technology cannot substitute for faculty. As Massy and Zemsky (1995) put it:

> IT has strong potential to increase learning productivity in the areas of codified knowledge and algorithmic skills. In these specific areas, the implication is that IT should supplement human instructors whenever possible -- human intervention should be oriented mainly towards making the advantages of IT accessible to all learners.... Whenever a significant portion of a curriculum includes non-codified, non-algorithmic knowledge, however, faculty maintain their historic advantage. IT provides a strong element of synthetic experience, of virtual reality fine for

some purposes but not all (p. 4).

So far, it does not appear there is any report in the literature of a large scale faculty layoff that stems from the use of interactive information technology in teaching. What appears to be helping to assuage concerns is the widely held view that retrenchment would lead to "a large decline in the quality of learning, which in turn will eventually lead to a less skilled workforce" (Bates, 1996, p. 4). The prospect of this is likely to discourage any serious contemplation of retrenchment.

What can be referred to as the all-encompassing issue that is brought up as a result of the use of interactive information technology in teaching is institutional restructuring. It is encompassing in that it would tend to address virtually all the other issues. The view is often persuasively expressed that the use of interactive information technology in teaching requires institutions to restructure and reinvent themselves. This would entail revamping the reward structure, redefining roles, and changing attitudes. In short, it would involve significant changes in the culture of academe in ways that would provide an amenable environment for the routine use, and rewarding of educational applications of interactive information technology. "Technology should not be bolted on to existing institutions; instead they [institutions] need to re-structure their organization in order to exploit new technologies in a cost-effective manner" (Bates, 1996, p. 14).

A key development in connection with the issue of restructuring that has been observed is the growing number of institutions that are establishing chief information officer positions with leadership and strategic responsibilities for the academic and administrative use of information technology. For example, in a survey by Penrod, Dolence, and Douglas (1990),

about 200 colleges and universities had established chief information officer positions as of 1989.

Distributed Learning and Distance Education

The use of interactive information technology in teaching tends to be easily associated with two generic modes of educational delivery, namely, distributed learning, and distance education.

Distributed learning is a term that has recently emerged following the increasing use of interactive information technology in teaching. The term is derived from the capability of the technology to support one-to-one, one-to-many, and many-to-many educational communication. Distributed learning can be employed for both on- and off-campus educational delivery. The Institute for Academic Technology at the University of North Carolina offers a comprehensive definition of distributed learning:

> A distributed learning environment is a learner-centred approach to education, which integrates a number of technologies to enable opportunities for activities and interaction in both asynchronous and real-time modes. The model is based on blending a choice of appropriate technologies with aspects of campus-based delivery, open learning systems and distance education. The approach gives instructors the flexibility to customize learning environments to meet the needs of diverse student populations, while providing both high quality and cost-effective learning (cited in Bates, 1996, p. 8).

The different kinds of technology often used in the distributed learning mode include, but are not limited to, electronic mail, World Wide Web, computer conferencing.

Distance education is a much older term than distributed learning. The definition of distance education has been a subject of controversy, particularly

in the 1980s (Keegan, 1986; Garrison & Shale, 1990). To date, therefore, distance education is variously defined.

Verduin and Clark (1991, p. 8) define it as "any formal approach to learning in which a majority of the instruction occurs while educator and learner are at a distance from one another." They described four defining elements of distance education: (a) separation of teacher and learner during, at least, a majority of the teaching and learning process, (b) influence of an educational organization, including the assessment of student performance, (c) use of educational media (print, audio, video, computer, and/or telecommunications) to unite teacher and learner and carry course content, and (d) provision of two-way communication between learner and teacher, tutor, or educational organization.

There is considerable literature on the evolution of distance education (Kaye & Rumble, 1991; Moore, 1992; Brown & Brown, 1994). It is generally considered to have begun with the sprouting of correspondence education in the mid-nineteenth century (Moore, 1992). The correspondence mode entailed educational communication between instructors and learners by means of postal correspondence. From the very humble beginnings in which it was a mere initiative of enthusiastic individual private instructors, correspondence education gradually rose to become a large-scale university activity. In the United States, pioneers in correspondence education included Illinois State University, 1874; University of Chicago, 1890; University of Wisconsin, 1906.

There were similar developments outside the United States. In Britain, the University of London made false starts towards providing correspondence education in 1858. However, private correspondence institutions, such as University Correspondence College, and Wolsey Hall, emerged. In Canada,

Queen's University started providing correspondence education in 1889 (Kaye & Rumble, 1991). In Australia, correspondence education became one of the activities of the University of Queensland in 1911. In South Africa, the University of South Africa began offering education by correspondence in 1946 (Moore, 1992).

The correspondence mode was generally regarded with some kind of contempt, if not outright derision. The expression "back door learning" (Wedemeyer, 1981) which referred to this mode of education and other modes other than the conventional on-campus face-to-face mode, connoted the inferior status accorded to correspondence education.

Such was the state of correspondence education until the founding, in 1969, of the British Open University (BOU): an autonomous institution granting its own degrees. The British Prime Minister at the time had directed his officials to democratize higher education. The establishment of the University was epochal (Granger, 1990; Kaye & Rumble, 1991; Moore, 1992). As a watershed institution, it marked the end of "first generation distance education" in which education at a distance was conducted almost entirely by correspondence. It thus inaugurated "second generation distance education" characterized by the combination of correspondence tuition, face-to-face tutorials, broadcast media, and telephone (Kaufman, 1989).

Second generation distance education which the British Open University epitomized is characterized by low interactivity. According to Bates (1995), distance education within this generation is marked by:

> a deliberately integrated multiple-media approach, with learning materials specifically designed for study at a distance, but with two-way communication still mediated by a third person (a tutor, rather than the originator of the teaching material) (p. 23).

In addition, in the second generation distance education, the learner is conceived in the traditional mode of learner-centred education where a rather benevolent institution avuncularly dispenses services to students, sometimes, in accordance with the stock stipulations of textbooks. The learner is not conceived to have the 'right' to negotiate educational services as his or her circumstances or preferences dictated. In spite of the moderate use of interactive information technology, and face-to-face sessions, the learner was conceived to have very little power (Kaufman, 1989).

Since the middle of 1980s, distance education has, generally speaking, discernibly moved into a third phase of development -- third generation distance education. Advances in, and availability of interactive information technology largely account for the emergence of this third generation distance education. The capability of the interactive information technology to support two-way communication provides opportunity in distance education for:

> direct interaction between the teacher who originates the instruction and the remote student -- and often between remote students, either individually or as groups. Third generation technologies result in a much more equal distribution of communication between student and teacher (and also between students) (Bates, 1995, p. 23).

In spite of the global spread of distance education, and the increased interactivity in the mode, as well as the enhanced power of the distance student made possible by the interactive information technology, there is evidence that distance education is still regarded as inferior to conventional education, especially by academics of conservative bent (Kirby, 1988; Kirby & Garrison, 1990; Black, 1992). Some are, however, of the view that the pedagogical capability of interactive technology, as well as the increasing use

of the technology in education is blurring the boundary between on-campus and distance education (Bates, 1995; Hall, 1995).

Research on Interactive Technology in Higher Education

The focus of much of the reported research on the use of interactive information technology in teaching in higher education is largely limited to the exploration of (a) pedagogical capabilities of the technology, and (b) faculty attitudes towards the use of the technology in teaching.

There is considerable research on the pedagogical capabilities of interactive information technology (Hiltz, 1986, Harasim, 1987, Burge, 1994). The studies mainly seek to investigate the strengths and weaknesses of the use of the technology in teaching and learning in higher education. In other words, they examine the educational value of technology, although owing to the newness of some of the technologies the literature deals primarily with older forms, such as computer conferencing.

Hiltz (1986) examined the capability of computer conferencing to support learning. She reaches a generally positive conclusion about the use of the medium as a teaching tool. In her view, computer conferencing introduces new educational options and can be a more effective way of teaching than the face-to-face mode. She cautions, however, that the potential value of computer conferencing in education largely rests on the ability of teachers to use the medium as a new educational option:

> One important requirement for realizing the promise of new educational technologies is to use them to create new learning and teaching environments that are more effective and exciting for at least some kinds of materials, rather than merely trying to replicate the traditional classroom electronically (p. 104).

Consistent with the analytical focus of studies that address the question of pedagogical capabilities of interactive information technology in teaching, Harasim (1987) describes and analyzes computer conferencing as a "support for effective and active learning in graduate-level courses" (p. 119). On the basis of qualitative and quantitative data she collected from learners in two graduate-level courses offered on-line, she concludes that one approach of utilizing computer conferencing to "support effective, active learning" is the use of "a collaborative group learning design." She highlights a number of collaborative learning design issues that need to be addressed, such as the possibility of "information overload," and "discontinuity of discussion thread" (p. 133).

Similarly, the focus of Burge (1994) is the process or dynamics of teaching and learning through computer conferencing. The study involved in-depth interviews with 21 graduate students in two courses, and the instructors of the courses. Findings are organized under three rubrics, namely, learning skills in computer conferencing, peer and instructor behaviour in computer conferencing, and strengths and weaknesses of the use of computer conferencing as a medium of instruction.

As was earlier indicated, faculty attitudes towards the use of technology in teaching, or distance education is the other major concern that engages the analytical attention of most studies on educational application of interactive information technology (Johnson, 1978; Clark, Soliman & Songaila, 1984; Stinehart, 1987; Parer, Croker and Shaw, 1988; Kirby & Garrison, 1990; Taylor & White, 1991: Black, 1992).

Johnson (1978) researched faculty attitudes towards the proposed degree program for external students at the University of Michigan. The external degree program was not strictly in the context of distance education since it

relied to some extent on the replication of on-campus teaching in-out- of campus sites. However, for Johnson (1978), an external degree program entailed providing university-education to "students living away from the campus, either by holding courses at different times or places or by using alternative modes of instruction" (p. 214). Johnson focused on "new delivery methods as opposed to formats closer to the traditional" (p. 214). The study showed that faculty were generally favourable to the use of television, computer programs, audio and videotapes, and self-instructional tapes. On this basis, Johnson concluded that "the popular image of professors as conservative resistors of change appears to be a distorted and inaccurate representation of academic people" (p. 180).

Clark, Soliman and Songaila (1984) surveyed the attitudes of faculty at the University of new England in Australia by mail questionnaire. The survey involved a sample of 102 faculty. The survey results indicated that most faculty considered distance teaching more demanding but more enjoyable than on-campus teaching. The authors also found that most faculty were of the view that distance students were better prepared for university studies than on-campus students.

Stinehart (1987) studied the factors influencing faculty attitudes towards distance education at Iowa State University in the United States. One of the interesting dimensions to Stinehart's study was the comparison of the faculty (n= 53) who had taught at a distance, with faculty (n= 52) who had not. In designing her study, Stinehart assumed faculty resistance on the grounds that "the literature of distance education is largely a chronicle of faculty resistance to teaching via instructional technology ..." (p. 1). Surprisingly, 46% of the faculty who had not taught at a distance were willing to participate; and

76% of those who had taught at a distance were willing to continue teaching in this mode.

Parer et al (1988) interviewed 70 faculty and administrators working in distance education at four Australian institutions: two universities, and two colleges of advanced education. The study investigated the respondents' attitudes towards distance education, their views on their institutions' policies on reward for faculty participation, and development in distance education. About 89% of the 70 respondents held favourable attitudes towards distance education notwithstanding that their institutions:

- did not have a clear statement of policy, as perceived by their staff, on how to fill their role as major distance education providers;
- did not offer training for academic staff in the different skill for distance education;
- did not have a reward structure and career path for academics which recognise the dimension of distance education (Parer et al., 1988, p. 45).

Kirby and Garrison (1990) interviewed six pairs of deans of graduate studies, and distance education administrators in six Canadian universities by telephone. The study found that the deans were generally unfamiliar with distance education methods. In addition, the study showed that the deans "had reservations about whether a student who studied at a distance had the same level of achievement as an on-campus student with the same grade" (p. 29). The distance education administrators saw things differently. They expressed support for graduate studies by distance methods: "All the distance education administrators believed that modern technologies provide sufficient opportunity for student-professor and student-student interaction" (p. 28). Kirby and Garrison's study highlights differences of attitudes between

the two groups towards distance education, particularly, regarding its suitability for quality graduate studies.

Taylor and White (1991) used a mailed questionnaire to study attitudes of faculty (n=37) towards distance education at the University College of Southern Queensland. A majority of the faculty preferred teaching on-campus even though, generally, they were favourably disposed towards distance education.

In a two-phase study, Black (1992) investigated faculty "support" for distance education at the University of British Columbia in Canada. The study defined support as "how faculty would speak about and vote for proposals to offer distance education courses for degree credit" (p. ii). In the first phase of the study, 487 faculty drawn from different disciplinary groupings were surveyed by questionnaire. The central issues the questionnaire addressed were (a) extent of faculty familiarity with distance education, and (b) extent of faculty support for distance education. The survey revealed that:

> Most respondents were not familiar with distance education, beyond hearing or reading about it generally. Just over 50% of the respondents described their overall attitude towards distance education as positive and about the same number said they would speak positively about it (p. 112).

Respondents were classified as being supportive, showing divided support, or being opposed. In the second phase of the study, fifty faculty drawn from these three categories were interviewed (supportive, n=14; divided support, n= 22; opposed, n= 14). Data from the interviews indicated that faculty support for distance education was a function of the compatibility of their perception of the distance mode with their notions of university education:

> Those who supported distance education believed it was compatible with their beliefs that university education should be more accessible. They emphasized accessibility over quality because they believed that different teaching methods achieve the same results. The supportive group also believed that distance education is feasible and that technology is very helpful. The divided group ... would be willing to comprise what they considered the ideal in quality in order to provide more educational opportunities for people. Faculty who opposed distance education understood it as incompatible with their ideals of university education and they did not find it feasible either. The opposed group emphasized quality which they believed requires face-to-face interaction and experience on a university campus (p. 170).

The studies reviewed above provide useful understanding about the use of technology in the micro contexts of teaching and learning, and about the attitudes of faculty. In general, studies on the pedagogical capabilities of technology seem to indicate that third generation distance education makes use of interactive information technologies in a way that promises to overcome some of the earlier criticisms of the powerlessness and isolation of distance education students. Regarding faculty attitudes, studies have continued to show, over a span of 20 years, both significant support for, and significant resistance to the use of technology, although in virtually every study, the degree of support is greater than the author had predicted it would be.

Among these studies, that of Parer et al (1988) stands out by reason of its design: it goes beyond looking at faculty attitudes *per se* to include the views of administrators, and structural factors within institutions. Even this study, however, does not consider any influences outside those internal to the university. Such an omission is likely to hamper a full understanding of the use of technology in university teaching. As Becher and Kogan (1992) note:

> Changes in the external environment can ... be seen to impinge in a variety of ways on individual academics. They [the changes] may give rise to normative shifts at the central authority level, which are then operationalised by adjusting the pattern of resource allocations to institutions and (less directly) basic units and individuals. These operational changes may in due course lead individuals to modify their own norms and collectively to adjust the norms of the basic unit. But new economic and social pressures can also impinge directly on academics as members of the wider society, and cause them to change their own sense of priorities. The values of academics, viewed in this wider context, are clearly not as self-contained as some of the protagonists -- or some of the detractors of the doctrine of academic freedom have been inclined to suggest (Becher & Kogan, 1992, p. 119).

It is in order to examine the influence of the broader contexts of teaching and learning that we move first to a review of work relating to the internal context -- the university as an organization.

The Internal Context: The University as an Organization

It was not until the 1970s that "theorizing about organizations began to take institutions of higher education into account" (Clark, 1984, p. 10). Since then, viewing the university as an organization has led to a large number of studies. Although the university may be considered an organization, it is nevertheless regarded as a special one owing to some key properties that are unique to it (Cohen & March, 1974; Campbell, 1975; Baldridge et al., 1978; Clark, 1983; Becher, 1989; Husen, 1991; Becher & Kogan, 1992). The goals of the university are "ambiguous" (Baldridge et al., 1978). Its structure is "atomistic" (Husen, 1991). Within the university authority is "diffused" (Clark, 1983). It is in the light of these characteristics that Cohen and March (1974) described the university as an "organized anarchy."

Attempts in the literature to understand the inner life of the university can be classified as focusing on university goals, on the organization of academic work, on the structure of authority, and on academic cultures (Baldridge, 1971; Clark, 1983, Becher, 1989; Becher & Kogan, 1992). In the following paragraphs we deal first with the concept of the university's goals, and second with the organization of academic work and the structure of authority. A review of disciplinary cultures brings the section to a close.

The Goals of the University

Goals are critical to the form and functioning of organizations (Hall, 1977; Mink, Shultz, Mink, 1979; Clark, 1983). According to Mink et al. (1979) "An organization's goals are shared understandings about why it exists and what it seeks to accomplish" (p. 117). They go on to add that "Goals give direction, channel energy, and set limits." These authors separate goals into 'outcome' and 'process'. "Outcome goals specify what the desired accomplishments are for the organization, and process goals specify how these are to be achieved" (p. 119). They note that process goals are given far less attention than outcome goals even when conflicts stem more from disagreements over process than from outcome goals.

Perrow (1961) distinguished between 'official' and 'operative' organizational goals. According to him, official goals are "the general purposes of the organization as put forth in the charter, annual reports, public statements by key executives and other authoritative pronouncements" (p. 855). On the other hand operative goals "designate the ends sought through the actual operating policies of the organization; they tell us what the organization actually is trying to do, regardless of what the official goals say are the aims" (p. 855).

The distinctions between outcome and process goals (Mink et al., 1979); and official and operative goals (Perrow, 1961) appear to be useful for understanding disagreements in the university over how agreed upon goals should be legitimately pursued. The distinctions can also help in understanding why some academic activities that derive from official goals of the university are operatively marginal, while on the other hand some operatively dominant activities do not stem from official goals. The political and ideological implications of the distinctions become more apparent considering Perrow's (1961) observation that operative goals "reflect choices among competing values" (p. 855).

The key official goals of the university are teaching, research, and public service (Clark, 1983; Becher & Kogan, 1992; Cabal, 1993). In addition to these, the university has a host of operative goals that are "indirectly related to its responsibility as traditionally perceived, for extending and transmitting knowledge" (Cerych, 1984, p. 237). The three traditional "official" goals of the university receive differential emphasis with research having the highest priority in most universities. The goal of teaching tends to receive less emphasis than research and that of public service less than either. The differential emphasis generates controversy and dissensus within and without the university. The multiple non-traditional goals the university pursues are also a subject of controversy. This is because the interests various stakeholders have in the university tend to conflict. Campbell (1975) notes the diverse expectations of the publics of the university and, similarly, Cerych (1984) states that:

> It [the university] is supposed now to be an active agent in social equalization, to provide more vocationally oriented training, to serve as a pole for regional development, to cater increasingly for adults, and so on. There is no general consensus regarding these

> new functions and, if and when they become specific policy objectives, the latter are immediately questioned and are more or less openly contested (p. 237).

All the traditional and virtually all the new goals of the university are knowledge-based. The university pursues most of its goals through the agency of faculty who as individuals and as a collectivity have beliefs and values on what should or should not be a legitimate goal of the university.

Being a dominant and an essential workforce in the university, faculty are unavoidably taken into account in any systematic analysis of university goals and how they are pursued (Gross & Grambsch, 1968; Allen, 1988). It has been noted that faculty support or lack of it for the goals of the university depends, to an appreciable extent, on their disciplinary or academic values, and on what, as individuals, they see as the university's responsibility to society (Clark, 1984; Becher, 1989; Black, 1992). The differences in disciplinary and social values among faculty largely account for the dissensus within faculty in respect of the goals of the university and how they should be pursued.

Dissensus within the university over goals is not limited to faculty. Newton (1992) observes that there are two communities in the university: "the corporate community," and "the community of scholars." The two communities appear to regard the university differently. While the corporate community tends to view universities mainly as business organizations, the community of scholars views them:

> as a near-sacred institution with a special and indispensable mission, a mission that is more similar to that of medicine and religion than that of industry and commercial services (pp. 9-10).

A similar observation was made by Campbell (1975) when he noted that though faculty and administration members occupy the same "premises," they tend not to be operating on the same "premises."

The observation in the literature on the diversity of university goals and the dissensus associated with it is not just anecdotal. Systematic research findings also indicate the phenomenon (Gross & Grambsch, 1968; Entwistle, Percy & Nisbet, 1971). In a large-scale comparative study of American universities, Gross and Grambsch (1968) identified forty-seven goals of the university . The study presented "no flattering" picture of the ability of university faculty to agree on university goals. Similarly, Entwistle, et al concluded in their study on the goals of British universities that there are "great and irreconcilable differences between the objectives and the priorities of objectives claimed for the universities" (p. 19). Others have noted that no other organization has the same high degree of goal diversity and dissensus as does the university (Baldridge, et al., 1978; Clark, 1983; Husen, 1991).

The crucial importance of the university in modern society is acknowledged by Bell (1976) who referred to the university as the society's "axial institution." He stated that the key to social, economic, and political progress is to extend advanced education to as many people as can benefit from it. The university, as the axial institution, is expected to play a major role in this regard.

The new roles of the university, such as the provision of mass higher education appear to be having a telling impact on the traditional values of the university. The 'ivory tower' values and ethos are challenged (Lynton & Elman, 1987) as the university transits from an elite to a mass institution (Trow, 1973). In the context of mass higher education, the conventional face-to-face, on-campus method of educational delivery is considered a "craft"

approach, inadequate in an era of mass demand. Faced with this situation of "performance-gap" (Zaltman, Duncan & Holbeck, 1973), universities are increasingly adopting the process (Mink et al. 1979) and operative (Perrow, 1961) goal of distributed or distance learning technology as a way of coping with the new reality.

The Structure of Academic Work and Authority

Basically, organization entails division and coordination of labour (Mintzberg, 1979), or "differentiation and integration" (Lawrence & Lorsch, 1967). Consistent with this fundamental organizational principle, writers on the organization of academic work in the university attempt to describe and explain how work is divided, and coordinated or integrated (Clark, 1983; Lane, 1990). Inherent in the organization of work is the exercise of authority. Clark (1984) states that "organization is authority, a way of concentrating and diffusing legitimate power" (p. 109).

There is a consensus in the literature that academic work is divided and carried out in disciplines or knowledge areas. This arrangement tends to be dictated by both the structure of knowledge and by the need for specialization. It is within disciplinary groupings that faculty engage in research, teach and provide public service in the knowledge areas in which they are specialists. This way, the university pursues its fundamental goals -- academic and knowledge-based goals -- through the instrumentality of faculty. For this reason, faculty are acknowledged in the literature as the most important workforce of the university:

> The most important membership group consists of teachers and researchers. They are organized in subsystems according to disciplines (departments, etc.), and their main competency as well

> as their professional identity is chiefly connected with the discipline (Ostergren, 1977, p. 102).

The highly differentiated structure of academic work in the university is amply noted in the literature (Campbell, 1975; Clark. 1983; Becher, 1989, Husen, 1991; Becher & Kogan, 1992). The high differentiation is owing to the grouping of work in disciplines and specialties. As Clark (1983) puts it, "The disciplines in effect determine much of the division of labor within the enterprises, and give content to the divisions" (p. 33).

Each discipline is virtually discrete and functions as such. Usually, disciplines that have close epistemological and methodological relationships are grouped under a department or basic unit (Becher & Kogan, 1992). Noting that each discipline is a distinct knowledge domain, Clark (1983) states: "Each [discipline] has something approaching a monopoly of specialized knowledge ... for a specific operation" (p. 33). Like disciplines, departments are more or less autonomous entities. This is also noted by Clark (1983) when he states that there is very limited mutual influence among academic departments.

The autonomy of faculty which its chief characteristic is professional latitude in the conduct of academic work is another major and consistent theme in the literature. As a group and as individuals, faculty have considerable authority to make substantive and procedural academic decisions, as well as to pace themselves at work. Fleming (1978) notes the primacy of faculty authority in academic matters:

> While university administrations allocate resources and exercise some obvious influence in policy areas, the identity of any school of higher learning is fundamentally rooted in its curriculum. In this regard, the locus of power resides with deans and faculty members at the departmental level for it is here that key decisions are made concerning offerings and programme emphasis (p. 40).

The supervisor-subordinate relationship which is a feature of most forms of organization hardly obtains in the academy. Each academic, as it were, is simultaneously the expert or boss as well as the front-line worker. The preponderance of faculty at the "factory-floor" of the academic enterprise accounts for the flat organizational form of the university often referred to as "bottom heavy" (Clark, 1983). If the fundamental levels of work in the university, namely, the academic, the discipline, and the department tend to be autonomous, how then is integration or coordination achieved?

While there is agreement in the literature that academic work in the university is highly differentiated, the literature is less clear as to how coordination is achieved, or put differently, how the commitment of the various parts to the university is secured. Lane (1990) appears not to see any integration. According to him:

> University integration is nil, because there is no common output; there are as many products as there are scholars. Differentiation is basic to university life, integration is not (p. 75).

Lane may be overstating. Rhoades (1992) acknowledges that in universities, "bureaucratic coordination is weak" and adds that "some scholars have turned to the symbolic side of organizations to explain what holds universities and colleges together. In their analyses, order is based on shared beliefs and traditions; it is a result of commitment, not explicit control" (p. 1890). In the view of Becher and Kogan (1992) the university is held together "through the maintenance of common rules and procedures" (p. 179). This implies the use of some bureaucratic mechanisms. But on the whole, these authors see coordination as resulting mainly from equal participation of academics in making decisions which are binding on each of them, as well as from administrative controls. As a result of "the duality of hierarchy and

collegium, academic institutions contain systems of executive roles and systems of committees. They seldom resolve the overlaps and conflicts between them in any logical way" (Becher & Kogan,1992, p. 72). For Baldridge (1971), coordination and commitment are secured by political means facilitated by efficacious and judicious deployment of critical resources. In general, it seems that there is no consensus on how the many relatively autonomous and authoritative constituencies that make up the academic work of the university are held together.

A number of writers have pointed out an important implication of the relative autonomy of faculty, disciplines, and departments for the implementation (or for the study of implementation) of innovation in the university (Cerych, 1984; Clark, 1984; Becher, 1989). They all caution that externally induced innovation must take into account the diffusion of authority. They also stress that externally motivated large-scale innovations are likely to meet internal resistance.

Academic and Disciplinary Cultures

Like most complex organizations, the university has multiple cultures and subcultures. Academic culture is easily regarded as its dominant culture. Academic culture consists of the norms and values common to all academics, irrespective of their disciplines. Kuh and Whitt (1988), are of the view that academic culture is made up of norms and values that support academic freedom, individual autonomy, collegial governance, and truth seeking. Clark (1983) draws on Merton (1957) in an attempt to identify the norms and values all academics have in common. He is of the view that what Merton (1957) considered the basic norms of science: "universalism",

"disinterestedness", "organized scepticism", and "communality" or "communism" are also properties of academic culture.

Clark (1984) views disciplines as "thought groups that have individual thought styles" (p. 12). Disciplinary cultures, as subcultures of academic culture are norms and values within individual knowledge areas or disciplines. Disciplinary culture includes "assumptions about what is worth knowing and how knowledge is created, about the tasks to be performed and standards for effective performance, and about patterns of professional interaction and publication patterns" (Kuh & Whitt, 1988, p. V).

Early writings on academic subcultures tended to provide dichotomized categorizations (Snow, 1959; Haskins, 1960). Snow (1959), for instance, maintained that two distinctive cultures coexisted in the university: the scientific and the humanistic. He contended that the ways of thinking of the two groups were dissimilar to such an extent that they had difficulty communicating with each other. Like Snow (1959), Haskins (1960) noted that two groupings made up the academic community of the university: the scientific and the nonscientific.

But the academic community within the university does not consist of just two cultures as seen by Snow (1959) and Haskins (1960). Rather, it has a multiplicity of subcultures (Becher, 1989). There tend to be as many subcultures as there are disciplines. As Clark (1983) puts it: "Around distinctive intellectual tasks, each discipline has a knowledge tradition -- categories of thought-- and related codes of conduct ... there is in each field a way of life into which new members are gradually inducted" (p. 76).

A relatively recent significant development in the literature is Biglan's (1973) classification of knowledge areas. Biglan's "hard", "soft", ""pure", and "applied" categorization has provided a framework for a number of studies

that have helped move exploration of academic subcultures beyond the early dichotomies (Lodahl & Gordon, 1972; Stark & Morstain, 1978; Gaff, 1982; Becher, 1987, 1989).

Utilizing Biglan's (1973) model of hard, soft, pure, and applied knowledge domains, Becher (1987) provides a categorization of disciplinary knowledge and the characteristics of each category. His work includes the characteristics and tendencies of the respective "disciplinary communities" -- academics who work within the disciplines. Becher (1987) has four disciplinary categories: "hard-pure", "soft-pure", "hard-applied", and "soft-applied". The pure sciences (for example, physics) fall under the hard-pure category. The nature of knowledge within this category is "cumulative", "atomistic". Knowledge in the hard-pure category is concerned with "universals", "quantities", and "simplification". This kind of knowledge results in "discovery", and "explanation." Faculty who work in hard-pure knowledge, that is, the pure sciences, are according to Becher's (1987), "competitive", "gregarious", "politically well-organized." They have a high rate of publication, and are "task-oriented" (p. 289).

The humanities (for example, history) and the pure social sciences (for example, anthropology), come under the soft-pure category. Knowledge in this category is characterized as "reiterative", and "holistic". It is concerned with "particulars", "qualities", and "complication." This kind of knowledge provides "understanding", and "interpretation." The community of academics in this knowledge area is "loosely structured." Members of the community tend to be: "individualistic" and "pluralist." They have a relatively low publication rate and are "person-oriented" (p. 289).

The technologies (for example, mechanical engineering) constitute the hard-applied category. The nature of knowledge in this category is

characterized as "purposive" and "pragmatic." This kind of knowledge is "concerned "with mastery of physical environment", and it yields "products", and "techniques." Members of the disciplinary community tend to be "entrepreneurial", and "cosmopolitan." They are generally "dominated by professional values" (p. 289).

Applied social sciences (for example, education) come under the soft-applied category. Knowledge in this category is described as "functional" and "utilitarian." Soft-applied knowledge is "concerned with enhancement of professional practice." It yields "protocols" and "procedures." Academics who work in and with this kind of knowledge tend to be "outward-looking." They appear to be "uncertain in status" and are "dominated by intellectual fashions." The pursuit of "consultancies" tends to reduce their publication rate. They are generally "power-oriented" (p. 289).

The view is expressed in the literature that knowledge of the epistemological and cultural properties of disciplines is important not only for understanding how universities function, but also for explaining the dynamics of policy implementation within universities (Clark, 1984; Becher, 1989). In this regard, the need to understand the potential relevance of the following four levels of factors is alluded to: epistemological, disciplinary community, gender, and individual.

At the epistemological level, a knowledge of the characteristics of different knowledge areas might be useful in understanding if the extent to which faculty who work within a discipline accept or resist innovation has to do with the amenability of the constituent knowledge of the discipline to the imperatives of the innovation. At the level of disciplinary community, the cultural orientation (Bourdieu, 1984) of a community can facilitate or hinder the adoption and diffusion of innovations. In other words, the nature of the

disciplinary community, particularly, in terms of its responsiveness to demands from the environment, and tolerance for individual approaches or projects no matter how seemingly outlandish, might provide some answers to why a disciplinary group or some members of a group tend to adopt or resist innovation. Disciplinary communities that tend to "jealously guard the status quo" (Becher, 1989, p. 71) are less likely to adopt innovation that does not arise from the developmental needs of the discipline. For instance, Everett and Entrekin (1987) find that faculty in engineering, science, and maths departments tend to resist innovative teaching more than faculty in the arts and social sciences.

Furthermore, in considering the nature of the disciplinary community and its implication for the adoption and diffusion of innovations, as well as for tolerance for individual professional idiosyncrasies, the notions of "convergent" and "divergent" disciplinary communities (Becher, 1989) might be useful analytical concepts. According to Becher (1989), "Disciplinary communities may in varying degrees be seen as convergent, i.e. manifesting a sense of collectivity and mutual identity, or divergent, i.e. schismatic and ideologically fragmented" (p. 151). Convergent communities have "reasonably uniform standards and procedures" and maintain "intellectual control" (p. 154); while divergent ones tolerate a "greater measure of intellectual deviance" (p. 154).

At the level of gender, a number of studies indicate that differences exist between female and male faculty in terms of academic interests and pursuits (Feldman, 1974; Freeman, 1977; Anwyl & Bowden, 1986; Everett & Entrekin, 1987; Simeone, 1987; Black, 1992). Female faculty are said to "cluster" in fields that are stereotypically regarded as "feminine", for instance, library science, home economics, nursing, foreign languages (Feldman, 1974;

Freeman, 1977). Women have also been considered to prefer teaching to research (Freeman, 1977; Simeone, 1987). They are more receptive of innovative teaching methods (Everett & Entrekin, 1987). Some reports are specific that women faculty tend to be more supportive of distance education (Anwyl & Bowden, 1986; Black, 1992).

At the level of the individual faculty member, there are indications in the literature that in spite of the power of disciplinary cultures, individuals nevertheless, make some decisions that may tend to conflict with traditional academic or disciplinary norms and values. As Becher (1989) puts it, "The values, causes and philosophies that academics as individuals espouse will often have their biographical origins outside the library or laboratory" (p. 133). That is to say, the view an academic holds, for instance, in debates, such as elite versus mass higher education; or the use of distributed or distance learning technology, might be a result of his/her personal, social or ideological values.

Becher (1989) adds that the personal and social values of academics in value-laden disciplines, such as education, sociology, history, economics, are more likely to be reflected in the choices the academics make in their work than is the case with academics in hard-pure fields. Huber (1990) also espouses the view that the social values of academics influence their views on substantive and procedural aspects of education, considering that "The disciplinary communities are also different in terms of social background of its members" (p. 244). The cultural capital each faculty member brings with him or her to work may in some cases influence his or her positions, notwithstanding the commonalties the member shares with colleagues within the disciplinary grouping.

The External Context: University-Environment Interface

A significant feature of organizational research is the underscoring of the influence of external factors on organizations. Virtually all modern theories of organization: open systems (Katz & Kahn, 1966), contingency (Lawrence & Lorsch, 1967), ecological (Hannan & Freeman, 1977; Aldrich, 1979), institutional (Meyer & Scott, 1992) emphasize the relationship between organizations and their environments.

Generally, the organization's environment is anything outside the organization itself (Miles, 1980; Robbins, 1986). Organizational environment can be divided into two categories: general and specific. General environmental conditions are of concern to all organizations. They include economic conditions, technological conditions, legal conditions, political conditions, demographic conditions, ecological conditions, and cultural conditions (Hall, 1977). Some of the components of the specific organizational environment are funding sources, suppliers, distributors, unions, customers, clients, regulators, competitors, collaborative partners, markets for products and resources, the state of knowledge concerning the organization's technologies (Harrison, 1994).

The importance of both the general and specific environments to organizations is underscored by Robbins (1986) when he states that "organizations must adapt to their environments if they are to succeed because organizations are dependent on their environment if they are to survive. They must identify and follow their environments, sense changes in those environments, and make appropriate adjustments as necessary" (p. 342). Although there tends to be a consensus that the environment is crucial for organizational survival and effectiveness, however, organizations are not

entirely passive in their relationship with the environment. Organizations vary in the extent to which they are vulnerable to the pressures emanating from the environment. Organizations sometimes attempt, with considerable success, to manipulate the environment (Morgan, 1986).

The concept of organizational boundary is important to understanding organization-environment interface. An organizational boundary is a point of demarcation and intersection between an organization and its environment. Miles (1980) defines an organizational boundary as "a region in which elements of organizations and their environments come together and in which activities are performed of such a nature as to more effectively relate the organizations to the outside world" (p. 317).

Some organizational members are assigned what are called boundary spanning roles in order to ensure that the organization keeps in touch with, and responds to developments in the environment. These roles are, for the most part, 'institutional-adaptive.' They seek to align the organization with the environment (Miles 1980).

In virtually every organization, the boundary-spanning functions are part of the job of persons charged with institutional responsibility. In higher education, Becher and Kogan (1992) include boundary roles as part of the core responsibilities of institutional leaders. They state that in carrying out their boundary functions, leaders of higher education institutions usually deal with the difficult task of mobilizing their institutions to respond to changes in the environment. They "make hard decisions about activities that should cease or be taken up at a different pace" (p. 70). The need to respond to the environment may impel the leadership to embark on "sponsoring changes in parts of the institution's range which would not occur through the traditional process of organic development" (p. 70).

Like all organizations, the university interacts with the external environment and is susceptible to its influences. Jonsen (1986) identifies major aspects of the external environment of higher education: demographic, economic, political, organizational, technological, social and cultural. Alfred and Weissman (1987) list the 'constituencies' of higher education: students, parents, alumni, business/industry, state agencies, legislators, civic organizations, accrediting associations. The "environmental factors" and the "constituencies" together constitute most of the important elements in the environment of the university. An examination of the literature shows that discussions of external influences focus on the following key areas: government, industry, demands for education, and information technology. In the following pages each of these is discussed in turn.

Government as an Influence on the University

An examination of the literature shows that governments all over the world intervene, in varying degrees, in the running of universities. Winchester (1985) sees government oversight of universities as legitimate. He argues that since government is responsible for the entire body social, it should not abdicate this duty in the case of the university, notwithstanding whatever traditional freedoms the university may have had. Also considering government intervention as both legitimate and necessary, Scott (1995) reasons that in view of the fact that government is "the ultimate source of legitimate authority in a democracy, it must ensure universities respect public policy concerns" (p. 18). The authority of government over the university is generally acknowledged. However, it does not appear that governments intervene in universities simply because they have the

authority. There is ample evidence in the literature indicating that in most cases social and economic imperatives warrant the intervention.

From their medieval beginnings, universities have had interactions with the church, government, and other institutions and entities in society. In a sense, the history of the university is essentially a study of how the functions and structure of the institution have been shaped by societal influences, notably, the church during the early years of the institution, and by government in the contemporary times (Scott, 1995). Although government intervention in the university has a long history, there is a consensus in the literature that in contemporary times, the heightened interest of governments in the university is unprecedented.

The reasons governments intervene in universities can be seen from two related broad analytical perspectives, namely, world-system theory (Wallerstein, 1984; Rubinson, 1981; Agnew & Corbridge, 1995; Jones, 1995); and national political economy (Carnoy, 1985; Scott, 1995; Park, 1995). The two perspectives are fundamentally related, considering that nation-states constitute, and are embedded in the world-system. In effect, nation states influence and are influenced by the world-system. Developments at the global level -- world-system dynamics -- influence socio-economic conditions in nation-states.

In the following paragraphs we deal with the world-system perspective and second with the political economy perspective. The discussion of the political economy perspective includes a discussion of the concept of "policy" and its application. A final subsection examines the mechanisms by which governments intervene in higher education.

World-system perspective on government intervention. After World War II, more than ever before, governments all over the world began to regard higher education, and universities in particular, as instruments of social and economic development. A major basis for this was the nature of the world economy. Knowledge was, and still is, central to the sustenance and development of the economy. Related to this was the rising profile of science and technology as a basis for national economic and military strength. As Teichler (1991) puts it, government intervention in higher education "may have been inevitable given the growing importance of systematic knowledge for economic growth, for social problem-solving and for the growing training function of higher education for the employment of graduates in the procession of educational expansion" (p. 45). As a result of the accentuated interest in knowledge and skills as crucial national development resources, governments embarked on the rapid development and expansion of their educational systems (Meyer, et al., 1979).

World-system theory hierarchically categorizes the world into core or centre, semiperiphery, and periphery. This categorization is based on the level of economic development which goes hand in hand with the international division of labour. The industrialized countries are grouped in the core category. Developing countries fall within the periphery category. In the (middle) semiperiphery category are countries with mixed economic characteristics. World-system theory conceives of an ensuing dynamic whereby countries within the core category struggle for economic hegemony, while countries in the semiperiphery and periphery categories aspire to move up the hierarchy. Jones (1995) notes that "The wider and more rapid diffusion of technology, advanced capital equipment and know-how, may further intensify the potential pressures exerted [on countries] by an increasingly

open trade system" (p. 12). The lead which more technologically advanced countries enjoy is subject to constant and increasing threat "as they face the reduction of the time-lag before innovative advantages are eroded and economies with lower wage levels are able to supplement basic cost advantages with increasing technological sophistication" (p. 12).

It is within the context of world-system dynamics or globalization that governments intervene in universities in order to steer them to contribute to the enhancement of national economic competitiveness. Jones (1995) states that pressures exerted by world-system dynamics create a set of virtually common constraints for all countries that pursue economic development and prosperity. He further states that the increasing globalization of culture and aspirational patterns reduce the "practical ability of societies to 'choose' not to conform to the apparent dictates of a globalised economy" (p. 12).

What this suggests is that effective competition in the contemporary global economy demands some kind of responses that are, to some extent, imperative and uniform:

> Realizing that international competition partly depends on a highly skilled workforce and the continuous development of high-technology products, governments have pressured universities to increase productivity in teaching as well as applied research (Mauch & Sabloff, 1995, p. xv).

Mauch and Sabloff (1995) refer to this trend as global. Without doubt, technological innovation has become the driving force in economic development. In the prevailing economic order based on global competition in knowledge intensive industries, countries strive to increase their quanta of 'human capital' through the instrumentality of educational institutions, and universities in particular. Underscoring the universality of this trend,

Altbach (1990) observes that government intervention in universities occurs in rich and poor, totalitarian and democratic nations.

Political economy perspective on government intervention. While world-system theory is concerned more with affording a perspective on the global-level developments that warrant government interest and intervention in universities, the political economy perspective accounts for the more internal rationale for government participation, and mechanisms for intervention. The political economy perspective is briefly explored below.

The political economy perspective on education views education as a factor shaped by the power relations between different economic, political and social groups (Carnoy, 1985). Viewed from this perspective, how much education an individual obtains, the kind of education he or she gets, and the role of education in economic growth are part and parcel of these power relations. Carnoy (1985) is of the view that no study of the educational system "can be separated from some explicit or implicit analysis of the purpose of the government sector" (p. 157). The government is a central factor in the political economic analysis of education because "power is expressed at least in part through a society's political system", therefore "any political economy model of educational change has behind it a carefully thought out theory of the functioning of government" (Carnoy, 1985, p. 157).

From the perspective of political economy, under the influence or guidance of government, education plays a variety of roles:

> It supplies skills for production and makes possible the allocation of skills to various kinds of jobs; it socializes youth to work in particular ways and to accept the work system; and it also inculcates a general ideology in the population which promotes

> the existing production system and the political process as fair and rational (Carnoy, 1985, p. 158).

The role of government in the democratization of access to education or in making education a social right is one of the issues the political economy of education examines.

The expansion, diversification and funding implications of higher education, as well as the heightened public interest in education call for more effective and efficient organization of the system. The cost of running higher education institutions and universities in particular is ever rising. In many countries, funding universities puts visible strains on national budgets. In Britain, for instance, the number of universities increased from 24, in 1960 to 45 in 1991 and the rise in public expenditure on universitures is dramatic, from $129 million in 1962 to more than $3 billion in 1989 (Scott, 1995).

The funding situation is worse in the developing world where most countries have difficulty meeting the basic needs of their universities. In Nigeria, for instance, while enrolment increases, "government funding of the universities is not likely to improve in the near future; the situation is even likely to get worse" (Adesola, 1991, p. 125).

The fact of rising costs in the face of mass demand for access provides a rationale for government intervention. In this regard, governments intervene in an attempt to get universities to increase enrolments and achieve greater productivity. The emphasis on efficiency puts pressure on universities to adopt managerial approaches. Government steering of university administration towards 'managerialism' or 'entrepreneurial management' has been noted by a number of writers (Goedegebuure & Meek, 1990; Adesola, 1991; Neave & Vught, 1991; Becher & Kogan, 1992). Neave and Vught (1991) for instance, note that:

> Efficiency has then become an essential credo in the higher education policy ... Two important developments should be noted in connection with the drive towards efficiency. The first involves significant changes in the process of management at institutional level. The second turns around the reinforcement by government of 'contracting' as an instrument of direction and the particular weight attached to the issues of quality and accountability (p. 242).

The managerial approach and the pressures for accountability measures which governments persuade universities to adopt conflict with the traditional academic culture and the collegial ethos (Adesola, 1991; Scott, 1995).

A concept central to government intervention in the university and in education generally is 'public policy'. A public policy rationale for government intervention is central to the political economy perspective. Public policy as a basis, and instrument for government intervention in the university speaks to government's fundamental responsibility to the provision of educational access and the deployment of educational resources in the service of society. Acting on behalf of society within the context of perennial scarcity of resources and conflict of interests, government intervenes to regulate, distribute, and redistribute educational opportunities and services; to capitalize universities to ensure their effectiveness; and to create an ethical environment for the conduct of research, public service, teaching and learning.

Governments generally pressure universities to increase enrolments in order to ensure that more and more citizens receive higher education. This is because modern political economy requires mass education (Fuller & Rubinson, 1992). Education is considered a public good and a citizenship right. It is through education that modern political economy generates technically

competent, economically rational, and politically conscious citizens whose pursuit of personal development contributes to national development.

Many governments do not just endeavour to provide opportunities for access to those who qualify in a traditional sense, they also are concerned about how to ensure equal access: "governments and law-makers have been looked to for legislation and judgements that would enhance participation by hitherto under-represented groups" (OECD, 1987, p. 36). In the United States, for instance, government seeks to promote equal access opportunity through affirmative action (Berdahl & Millet, 1991).

In some relatively new societies with problems of national integration or unity, universities are used by governments to pursue integration. In Nigeria, for example, the goal of national unity, and the measures for pursuing it are part of the curriculum of universities. Nigeria's National Policy on Education clearly spells this out:

> For universities to serve as effective instruments for cementing National Unity; (i) The quality of instruction in Nigerian universities will be improved with a view to further enhancing objectivity and tolerance; (ii) University development will ensure a more even geographical distribution to provide a fairer spread of higher education facilities; (iii) Admission of students and recruitment of staff into universities and other institutions of higher learning should be on a broad national basis; (iv) Universities will be required to develop teacher and student exchange programmes to improve both inter-university communication and knowledge of the country; (v) Widespread ignorance among Nigerian groups about each other and about themselves will be remedied by instituting a compulsory first year course in the social organization, customs, culture and history of our various people. The award of degrees will be made conditional upon the passing of the paper in this course (Federal Government of Nigeria, 1981, p. 24).

This example also illustrates government influence on university curriculum. Government incursion into university curriculum is amply

noted in the literature. Fisher, et al (1994) observe that governments encourage and promote the growth of some fields of study at the undergraduate level and also overtly steer university research to address the needs of society. Similarly, Neave and Vught (1991) note that governments urge greater emphasis on vocational and science based programs.

The pressures from government and other external sources on academic disciplines to be relevant to societal needs have been noted to have affected the disciplines. The notion of "epistemic drift" (Elzinga, 1985), refers to the effect which pressures from outside the university, especially from government and industry, have on disciplines and disciplinary culture. Epistemic drift is:

> a shift from traditional reputational control associated with disciplinary science to one that is disengaged from disciplinary science, and, thus, more open to external regulation and managerial policy impositions .... The bureaucracy thereby influences not only problem selection but also the standards of performance of research, standards of significance and territorial definition of the field or specialty in question" (p. 209).

Coordination of post-secondary education is given as another reason governments intervene in the running of universities. In this regard, Winchester (1985) appreciates the need for government intervention. He argues that since the university is one among many post-secondary teaching institutions, and one out of many types of research institutions, government intervention is necessary for coordination and regulation "if we are to have a post-secondary "system" instead of post-secondary anarchy" (p. 35).

So far, this discussion on government influence on the university has been concerned with the economic and social justifications for government policy intervention. Next to be considered are the key intervention mechanisms which governments employ.

Government intervention mechanisms. A number of writers have dealt with the forms and mechanisms of government intervention in universities (Vught, 1989; Neave & Vught, 1991, 1994; Becher & Kogan, 1992; Mauch & Sabloff, 1995).

Drawing on Vught's (1989) attempt to analyze conceptually government intervention strategies, Neave and Vught (1991, 1994) identify and distinguish two models of intervention: (i) state supervising, and (ii) state control models.

The state supervising model is characterized by a very limited government regulation of universities. Government does not intrude into universities by means of centralized, detailed regulation and strict rules. In this model of intervention, government respects the autonomy of universities and stimulates their self-regulating capabilities. Neave and Vught (1994) note that government "sees itself as a supervisor, steering from a distance and using broad terms of regulation" (p. 11). Government-university relationships in the United States and in Britain are exemplars of the state supervising model. It is, however, noted that in the last decade in Britain, government intervention in universities has tended to be blatant and indelicate (Walford, 1991; Scott, 1995).

In contrast to the state supervising model, the state control model is characterized by a centralized and detailed bureaucratic control exercised by the ministry of education. Government seeks to control virtually all aspects of the dynamics of the higher education system: access, curriculum, degree requirements, examination systems, appointment and remuneration of academic staff (Neave & Vught, 1994).

A number of national case studies on government intervention in universities have been carried out using the state supervising and control

models (Neave & Vught, 1991, 1994). Government-university relationships in continental Europe are considered as some of the examples of the state control model (Neave & Vught, 1991, 1994). France and Sweden are consistently cited as illustrative cases of this model in Europe. The model is also the norm in virtually all developing countries. In most of these countries, the attitude of government towards universities tends to be authoritarian. As Neave and Vught (1994) observe, governments of many developing countries "use their higher education institutions as instruments for national development, thereby *forcing* [italics added] these institutions to adapt themselves to local needs and circumstances" (p. 13). For example, in Ghana, Uganda, Zambia (Nwiria, 1992), India (Rao, 1991), Thailand (International Institute for Educational Planning, 1992) and South Korea (Park, 1995), government strongly controls universities. Neave and Vught (1994) note that in Latin America the state control model is largely the norm.

In both the state supervising and the state control models, governments use a number of mechanisms to steer universities towards meeting governmental objectives. Some of the key mechanisms are legislations, resource allocation policies, "vetting", "validation", accreditation of programs, and key appointments.

Governments use the legislative mechanism in the establishment of public universities and in setting conditions of operation for both public and private universities. In Canada, for instance, "an institution cannot award degrees or refer to itself as a university without being authorized to do so by an Act of a provincial legislature" (Skolnik & Jones, 1992). In South Korea, the Private School Law brings private universities under the control of government (Park, 1995).

The mechanism of resource allocation is a very potent tactical and strategic governmental tool for steering universities. Neave and Vught (1994) observe that "In any higher education the budgetary process is a powerful instrument in determining institutional behavior" (p. 312). The telling efficacy of the resource allocation mechanism prompts Becher and Kogan (1992) to assert that "resource allocations are a metaphor for the allocation of values" (p. 83). For instance, cutbacks in government funding appear to be contributing to the adoption of managerialism or entrepreneurialism in administration, as well as innovative teaching approaches.

The mechanisms of vetting, validation, or accreditation of new courses and programs are employed by governments exercising strict control over universities. In such situations, new courses and programs must be approved by government before they are offered. In some cases, degrees are awarded by government through the appropriate ministry. Neave and Vught (1994) cite Argentina, Chile, Brazil, Cameroon as examples of countries where government vets, validates and accredits courses and programs. In Cameroon, for instance, the initial steps in proposing a program are taken by the department intending to offer the program. Thereafter, virtually all other elements of validation lie outside the university to the extent that first degrees are awarded by the Minister of Education (Neave & Vught, 1994).

Another critical mechanism of governmental intervention in universities is appointment. Besides appointing almost or all of the members of university council, some governments also appoint the president or vice-chancellor (Omari, 1994). In this connection, Agilakpa (1994) reasons that a president or vice-chancellor appointed by government is more likely to see himself or herself as an official of the state or the ruling party.

In countries where buffer or intermediary bodies exist, governments do not supervise or control directly. They rather steer universities through such bodies. The intermediary bodies employ the mechanisms discussed above, except legislation, to influence universities to be more responsive to the needs of society as interpreted and articulated by government.

Industry as an Influence on the University

The relationship between universities and industry is a major issue in contemporary higher education policy and practice debates. University-industry relationships, like the relationship between government and the university is a controversial topic, partly because of its potential or real threat to traditional university autonomy. There appears to be a consensus that industry, in no small way, affects the structures, and programs of modern universities as well as their values (Davies, 1987; Powers, et al., 1988; Michael & Holdaway, 1992; Blackman & Segal, 1992; Buchbinder, 1993; Fisher, Rubenson & Schuetze, 1994).

The literature on university-industry interface is relatively recent, rapidly growing, and already extensive. The following are some of the major themes that feature in the literature:

a) the reasons industry needs the partnership of university (Powers, et al., 1988; Blackman & Segal, 1992);

b) the motivations of university for collaborating with industry (Fairweather, 1988, Michael & Holdaway, 1992; Buchbinder, 1993);

c) university-industry linkage mechanisms (Davies, 1987; Powers, et al., 1988; Blackman & Segal, 1992; Fisher, Rubenson & Schuetze, 1994);

d) the effects of university-industry relationship on university structure, programs, and faculty values (Davies, 1987, Blackman & Segal, 1992);

e) the implication of university-industry partnership for university autonomy (Buchbinder, 1993);

f) the benefits universities derive from cooperating with industry (1988; Powers, et al.);

g) the impact of university-industry collaboration on companies and on national economic competitiveness (Newson & Buchbinder, 1988).

In the following paragraphs we explore these themes by considering first industry's motivations for collaboration and second, the motivations of the university. We then examine the mechanisms by which university-industry linkages operate and their effect upon various aspects of the university.

The motivations of industry. The nature of the modern economy is the fundamental stimulus for university-industry relationships. The demands of the economy drive industry to seek partnerships with university and other higher education institutions. The contemporary economy is knowledge- and skill-based, and technology intensive (Bell, 1976). For companies, as well as nations, economic competitiveness largely depends on a knowledgeable and skilled workforce, and on advanced technology. This makes investment in research and development, and in human capital imperative for economic success. Given that knowledge and skills -- the critical resources of the economy --are susceptible to rapid obsolescence, the need for relentless commitment to keep these vital ingredients up-to-date becomes a top priority of nations and companies that pursue the objectives of economic success and

leadership (OECD, 1989; Blackman & Segal, 1992). Universities provide both human resources and advanced technical know how. Blackman and Segal's (1992) review of the nature of modern economy notes the economy's heavy reliance on human resources and advanced technology. On that basis, they conclude that "it is only natural that firms should seek to establish enduring relationships with HE [higher education] and other institutions, to ensure that they have the knowledge base and more particularly the skill essential ... for economic activities" (p. 936). Power et al.'s (1988) attempt to outline some of the objectives and activities of business organizations which make universities a necessary partner of industry in the prevailing economic dispensation is pertinent:

> Business enter cooperative relationships first of all to meet corporate product, service, or management needs. To make a profit, corporations must seek new products, improve current products, make technological advances in production techniques, package and deliver services more effectively, and optimize management (p. 23).

The authors then go on to establish a nexus between the above corporate objectives and activities, and universities: "Universities conduct research in fields pertinent to these matters [outlined above] and employ faculty members who can provide expert advice" (p. 23).

<u>The motivations of the university</u>. Buchbinder (1993) aptly articulates what is perhaps the most recurring reason in the literature why universities are impelled to engage in collaborative ventures with industry -- the need for funds. As Buchbinder puts it:

> Business has looked to university research to provide them a "window" on scientific research and development. University research laboratories are seen as potential innovators in the

> development and production of marketable products. *Underfunded universities and university researchers struggling to fund their research from inadequate research funding have turned to the private sector* [italics added] (p. 331).

It is consistently noted in the literature that university-industry relationships are encouraged by government and non-governmental agencies. Citing university-government partnership in Canada as an example, Buchbinder (1993) notes that:

> This process [university-government] relationship has been encouraged by government, as well as non-governmental agencies such as Canadian-Higher Education Forum, who see a "marriage" between private industry and university research as a more efficient way to survive in a political economy characterized by severe recession (p. 331).

Thus, the goal of improving funding in the face of financial constraint is a primary motive force spurring universities into partnership with industry. Expounding on this, Michael and Holdaway (1992) observe that there is worldwide decline in funding for post-secondary education. They, like other writers emphasize that what has become a chronic underfunding of higher education institutions is a matter of great concern for governments and the institutions. In the scenario presented by these authors, institutions are caught in a dire reality of inadequate funding from government or traditional sources. The pressure of rising student enrolment, and the rising costs of running modern libraries, and of installing modern laboratories, and hiring high-quality faculty compound the financial situation of most institutions. It is partly in this context of underfunding from traditional sources, that universities are now engaging in "more entrepreneurial activities, and shifting of costs through privatization of some functions" (Michael & Holdaway, 1992, p. 21).

Presenting a scenario similar to that by Michael and Holdaway (1992), the Science Council of Canada (1988), makes a case for greater university-industry interaction "in an age when international economic success increasingly depends on knowledge and technological innovation" (p. 3). The Council highlights the financial neediness of universities and hints at its implication for academic excellence:

> Universities are also suffering from the consequences of more than a decade of stringent financial restraint. In Canada, as in many other countries, enrolments have grown much faster than funding for higher education. Between 1970 and 1983, enrolment rose 62.2 per cent while real public expenditures increased only 3.9 per cent. The consequences are readily apparent in dilapidated buildings, obsolete equipment, and overcrowded lecture rooms. The spirit of scholarship may be alive but quality and excellence are in peril (p. 4).

Although the need for improving funding appears to be the key motivation driving universities into relationship with industry, it is not the only reason. A host of other reasons are noted in the literature (Powers et al., 1988; Fairweather, 1988; Blackman & Segal, 1992).

Universities also interact with industry with a view to having access to cutting edge theoretical and practical knowledge that may be available in industry. Blackman and Segal (1992) observe that, in some fields, companies may be ahead of universities with respect to "theory and not just practice" (p. 936). By interacting with industry, universities have an opportunity to access up-to-date and expensive equipment usually available in industry. University-industry interaction provides opportunities for university faculty and students to familiarize themselves with state-of-the-art industrial science and technology, and management systems. Furthermore, universities enrich and up-date their research agendas from their interactions with industry.

Another consideration motivating universities to collaborate with industry is the need to make program and course offerings relevant to the requirements of industry. Programs and course offerings that are responsive to the needs of industry brighten the employment prospects for students. It is also noted in the literature that the prospect of enhancing their image as contributors to the economy spurs universities to cooperate with industry (Blackman & Segal, 1992).

As has already been noted, university-industry relationship is controversial. Some see it as prejudicial to traditional academic ethos and to university autonomy. Proponents of the view contend that universities face a real danger of imbibing the compulsive propensity of business for profit making if they interact unrestrainedly with industry. This will result in the university commodifying knowledge. And this looming prospect, if not already a reality, "threatens to transform the university from an open, inquiring and relatively free institution committed to the widespread dissemination of knowledge to a closed, secretive institution preoccupied with the commercial and security and public sector partners" (Langford, 1991). Others opposed to, or critical of, university-industry collaboration have expressed a similar fear. For instance, Kenney (1986) cautions:

> When the university and industry become partners, the entire society is endangered, for the demise of the university as an independent institution will lead to the crippling of the tradition of an independent university (p. 246).

In spite of the protestations of the opponents or critics of university-industry interaction, it does appear that the relationship between universities and industry is developing inexorably in complex ways. Buchbinder (1993), after reviewing the circumstances driving university-industry partnerships

remarks that: "there does not appear to be an alternative to the market [university] which has widespread currency" (p. 346).

Linkage mechanisms and their effect. Research and development, and technology transfer activities are some of the ways universities are responding to the needs of industry and, by extension, to the economic development needs of society. As already noted, in the current economic order driven by global competition in knowledge-intensive industries, technological innovation has become a crucial engine for economic development. Consequently, in many countries, particularly industrialized ones, universities are employing a number of mechanisms for transferring technology to industry. Increasingly, they are engaging in consulting, contract research, and such joint ventures as incubators, science parks, and spin-off companies (Davies, 1987; Blackman & Segal, 1992). These mechanisms, in structural and processual forms, are some of the evidence of how universities are being affected by their interaction with industry. The structures and curricula of universities, as well as faculty values are being affected (for the better or for the worse, depending on one's stand on the university-industry relationship debate) by the relationship. Universities are increasingly becoming entrepreneurial as a consequence of the relationship (Davies, 1987; Michael & Holdaway, 1992; Buchbinder, 1993).

The relationship has structural impacts on universities. The establishment of an industrial liaison office by universities exemplifies this kind of impact. Industrial liaison offices facilitate, regulate and control the research and development, and technological transfer activities of universities. The attempt by universities to produce graduates who meet the requirements of industry influences the curriculum, and results in the

adoption of innovative ways of delivering education and training. In terms of the impact of the relationship on curriculum, there are some programs of study, (for instance, business administration, commerce, industrial psychology) that are designed to focus almost entirely on industry.

Another dimension of the impact on curriculum, is the tendency by industry to pressure some basic disciplines to be relevant to industrial needs. The impact of this kind of pressure on disciplines is referred to as epistemic drift (Elzinga, 1985). Noting the influence of industry on curriculum, Blackman and Segal (1992) observe that some courses have "explicitly taken into account the needs of industry" (p. 940). While examining the role of universities in addressing the labour needs of industry, Fisher, et al (1994) note that continuing education, distance education, cooperative education, and enterprise education are some of the innovative ways universities are adopting in pursuing the purpose. Of course, the adoption of these mechanisms would affect the organizational structure and values of universities.

The interaction between universities and industry is seen as one of the influences eroding traditional academic norms and values (Newson & Buchbinder, 1988; Buchbinder, 1993). More than ever before, faculty are no longer seen as a monolithic group upholding the 'ivory tower notions' of the university which Burgess (1982) refers to as the "autonomous tradition." Burgess (1982) characterizes the autonomous tradition as "aloof, academic, conservative and exclusive" (p. 70). Academics who adhere to this tradition "hold themselves apart, ready if necessary to resist the demands of society, the whims of government, the fashions of public opinion, the importunities of actual and potential students" (Burgess, 1982, p. 70). Academics working in accordance with the tenets of the autonomous tradition, according to Burgess,

pursue knowledge for its own sake. Industrial and other societal influences on the university, and by extension on faculty, have resulted in the emergence of a tradition that contrasts with the autonomous tradition. Burgess (1982) refers to this as the "service tradition." It explicitly expects education to serve individuals and society" (p. 70). The service tradition is "responsive, vocational, innovating and open" (p. 71). Academics who work within this tradition "do not think it right to hold themselves apart from society," they rather "respond to its needs. They seek to place the knowledge that they have at the service of society" (pp. 71-72).

Demand for Higher Education as an Influence on the University

Social demand for access to higher education is identified in the literature as a factor that has shaped and continues to shape universities (Gardener, 1976; OECD, 1987; Kallen, 1992; Fulton, 1992; Woodhall, 1992; Moore, 1992). The strong and generally rising demand for higher education world-wide is illustrated by relatively recent figures from the United Nations Educational, Scientific and Cultural Organization (Unesco) (1993). Higher education enrolment rose from about 38 million in 1975 to over 64 million in 1991. In Canada, full-time post-secondary enrolment rose from 91, 000 in 1951 to 857, 000 in 1990. University enrolment in Canada over the same period increased from about 75, 000 to 532, 000 (Secretary of State, 1991). Noting contemporary mass demand for access as one of the significant factors shaping universities, Gardener (1976) observed that:

> Roughly four percent of college-age youth were enrolled in America's institutions of higher learning in 1900; today more than 40 percent are enrolled, and estimates are that nearly two out of three of the age group will be enrolled as this century closes" (p. 104).

Two questions are important for our understanding of this phenomenon: What are the forces driving mass demand for higher, as well as lower levels of education? and how does the sustained and sometimes overwhelming pressure for increased access affect the structures and values of universities? The answer to each are considered in turn in the following paragraphs.

The reasons for the demand. There is hardly any attempt to account for the phenomenon that does not emphasize the numerous crucial roles education plays in modern society as the fundamental reason why nation-states, as well as individuals, almost inevitably pursue education. Education now plays decisively central roles in the vital processes of modern society. It plays critical roles in economic productivity (Schultz, 1961), and in social selection or mobility (Dore, 1976; Collins, 1979). The value of education in contemporary society goes beyond the instrumental. Education has become institutionalized as a normative and valued good (Carnoy, 1985; Meyer, 1992).

The economic productivity value of education is explored, expounded and supported by human capital theory (Schultz, 1961; Denison, 1962). The theory considers human resources as a vital economic factor. It, therefore, espouses the pursuit of education for economic productivity. Education directly contributes to the growth of a national economy by improving the skills and productive capacity of workers (Schultz, 1961). Conversely, the theory postulates that a lack of education keeps individuals and nations poor.

It has been observed that the argument and postulates of human capital theory largely inform the educational programs of many governments pursuing the objectives of economic growth, and reduction of income inequality (Davis, 1992). The implication of human capital theory for the individual in the context of a modern economy which emphasizes

knowledge, skills, and technology is that the acquisition, and continual up-dating of knowledge and skills are imperative. Hence, people seek to participate in education in order to acquire knowledge and skills valued at the labour market. Human capital theory, therefore, provides one explanation for mass demand for education.

Closely related to this explanation for mass participation in education is that inferrable from the phenomenon of the professionalization of modern society (Cullen, 1978; Eraut, 1994). Professionalization or occupational rationalization (Cullen, 1978) is driven by a number of factors. The complexity of modern society calls for the services of a multiplicity of diverse occupations. This demands the preparation of large numbers of people for the different occupations. Besides, being a society that is dependent on knowledge, modern society needs knowledge-experts in diverse fields for knowledge generation. Systematic pursuit of knowledge about the physical and social world can best be handled by experts. Similarly, efficient and effective application of knowledge and skills to valued social purposes requires specialists. It is, however, noted that the need for expertise is not the only reason driving professionalization. Protection of the interests of occupational groups is noted as a major additional force behind the phenomenon (Cullen, 1978; Eraut, 1994). Thus, professionalization, or the reality of 'expert society' makes the acquisition of 'expert knowledge and skills', obtainable from participation in education, a necessary requirement for entry into occupations or professions.

A different explanation for mass demand for education is offered in the literature on "credentialism" (Marien, 1971; Collins, 1979; Stodt & Thielens, 1985; Davis, 1992), and "diploma disease" (Dore, 1976). The term credentialism sees degrees, diplomas, and certificates as essentially a currency for purchasing

jobs and social status. While the explanations for mass demand for education offered by human capital theory, and in some respects, by the professionalization of society emphasize education for competence and productivity, the explanation afforded by credentialism stresses education for social reward and stratification. As Stodt and Thielens, (1985) state, credentialism:

> depicts a combination of interests, motives or goals which attaches comparatively high importance to credentials in and of themselves and relatively low importance to any educational acquisition of competence the credentials supposed to certify (p. 251).

The overriding consideration for participation in education, viewed from the credentialist perspective, is the acquisition of educational credentials (not necessarily competencies and skills) for the purposes of entering occupations and professions, as well as for qualifying for higher social status.

Diploma disease is a more pejorative notion than credentialism for the pervasive use of educational credentials as a device for social and occupational selection, and other social rewards (Davis, 1992). Both credentialism and diploma disease are, in effect, concerned with the pre-eminent role of education in social selection. The following observation by Marien (1971), sheds some light on the pervasiveness and power of credentials in modern society:

> Among the many selection mechanisms presently employed, the greatest emphasis is on diplomas, and "credentialism" is therefore the best term for the present system of social selection .... Credentials also serve as a measure of social status and of self-worth. Those who "get" their education from a school or college are looked upon as "educated" and see themselves as such, whereas those without a credential are designated as inferior and are prone to accept the label. This attitude is unquestionably reinforced by social scientists, census takers, and pollsters, who use

> "education" as a basic socio-economic descriptor. In part, such use is perpetuated because educational attainment is a readily obtained measure, as opposed to any other criterion of social status, level of knowledge, or skills possessed by the individual (p. 15).

The need for personal development, and meaningful participation of the individual in society also drives mass demand for education. It is becoming increasingly limiting for anyone to function in modern society without a good measure of education. The imperatives of an 'information and technology society' demand that individuals possess at least basic literacy and numeracy skills, as well as, general social knowledge. The rapid obsolescence of knowledge and skills literally condemns individuals who need up-to-date knowledge and skills for personal development and occupational purposes to continual participation in education or lifelong learning.

Taking into account the multiple social and economic roles of education in modern society, 'institutionalists' (Meyer, 1992), offer what seems to be an overarching explanation for mass demand for education. They are of the view that modern society has institutionalized education as a citizenship right, as a social virtue, as a public good, and as a stratification process, thus providing individuals incentives to participate. As Meyer (1992) puts it: "Every institutionalized social motive impels" people "to participate in education" (p. 227). He also observes that:

> In contemporary societies educational attainment is directly valued and is the main factor leading to advantage along all other key dimensions of individual stratification. Essentially every incentive that modern systems have to offer is put at the service of educational participation. In going to school and staying longer, people tend to gain greatly in occupational status, income, political rights, to fuller participation and to seek office, preferred marital partners, enhanced access to organizational participation, cultural capacity to act in preferred ways, informal social advantages, and the esteem of almost all who matter. For each of these goods,

> education is not simply one helpful resource; it usually is the primary factor (p. 227).

The effect of demand on the university. A number of writers have attempted to provide insights into the diverse ways the university has been affected by mass demand for access (Gardner, 1976; Campbell, 1984; OECD, 1987; Smith, 1991; Kallen, 1992; Curran, 1992; Tight, 1994; Taylor, 1994; Fisher, et al., 1994). In a number of ways, mass demand for education has generated changes in universities. Universities appear to be realizing that their spatial and other infrastructures designed largely for elitist or restricted university education are insufficient and inadequate for mass higher education. Consequently, they seem to be under pressure to look for ways of dealing with the new reality. Specifically, they face the challenge of meeting the diverse educational needs of a heterogeneous mass clientele, mostly adults, demanding flexible arrangements (Campbell, 1984).

With regard to academic values, mass participation is contributing to the emergence of a 'service tradition' (Burgess, 1982) or an egalitarian culture in the university. Fisher, et al. (1994) observe that universities are changing significantly as they respond to mass demand for access as well as to other societal influences:

> The "idea" of the university is changing as academics respond to the technical and social changes in the wider society. Economic recession, government fiscal restraint, the rise in student numbers and the new demands from mature students for programs that refresh and enlarge work-related skills and knowledge have all contributed to internal tension within universities (p. 31).

One of the responses to mass demand for access that virtually embodies almost every category of change observed in universities is continuing

education. The adoption of continuing education is affecting the structures, curriculum, pedagogy, and values of universities.

In general, there are two organizational models of university continuing education, namely, the decentralized model, and the centralized model. In the decentralized model, continuing education is provided by departments or faculties, while in the centralized model, one continuing education department or unit organizes all the continuing education activities of the university (Fisher, et al. 1994).

As a result of its being a predominantly adult matter, universities, in designing and implementing continuing education, take into account the circumstances of adult life, the varied demands family, work, and other social roles impose on adults. Consequently, rather than running continuing education along the lines of traditional university programs, universities tend to make continuing education programs unorthodox, and flexible (Tight, 1994). Unorthodoxy and flexibility entail the provision of such conditions and services as: customized courses and programs, assortment of personal and professional development courses, programs responsive to diverse needs and interests, convenient scheduling, credit transfer and banking arrangements, and removal of stringent requirements that restrict access to academic and professional programs.

In Canada, for instance, a significant number of university students are pursuing their studies through continuing education. In 1991, of the 800, 000 students in Canadian universities, about 38% were studying part-time. Between 1972 and 1990, part-time enrolment in Canadian universities rose from 151, 800 to 309, 200 (Employment and Immigration Canada, 1992, p. 5). These figures suggest the organizational and programatic effects continuing education has on universities.

Smith (1991) is of the view that continuing education programs in Canadian universities are generally successful. He further makes a succinct observation that gives a glimpse of how universities are pro-actively using continuing education as an organizational and programatic apparatus for addressing mass and flexible demands: "They [continuing education departments] tend to be pro-active and often do market research to determine demand for new courses" (p. 82).

The use of interactive information technology for on-campus or distance education is another major mechanism universities are utilizing to respond to mass and flexible demand for access. Distance education is a flexible mode of teaching and learning in which the student and the teacher are in two separate geographical locations. In the distance mode, teacher-learner, and learner-learner interaction is increasingly being facilitated by information technology (Moore, 1992; Curran, 1992; Taylor, 1994; Bates, 1995).

Through distance education, universities provide access to people not accepted in on-campus programs owing to lack of space, and to those who cannot come to the campus on account of familial, occupational, health, distance, cost, and other reasons. Distance education overcomes some access barriers associated with traditional on-campus education, such as, costs of travel and accommodation, disruption of workflow and rigid scheduling (Fisher, et al. 1994).

The adoption of the two mass and flexible access mechanisms -- continuing education and distance education -- has contributed to changes in the organizational structure, curriculum, as well as the way education and training is delivered, and to changes in the values of the university.

The review now considers information technology along with the information society as another significant societal influence on the university.

Information Technology as an Influence on the University

It has been observed that modern society is experiencing an "Information Revolution" (Martin, 1988; Woods, 1993). A critical factor driving the revolution is information technology. Martin (1988) describes information technology as a 'change agent" and observes that "No field of human endeavour remains immune to its influence, no corner of life is left undisturbed by its coming" (p. 11).

Rogers and Picot (1985) note that interactive television systems (representing a unique combination of computers, satellites, and cable television), videotex, home computers and video tape recorders are increasingly becoming standard features of the household. The radio, television, and telephone have, of course, been features of modern society for sometime now. Rogers and Picot (1985) also note that at the organizational level, the way work is done is substantially changing owing to the impact of video- and computer conferencing, electronic messaging, word processing, telecopying and electronic filing and retrieval. A similar observation about the penetration of information technology in modern society is made by Rubenson (1992): "It is evident that information technology is already influencing most sectors of the economy: offices, factories, stores, schools, etc" (p. 14).

Woods (1993) notes the pervasiveness of information technologies in modern society, and on the basis of their increasing capabilities, sees their immense potential for a wide range of development functions. He notes that

the merging by digital technology of broadcasting, telephony, printing, and computing has resulted in multimedia that "communicate on demand in sound, pictures and graphics as well as in script and numbers .... " (p. 13).

Discussions in the literature on the socio-economic impact of information technology are often undertaken in the context of the ways the technology services "the information society" and its institutions. The contemporary society is sometimes referred to as information society. In the information society, information is central to the economy, as well as to social and cultural life. The emergence of the information society is contingent on a variety of criteria: technological, social, economic, political and cultural (Martin, 1988). Under the technological criterion, Martin notes that information technology must be diffused in offices, factories, education and the home. Subsumed under the social criterion are the following conditions: widespread information consciousness, pervasiveness of the notion of information as an enhancer of quality of life, and easy access to information by end-user. Under the economic criterion, information must be regarded as a key economic factor in the form of resource, service, commodity and a source of employment. The political criterion includes freedom of access to information, and a democratic political environment. Finally, information must be valued as a cultural good.

The criteria outlined above underscore the centrality of information technology as well as information to the socio-cultural and economic institutions of the information society. Although, some take the position that the information society does not quite exist yet, there appears to be a consensus that there are already some conditions that indicate its inexorable emergence (Martin, 1988). Such conditions as increased awareness of the value of the information resource; growing appreciation of the need for

widespread computer literacy, the rapidly increasing diffusion of information technology are heralding the inevitability of the information society. Martin (1988), however, cautions that information society should not be "taken too literally but should rather be employed as the nature and direction of changes in society" (p. 37). He also notes that different societies are at different points on the continuum of the information society.

Although the emergence of the information society may appear inevitable, there are nevertheless concerns that it might have some harmful effects on society and culture (Lyon, 1991; Postman, 1992). In this regard, Lyon (1991, p. 94) asks: "whether or not we are witnessing the emergence of a 'new kind of society', are its advocates correct to assume, as they often tend to, that the social effects of Information Technology are generally benign?"

Critics fear that the information society will exacerbate social inequality. The gap between the haves who can afford information technology and the have-nots who cannot will widen (Apple, 1987). They also fear that the possibility exists for governments and powerful groups to use information technology to repress and dominate.

Like all other institutions of modern society, educational institutions are susceptible to the influences of information technology and the other features of the rapidly emerging information society. There is evidence in the literature of the penetration or use of information technology in education (Backer & Yabu, 1994; Bates, 1995; Hall, 1995; Tiffin & Rajasingham, 1995). The literature further indicates that educational application of information technology is giving rise to new modes of instructional delivery.

Summary: A Conceptual Framework for the Study

The literature reviewed in the preceding pages may be conveniently summarized by means of a conceptual framework to guide the present study of the use of interactive information technology in the University of British Columbia. The framework is diagrammed in Figure 1 (p. 82).

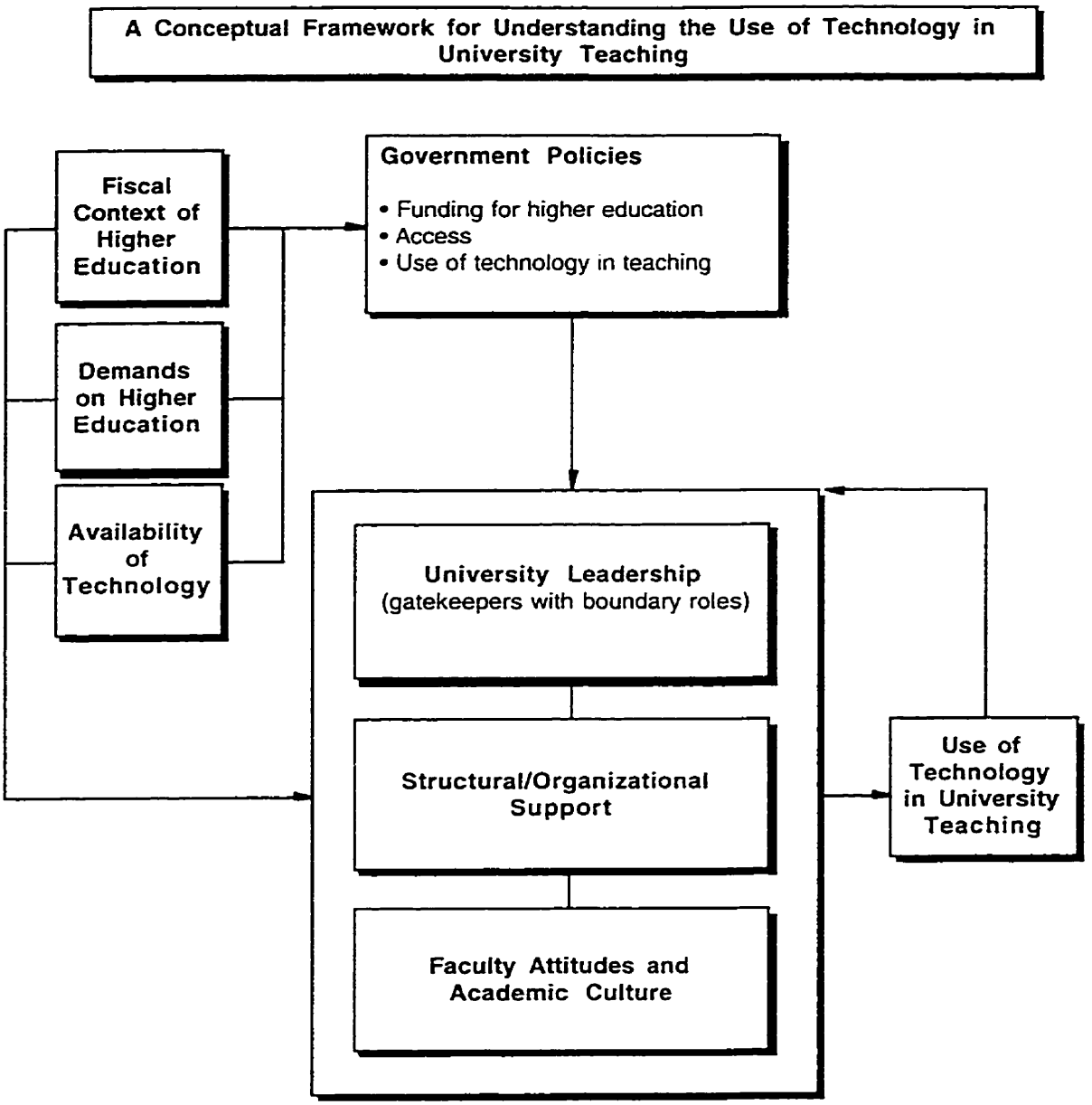
The use of technology is seen to be increasingly urged and to have increasingly sophisticated developments available. The literature refers to the way technology makes possible new and innovative pedagogical strategies. It also shows that faculty attitudes to the use of technology are mixed. What emerges particularly, however, is that a full understanding of the phenomenon needs to take account of broader contextual factors affecting the university. These may be seen as two kinds -- those internal to the organization and those external.

Figure 1 accordingly should be read from the bottom right hand corner to the rest of the diagram. The present study conceptualized the use of interactive information technology in university teaching as a result of the influence of external and internal factors. Four key external factors delineated in the framework as influencing the use of interactive information technology in instructional delivery are: a) availability of information technology. b) public demands on higher education, c) fiscal context in which post-secondary education operates, d) government policies on post-secondary education. The identification of these factors, at the theoretical realm, as the key societal forces shaping the structures and processes of higher education in general, and pushing the adoption of interactive information technology in university teaching, in particular, was informed by the literature on the

interface between higher education and society (Clark, 1983; Becher & Kogan, 1992; Scott, 1995; Neave & Vught, 1991, 1994).

With regard to the internal factors, the literature on the inner life or internal structures and dynamics of higher education (Clark, 1983; Becher, 1989; Becher & Kogan, 1992), guided the theoretical identification of three principal internal factors pertinent to the adoption and integration of interactive information technology in university teaching. These are: a) University leadership, b) Structural and organizational support, c) Faculty attitudes and academic culture. As Figure 1 shows, while the use of technology in teaching results from the influence of the external and internal factors, the use of technology itself, in turn, induces changes in the university.

Figure 1


A Conceptual Framework for Understanding the Use of Technology in University Teaching
Fiscal Context of Higher Education
Demands on Higher Education
Availability of Technology
Government Policies
• Funding for higher education
• Access
• Use of technology in teaching
University Leadership
(gatekeepers with boundary roles)
Structural/Organizational Support
Faculty Attitudes and Academic Culture
Use of Technology in University Teaching

CHAPTER 3

RESEARCH DESIGN AND PROCEDURES

As indicated by the conceptual framework developed in the previous chapter, this case study of the use of interactive information technology in teaching at the University of British Columbia had three key foci: the use of technology itself, the effect of factors external to the University and the working of relevant internal factors. This chapter describes the procedures used in the study. It begins by detailing the specific research questions used. This is followed by a description of the research approach, setting, and the types of data used, as well as the procedures by which data were collected and analyzed. The soundness and limitations of the study are discussed next. The chapter concludes with a summary.

Research Questions

It will be recalled that the purpose of the study was to identify and analyze the external and internal factors influencing the use of interactive information technology in teaching at the University of British Columbia, as well as to describe and analyze the changes the use of technology is inducing in the University. Eight research questions were developed for the study, taking account of both the stated purpose and the conceptual framework.

The first set of questions deal with the use of interactive information technology in teaching. They were:

1. What kinds of interactive information technology are used in

teaching at the University of British Columbia?

2. To what extent is interactive information technology used in teaching at the University?
3. To what extent is interactive information technology used in distance teaching at the University of British Columbia?

Two questions allowed a focus on the external factors influencing the use of technology:

4. What are the principal external factors driving the use of interactive information technology in teaching at the University of British Columbia?
5. How did these factors operate during the period of the case study?

Two questions focussed on factors internal to the University:

6. What kinds of support exist or are being developed in the University to enhance the use, or encourage increased use, of interactive information technology in teaching?
7. What are the attitudes and experiences of faculty regarding the use of interactive information technology in teaching?

Finally, one question focussed on the effect of interactive information technology in one aspect of the University's operation:

8. In what ways has the use of interactive information technology in instructional delivery affected the culture of teaching at the University?

The Research Approach, the Setting and the Data

The case study approach was used in this study. It is an approach which "permits the grounding of observations and concepts about social action and structures in natural settings at close hand" (Orum, Feagin and Sjoberg, 1991, p. 6).

It has been observed that the key difference between case studies and other types of research is not one of method but of purpose and focus (Merriam, 1988; Yin, 1994). In this regard, methods employed in case studies can range from the purely qualitative and ethnographic to the highly quantitative and statistical (Merriam, 1988). This study made use of both qualitative and quantitative methods of data collection and analysis.

The tendency of case studies to explore the particular, focusing on its uniqueness and complexity limits their ability to generalize (Orum, Feagin and Sjoberg, 1991, p. 14). Even in multiple case studies, transferability and extrapolation, not "statistical or empirical generalization" (Yin, 1994) are the key objectives (Patton, 1990). With regard to transferability, the case study researcher describes the case in sufficient detail in a way that allows readers to interpret results in relation to context, and thereafter determine for themselves the extent to which findings are transferable to their own situations. Concerning extrapolation, the researcher can make "modest speculations on the likely applicability of findings to other situations under similar, but not identical conditions" (Patton, 1990, p. 489).

The particular setting for the present case was the University of British Columbia (UBC). It is one of the largest universities in Canada. It has about 7,500 faculty and staff, and an enrolment of about 32,000 full-time students of whom 6,500 are pursuing graduate programs.

The University has 12 Faculties and 10 Schools, as well as many Institutes and Centres. The University is regarded as a leading research university. The faculty members attract over $120 million in research grants and contracts annually. The University is the oldest and largest of the four public universities in the Province of British Columbia.

These features of the University of British Columbia make it particularly suitable for the present investigation since in such a setting a wide range of technological provision may be expected. It is, moreover, a publicly funded institution and thus subject to externally imposed funding influences. In addition, because the researcher was a student at the University, access to the setting and its personnel was facilitated (see Appendix C).

The study used three kinds of data: documents, a survey questionnaire to selected faculty, and interviews with faculty, university leadership, and government officials. The procedures used for the survey and the interviews are described in separate sections below. The documentary sources included government documents, documents from the University and other educational institutions, as well as documents from the private sector.

The Survey Questionnaire

A survey questionnaire was used to obtain information from two purposively selected groups of faculty: those considered to be users of interactive information technology in teaching and those considered to be non users. In the following paragraphs are described the development of the questionnaire instrument, the selection of respondents and the

administration of the questionnaire. A description of return rates is included in the third subsection.

Development of the Questionnaire

The survey questionnaire was designed to elicit data from faculty members about eight aspects of the use of interactive information technology. These are:

1. The kinds of interactive technology used in teaching;
2. The extent to which interactive information technology is used in teaching;
3. The number of courses taught partly or entirely by means of interactive technology;
4. The categories or location of learners served by the teaching mode (i.e. whether on-campus, off-campus, or students of other universities);
5. Faculty attitudes towards the use of interactive information technology in teaching;
6. Faculty perceptions of the attitudes of the university leadership towards the use of interactive information technology in teaching;
7. Types and sources of available support for teaching by means of interactive information technology;
8. Changes in teaching culture due to the use of interactive technology.

The survey also sought information about respondents' rank, department and Faculty, and gender. The instrument was designed and developed from July 1996 to January 1997. A first version was pilot-tested in November 1996. Six faculty members (3 users and 3 non-users) drawn from different ranks from five different Faculties participated in the trial run. The

exercise yielded feedback that led to the rewording of some items considered ambiguous and some changes in the layout. A copy of the final questionnaire is included at Appendix E.

Selection of Respondents

In a number of circles in the University, there were anecdotal reports to the effect that not many faculty members used interactive information technology in their teaching. These reports, although anecdotal, were widespread. Since it was essential for the study that those who did use the technology were tapped for their views, the purposive sampling technique of quota selection (LeCompte & Preissle, 1993; Miles & Huberman, 1994) was employed, rather than the often preferable stratified random sampling procedure.

In quota selection, the major subgroups of a population are identified and an arbitrary number is taken from each group (Miles & Huberman, 1994). As in all purposive sampling, the essence of quota selection is not to achieve statistical representativeness, but to illuminate social phenomena -- what Miles and Huberman (1994, p. 29) refer to as the goal of seeing a "local configuration in some depth." In the present study, the limitation of non representativeness inherent in purposive sampling was considered less damaging than would have been the failure to tap the users of technology in teaching.

The principles of purposive sampling were used in two kinds of selection: first the selection of Faculties within which respondents would be sought, and second, the selection of respondents themselves.

Two of the University of British Columbia's twelve Faculties were excluded for purposes of this study: the Faculty of Medicine which has a

number of unique features that make it untypical of the way teaching is organized at the University, and the Faculty of Graduate Studies which is a "non budget Faculty" with virtually all its faculty members belonging organizationally to one of the other Faculties. The remaining ten Faculties vary on at least two important dimensions: size and the nature of their programs. The number of enrolled students in 1996-97 ranged from 177 in Dentistry to 7603 in Arts (The University of British Columbia Calendar, 1996-97, pp. 88-89). Their programs are generally considered to fall into the two categories of "discipline-based" and "applied". For the present study, it was considered important to tap the larger Faculties (where more and more varied use of technology might be expected) and also to include both "discipline-based" and "applied" areas. Accordingly, the five largest of the "budget" faculties were selected as the ones from which respondents would be sought. These are Applied Science, Arts, Commerce and Business Administration, Education, and Science. Three of these may be considered "applied" Faculties.

The selection of individual faculty members who would constituted the sample was then done as follows. From the Dean's office of each of the five Faculties, I obtained a list of faculty members by department. I then visited each department in order to find out which faculty members were considered to use interactive information technology in their teaching. The process typically went as follows. Upon getting to a department, I would first go to the department office, greet the staff, introduce myself, and the purpose of the study. I would then ask to see faculty members who might help me in identifying department faculty who used interactive information technology in their teaching. I would be referred to various faculty members, and sometimes to the department Head. Generally, these people would provide

the names of the faculty they thought might be using technology in their teaching (or they would tell me that they were not sure there was anyone who did). Sometimes, I would be referred to yet another person for possible additional information, or confirmation of information already obtained, and I followed up these references. This procedure yielded a total of 248 faculty members who were considered to be users of interactive technology in teaching in the five Faculties. I checked off the names of each of these people on the lists originally supplied by each dean's office.

It seemed important for the study to ensure as far as possible that the views of both users and non users were represented. On the assumption that all names which were not checked off were probably considered non users of technology in teaching, I then selected unchecked names from each Faculty, making sure that faculty members from each department, as well as from each rank were included. This resulted in the selection of 145 faculty members considered to be non users. The need to ensure that all departments and ranks were included meant that there was no direct relationship between the number of people in each Faculty and the number finally selected as users and non users respectively.

Altogether then, a total of 393 faculty members (248 "users" and 145 "non users") were sent the questionnaire. Table 3.1 (see p. 91) shows the distribution of "users" and "non users" by Faculty in the targeted sample. The targeted sample constituted 34% of the total number of names in the lists supplied by each dean's office.

Table 3.1: Distribution of "Users" and "Non Users" in the Targeted Sample by Faculty

Faculty	Total No. of Faculty Listed	Target Sample: No. of "Users"	Target Sample: No. of "Non Users"	Target Sample: Total
App. Sc.	178	36	21	57
Arts	460	67	57	124
Commerce	76	16	18	34
Education	134	33	23	56
Science	318	96	26	122
Totals	**1166**	**248**	**145**	**393**

Questionnaire Administration

On February 17, 1997 the questionnaire, with a cover letter from the researcher (see Appendix D), was distributed by campus mail to each of the 393 faculty members selected for the survey. After three weeks, a telephone follow up request was made to those who had not responded. Two weeks later, another telephone follow up request was made. A total of 150 questionnaires were returned, for an overall return rate of 38%. This 38% rate was identical for males and females. The return rates for "users" and "non-users" were 41% and 33% respectively. This difference is not statistically significant (chi-square =2.497; 1df; p = .114).

Table 3.2 (see p. 92) shows the questionnaire return rates by rank and Faculty.

The Interviews

The interviews were used to elicit data from the three categories of respondents -- faculty members, the university leadership and government

officials. The following paragraphs describe the development of the interview schedules, the selection of respondents, and the conduct of the interviews.

Table 3.2: Questionnaire Response Rates by Rank and Faculty

Faculty	Full Prof.			Asso. Prof.			Asst. Prof.			Lecturer/Instr			Faculty Total		
	No. Sent	No. Ret	% Ret	No. Sent	No. Ret	% Ret	No. Sent	No. Ret	% Ret	No. Sent	No. Ret	% Ret	No. Sent	No. Ret	% Ret
App. Sc.	16	2	13	20	5	25	18	7	39	3	1	(33)	57	15	26
Arts	41	15	37	36	19	53	36	10	28	11	5	45	124	49	40
Commerce	11	4	36	8	7	88	13	5	38	2	–	–	34	16	47
Education	16	6	38	23	11	48	17	8	47	–	–	–	56	25	45
Science	50	17	34	34	14	41	28	13	46	10	1	(10)	122	45	37
Totals	134	44	33	121	56	46	112	43	38	26	7	27	393	150	38

Development of the Interview Schedules

Three interview schedules were developed for faculty members, university leadership, and government officials respectively.

The interviews with faculty members sought to generate data regarding

(1) Their experience or perception about the use of interactive information technology in teaching;

(2) What they observed as the changes (in organization, curriculum, culture of teaching) taking place in the University as a result of the use of interactive information technology in teaching;

(3) What they considered to be the key external and internal factors facilitating or hindering the use of interactive information technology in university teaching;

(4) What they saw as the responses of the University leadership to the factors influencing the use of interactive technology in teaching;

(5) What they perceived to be the prospects (if any) for the use of interactive technology in university teaching;

(6) Any other insights or opinions they had about the use of interactive technology in university teaching (see Appendix H).

The interview schedule for members of the university leadership (see Appendix I) was very similar to that for faculty members. Members of the leadership were asked virtually the same questions as faculty members. The only difference in the two interview schedules lay in the question that addressed leadership response to the factors influencing the use of interactive information technology in teaching. While faculty members were asked what they observed to be the responses of the leadership to the external and internal factors facilitating or hindering the use of interactive information technology in teaching, members of the leadership were asked the "specific ways" in which they (or their offices) were responding to those factors.

The interviews with government officials were designed to generate data regarding the policy context of the use of interactive information technology in university teaching. The interviews explored three areas of government policy pertinent to the use of interactive technology in teaching that were delineated in the conceptual framework, namely; funding for higher education; access to higher education; and use of interactive technology in teaching in higher education. The interviews sought to elicit data about:

(1) The goals of the policies;

(2) The social and economic bases for the policies;

(3) The mechanisms by means of which government implements the policies;

(4) The views of the officials on the prospects (if any) for the use of interactive information technology in university teaching;

(5) Any other insights or opinions they had regarding government influence on the use of interactive information technology in university teaching (see Appendix J).

Table 3.3 (see p. 95) itemizes the issues explored in these three sets of interviews according to the three categories of respondent.

Selection of Respondents

Selection of faculty members for interview began when it was virtually clear that questionnaire return was drawing to a close. The selection had to wait until all questionnaires were returned because informants would be drawn from among faculty members who participated in the questionnaire survey.

The selection, as in the case of the questionnaire, was purposefully conducted to include "users" and "non-users" of interactive information technology in teaching from the various ranks in the five Faculties. Unlike the selection of respondents for the survey, interview respondents were classified as "users" or "non users" on the basis of the information they provided in the questionnaire.

Consistent with the principle of quota selection of purposive sampling, a major objective of the selection of faculty members for the interview was to ensure that the perspectives of both users and non users from the five Faculties and different ranks were tapped. To pursue the objective, it was decided that 20 faculty members (10 users and 10 non users) drawn from the

five Faculties and different ranks would be sought to participate in the interview.

Table 3.3: Issues Explored in the Interviews by Category of Informants

Issues	Informants
1. External factors driving the use of interactive information technology in teaching.	• Faculty members • University leadership
2. Responses of the University leadership to the external factors driving the use of interactive information technology in teaching.	• Faculty members • University leadership • Government officials
3. Attitudes and experiences towards the use of interactive information technology in teaching.	• Faculty members • University leadership
4. Internal factors hindering the use of interactive technology in teaching	• Faculty members • University leadership
5. Responses of the University leadership to the internal factors hindering the use of interactive information technology in teaching.	• Faculty members • University leadership
6. Changes in the University due to the use of interactive information technology in teaching.	• Faculty members • University leadership
7. Prospects for the use of interactive information technology in teaching.	• Faculty members • University leadership • Government officials

This number of faculty members was considered reasonable enough to provide illuminating perspectives on the use of interactive information technology in teaching at the University of British Columbia. The number was also considered reasonable in view of the constraints of resources and time the researcher faced. Subsequently, letters of invitation for participation in the interview were sent to some users and non users from the different Faculties and ranks. Those invited were picked serially from a list of users and non users drawn from the returned questionnaires. Some of those sent the invitation did not respond, and some turned down the invitation. The process of sending out invitations continued until the consent of 20 faculty members to participate was secured. The distribution of those who consented is as follows. Four faculty members (i.e. 2 users and 2 non users) came from each of the five Faculties. Of the 20 faculty members, six were full professors; nine were associate professors; four were assistant professors; while one was an instructor. The rank distribution of the respondents was not the choice of the researcher, rather consent to participate dictated the distribution.

The study needed the perspectives of the leadership of the University on the use of interactive information technology in teaching. It was decided that respondents would be drawn from three key levels of leadership: central administration, Faculty, and department. Eleven members of the leadership were selected for interview. They consisted of two vice-presidents with roles relevant to the use of technology in teaching, four deans, and five department heads. The four deans and the five department heads were drawn from the five Faculties. The dean of one of the five Faculties declined to participate, hence, the sample had four deans instead of five.

Three senior officials of the government of British Columbia with responsibility for post-secondary education policy development were interviewed.

Conducting the Interviews

Semi-structured interviews, which lasted between 45 and 75 minutes, were conducted from April 7, to May 16, 1997. Prior to the interviews, the researcher secured the consent of the informants to participate. The purpose of the study, and the procedure for the interview, as well as the conditions for informant participation, such as the researcher's commitment to ensure confidentiality were stated in a consent form sent to each informant (see Appendix G).

Each informant was asked all the questions on the interview schedule developed for his/her category. For the most part, questions were asked in the order in which they appeared on the interview schedule. Follow-up questions or probes were, however, rather spontaneous and, therefore, not included in the interview schedule. The interviews were audio-taped with the consent of the informants.

Data Analysis

Questionnaire data were entered into the computer. Analysis was by means of frequencies and percentages. Cross tabulations of data and chi square analysis were used to search for patterns. All the quantitative analyses were done using the Statistical Package for the Social Sciences (SPSS).

The tape recordings of all the interviews were transcribed and the accuracy of the transcriptions was carefully verified. Each transcript was given an identification consisting of a letter and a 3-digit number. The letter F was used to denote a faculty member. The letter L denoted member of the university leadership, and the letter G a government official. In quoting from interviews in chapters 5 and 6, these identifiers are used to indicate the source of quotations.

The transcripts were then read and coded for content analysis. The categories used in the coding were those around which the interview schedule had been developed. Accordingly, for the interviews with faculty members, and members of the university leadership the following analytical categories were used:

(1) Strengths of interactive information technology in teaching;

(2) Limitations of interactive information technology in teaching;

(3) Changes (organizational, curricular, cultural) due to the use of interactive information technology in teaching;

(4) External factors driving the use of interactive information technology in teaching;

(5) Internal factors enhancing the use of interactive information technology in teaching;

(6) Internal factors hindering the use of interactive information technology in teaching;

(7) Prospects for the use of interactive information technology in teaching.

Similarly, for the interviews with government officials, categories that informed the development of the interview schedule were used in coding. They are:

(1) Government funding policy for higher education;

(2) Government policy on accessibility to higher education;

(3) Government policy on the use of interactive information technology in teaching in higher education.

Frequency counts of the comments in the interviews were undertaken and an analysis was made of any patterns emerging.

The Soundness of the Study and Its Limitations

Lincoln and Guba (1985) have identified five criteria by which the soundness of a qualitative study may be judged. They are credibility, transferability, dependability, and confirmability. The design of the present study meets these criteria as they relate to a case study.

Credibility in qualitative research is the rough equivalent of 'internal validity' in positivistic or quantitative inquiry. The criterion of credibility requires of the researcher a demonstration that "the inquiry was conducted in such a manner as to ensure that the subject was accurately identified and described" (Marshall & Rossman, 1989, p. 145). Of key importance in this regard is the study's thorough literature review and the development of an appropriate conceptual framework. Operationally, it should also be added that the questionnaire, and interview schedules used for data collection were pilot tested for their capability to elicit the data needed to address the research questions.

The criterion of transferability requires of the researcher to show that research findings can be applied or transferred to other contexts. The case study nature of the present study places important limitations on the

transferability of its findings. At the theoretical level, however, the conceptual framework developed for the study is generalizable beyond the confines of this case.

Dependability is the rough equivalent of reliability in quantitative inquiry. In quantitative research, the purpose of reliability is to ensure replication or that "repeated application of the same or equivalent instruments to the same subjects under the same conditions will yield similar measurements" (Erlandson, et al., 1993, p. 34). In the case study, however, the quest for the kind of consistency and repeatability implied by 'reliability' is not for invariance, but for "trackable variance" or explainable changes. This is ensured by keeping an "audit trail" that makes it possible for the process and findings of the study to be checked. The present chapter and the appendices provide such an audit trail for this study.

Confirmability is the qualitative research variant of 'objectivity' in quantitative inquiry. In quantitative research, objectivity is pursued through replicable methodological processes in a bid to insulate observations from contamination by the "natural subjectivity of the researcher" (Marshall & Rossman, 1989). But in the qualitative research paradigm, "objectivity is an illusion ... no methodology can be totally separated from those who have created and selected it" (Erlandson, et al., p. 34). Consequently, the case study researcher settles for tracking data to their sources and attempting to ensure that the logic undergirding analyses and interpretations are clearly detailed (Lincoln & Guba, 1985). As already noted, data sources for the present study were clearly identified and tracked, and the chapters on findings attest to the logic of the analyses and interpretations.

These assurances of soundness notwithstanding, the study needs to be interpreted in the light of a number of limitations. First, the study has

assumed that data from five Faculties can represent the whole University. There is no doubt that even though the participants spoke to the factors influencing the use of interactive information technology in teaching in the University as a whole, the participation of faculty members and leaders from the other Faculties would have enhanced the robustness of the findings of the study. In mitigation, it can be said, as stated earlier, that the five largest Faculties were the ones selected for the study, and that they represent the range of both "discipline" and "applied" Faculties.

Second, faculty members who participated in the study were purposively selected. As such, they do not constitute a random sample. As a result, it cannot be claimed that any finding pertaining to any of the subgroupings of faculty members is statistically representative. As is typical in purposive sampling, the object of the purposive selection procedures undertaken in the study was not representativeness, but illumination of a social phenomenon (Miles & Huberman, 1994). The purposive nature of the sample allows statements about the views of "users" and "non users". About other variables, such as rank, disciplinary affiliation and gender, it can only be suggestive.

Third, the low questionnaire return rate of 38% is a limitation. Even though statistical representativeness was not a goal, a much higher return rate would have made a firmer basis for any inferences and interpretations made with respect to the survey data.

Fourth, the application of interactive information technology to teaching is a rapidly developing phenomenon. For this reason, the findings of this study, particularly with regard to the kinds of interactive technologies used in teaching at the University of British Columbia in early 1997, and the

extent to which the technologies were used may no longer reflect the current situation.

Finally, the study did not include the perspectives of students regarding the use of interactive information technology in teaching. Although data on issues, such as students' access to technology, as well as the strengths and limitations of the technology in teaching and learning were obtained through other sources, findings on these issues would have been more enriched if students' own points of view had been directly elicited and reflected. This limitation was imposed by the constraints of resources and time available to the researcher.

As already stated, this study explored the factors influencing the use of interactive information technology in teaching in one university -- the University of British Columbia and therefore no claim of the generalizability of the findings to other universities can be made. What can be made are claims of "analytic or theoretical" generalization (Yin, 1994).

Summary

The design of this case study of the use of interactive information technology in teaching at the University of British Columbia followed from a conceptual framework which posited three important elements: (a) the use of technology, (b) the effect of external forces, and (c) the effect of internal forces. The study used three kinds of data, documents, a survey, and interviews to answer eight research questions. A purposively-drawn sample of 393 faculty members were invited to respond to a questionnaire survey and 38% responded. From these respondents, twenty were selected for interviews.

Interviews were also conducted with eleven members of the university leadership, and three government officials. Frequencies and cross tabulations were used in the analysis of the questionnaire data. Content analysis was undertaken with the transcribed interview data. The chief limitations of the study lie in the nature of the sample and in the relatively low return rate. Table 3.4 lists the study's research questions and shows which data were used to address each one.

Table 3.4: Primary Data Sources for Each Research Question

Research Questions	Documents	Quest S'vey	Fac. Inter-view	Lead. Inter-view	Govt Inter-view
1. What kinds of interactive information technology are used in teaching at the University?	√	√	√	√	
2. To What extent do faculty in the University use interactive information technology?		√	√	√	
3. To what extent is interactive information technology used in distance teaching at the University?	√		√	√	
4. What are the principal external factors driving the use of interactive information technology in teaching at the University?		√	√	√	√
5. How did these factors operate during the period of the case study?		√	√	√	√
6. What kinds of support exist or are being developed in the University to enhance the use, or encourage increased use, of interactive information technology in teaching?	√	√	√	√	
7.What are the attitudes and experiences of faculty regarding the use of interactive information technology in teaching?	√	√	√	√	
8. In what ways has the use of interactive information technology in instructional delivery affected the culture of teaching at the University?	√	√	√	√	

CHAPTER 4

THE USE OF INTERACTIVE TECHNOLOGY IN TEACHING AT THE UNIVERSITY OF BRITISH COLUMBIA

This chapter presents results from the survey questionnaire designed to assess the use of interactive information technology in teaching at the University of British Columbia in early 1997. It will be recalled that the questionnaire was sent to 248 faculty members identified as possible users of technology in five Faculties and to a further 145 people initially assumed to be "non-users". From the 393 surveys sent out a total of 150 were returned. The results reported here are based primarily on the responses to the closed-ended parts of the questionnaire. Responses to the open-ended questions are used as appropriate in later chapters. The present chapter begins with an overview of the data based on frequency counts and, in a second section, deals with patterns found in the data. A summary concludes the chapter.

The Use of Technology: An Overview

In the selection of the original purposive sample, the method used to identify "users" was a coarse one consisting of asking knowledgeable people in each Faculty who they thought the users of interactive information technology were. The responses to the questionnaire themselves, however, gave a much better indication of which respondents were users and which were non-users. "Users" were identified as those who gave a positive response to item three of the questionnaire. All others who gave a negative

response to that item were considered to be "non-users". Table 4.1 shows the number of users and non-users respectively.

Table 4.1: Number of Users and Non-users* of Interactive Technology in Teaching

Users	Non-Users
89 (59%)	61 (41%)

** User is defined as a respondent answering positively to item three of the questionnaire:"Do you teach by means of interactive information technology?"*

Almost 60% could be classed as users. The responses permit an analysis of five ways of assessing the extent of use of interactive technology in teaching by those identified as users. These are (a) the kinds of technology used, (b) the length of time respondents have been using given technologies, (c) the different purposes for which technology is used, (d) the number and level of courses for which it is used, and (e) the extent of its use for distance education.

Table 4.2 shows the number of respondents using each of six different kinds of technology.

Table 4.2: Number of Users of Each of Six Kinds of Technology

Technology	No. of Users	(%)
E-mail	85	(96%)
W W W	75	(84%)
CD-ROM	32	(36%)
Video Conferencing	6	(7%)
Computer Conferencing	6	(7%)
Audio Conferencing	2	(2%)

It is clear that E-mail is almost universal among users, with 96% of them making use of it. The use of the Web (WWW) is also common, being indicated by almost 85% of the users. The other technologies are much less frequently used – CD-ROM by just over one third of the users, and the three kinds of conferencing (video, computer, and audio) used by very few people.

It would appear that the use of interactive information technology in teaching at the University of British Columbia is a relatively recent development. Little seems to have been happening at the University concerning the application of interactive information technology to teaching before 1990. Table 4.3 (see p. 107) shows the number of adopters of each technology in various time periods -- prior to 1990, and in each of the years 1990 to 1996.

As can be seen in the Table, one third of all E-Mail users had adopted the technology by 1992, while a similar proportion of users adopted the Web/Internet in 1994. For CD-ROM, only in 1996 do we find one third of users making use of the technology. As already noted, it would appear that video, computer, and audio conferencing technologies are not used to any considerable extent, although video conferencing seems to have been adopted earlier than computer conferencing by those who do use it. These data could be interpreted in at least two ways, (a) the patterns of the dates of adoption reflect the dates at which particular technologies became reasonably widely available on campus, and (b) faculty members who are inclined to use interactive information technology in teaching find less use for CD-ROM and the three kinds of conferencing than for E-mail and the Web.

Table 4.3: Number of Users Adopting Each of Six Technologies at Different Times

Technology	Year Adopted	No. Adopting	Cumulative Total	(%)
E-mail	Before 1990	14	14	(16%)
	1990	4	18	(20%)
	1991	5	23	(26%)
	1992	9	32	(36%)
	1993	10	42	(47%)
	1994	12	54	(61%)
	1995	15	69	(78%)
	1996	16	85	(96%)
WWW/Internet	Before 1990	--		
	1990	1	1	(1%)
	1991	1	2	(2%)
	1992	6	8	(9%)
	1993	12	20	(22%)
	1994	15	35	(39%)
	1995	20	55	(62%)
	1996	20	75	(84%)
CD-ROM	Before 1990	4	4	(4%)
	1990	1	5	(6%)
	1991	2	7	(8%)
	1992	2	9	(10%)
	1993	4	13	(15%)
	1994	6	19	(21%)
	1995	6	25	(28%)
	1996	7	32	(36%)
Video Conf.	Before 1990	–		
	1990	–		
	1991	1	1	(1%)
	1992	1	2	(2%)
	1993	2	4	(4%)
	1994	1	5	(6%)
	1995	1	6	(7%)
	1996	–	6	(7%)
Computer Conf.	Before 1990	1	1	(1%)
	1990	–	1	(1%)
	1991	–	1	(1%)
	1992	1	2	(2%)
	1993	1	3	(3%)
	1994	1	4	(4%)
	1995	–	4	(4%)
	1996	2	6	(7%)
Audio Conf.	Before 1990	1	1	(1%)
	1990	–	1	(1%)
	1991	–	1	(1%)
	1992	–	1	(1%)
	1993	–	1	(1%)
	1994	1	2	(2%)
	1995	–	2	(2%)
	1996	–	2	(2%)

A number of the questionnaire items (items 14 to 21) focused on four purposes for which interactive technology was used in teaching. They are (1) transmission of course materials to students, (2) transmission of course assignments to students, (3) assignment return, and (4) transmission of assignment feedback. Table 4.4 shows the number of people who indicated they use technology for each of these purposes, and shows also the kind of technology used for each.

Table 4.4: Number of Respondents Using Various Kinds of Technology for Each of Four Purposes

Technology	No. of Respondents Who:			
	Transmit materials to students	Transmit assignments to students	Receive assignments from students	Provide feedback to students
E-mail	47 (58%)	26 (44%)	26 (72%)	39 (78%)
W W W	58 (72%)	44 (75%)	12 (33%)	12 (24%)
CD-ROM	8 (10%)	2 (3%)	–	–
Totals	**81 (91%)**	**59 (66%)**	**36 (40%)**	**50 (56%)**

** Totals may exceed 100% because respondents may have chosen more than one technology for a given purpose.*

Only three of the technologies are used for these purposes. It should be noted that the "Totals" shown in each column of Table 4.4 represent the total number of people using technology for a given purpose. The figure is not the total of figures shown in the column above it because several respondents indicated they use more than one technology.

Most of the respondents who use interactive information technology in teaching make available their course materials to students by means of technology. However, although not shown in the Table, the raw data show

that only eight users transmit 100% of their course materials to students by these means. Most transmit less than half of their course materials this way. Eight users do not make their course materials available to students by interactive technology at all.

The technologies used in transmitting course materials to students are: E-mail, the Web, and CD-ROM. Over half of those who use technology to transmit course materials to students do so by E-mail, but most (72%) use the Web.

Two thirds of the users make course assignments available to students by means of technology. Just over one third of these people transmit all of their course assignments to students by these means, and approximately two thirds make minimal use of technology in transmitting course assignments. Most of those using technology for transmitting assignments do so through the Web, and forty-four percent use E-mail. Only two people provide assignments to students by means of CD-ROM. Of all users (N=89), about one third do not use technology to make assignments available to their students.

Thirty-six respondents receive completed course assignments from their students by means of interactive information technology. Of these, only three indicated that their students turn in 100% of course assignments by these means. The kinds of interactive information technology students use to turn in assignments are E-mail and the Web. By a margin of more than 2:1, the preferred means of this purpose is E-mail. Fifty three of the 89 users do not receive completed assignments from their students through interactive information technology.

Fifty of the 89 users provide feedback on assignments to their students by means of interactive information technology. Only three send all their feedback to students this way. E-mail and the Web are the technologies used

for this purpose, with E-mail predominating. Over forty percent of the 89 users do not make feedback available to students by means of interactive technology.

With respect to the number of courses taught by interactive information technology, six respondents reported teaching one course entirely by interactive information technology, and three reported teaching two courses wholly by these means.

When the use of technology for some portion of the course is examined, we find both graduate and undergraduate courses reported. Forty respondents teach both graduate and undergraduate courses by means of interactive technology. Thirty-three teach undergraduate courses this way, and sixteen teach graduate level courses.

A final analysis examined the use of interactive information technology for distance education purposes. Of the 89 users of interactive information technology in teaching, only 13 teach off-campus UBC students by these means. Six of the 89 users teach students of other universities by means of interactive technology. This would mean that, altogether, only about one fifth of the users report teaching at a distance.

Patterns in the Data

Conventional wisdom suggests that certain patterns may be expected in the way university faculty use interactive information technology. For instance, it might be plausibly argued that some Faculties where computers are widely used for other kinds of work (e.g. Applied Science) might be expected to make greater use of the technology for teaching than, for example

Arts, where a great deal of research has traditionally made little use of new technology. In order to check for such patterns, a number of cross tabulations were done. The following paragraphs report those of interest.

To pursue the argument used for illustrative purposes above, an analysis of the number of users by Faculty was undertaken. The results are shown in Table 4.5.

Table 4.5: Users and Non-Users of Interactive Technology in Teaching by Faculty

Faculty	Users	Non-users	Total
Applied Science	7	8	15
Arts	28	21	49
Commerce	13	3	16
Education	14	11	25
Science	27	18	45
Totals	**89**	**61**	**150**

Although it is clear that a higher proportion of Commerce respondents are users than is the case in the other Faculties, a chi-square test indicated no significant difference in the distribution of users and non-users in the five Faculties (chi-square = 4.403; 4df; p =.354).

Table 4.6 (see p. 112) explores another relationship which might be suggested by conventional wisdom, namely that it would be the junior faculty members who would be most likely to adopt the new technologies in teaching. The data do not indicate that this is the case. A chi-square test of the rank distribution of users and non-users showed no significant difference between or among the different ranks (chi-square =2.944; 3df; p. =.400).

Analyses were made of the possible relationships between Faculty and rank and all other variables reported in the earlier section of this chapter.

Table 4.6: Users and Non-Users of Interactive Technology in Teaching by Rank

Rank	Users	Non-users	Total
Full Professor	28	16	44
Associate Prof.	31	25	56
Assistant Prof	24	19	43
Lecturer/Instr	6	1	7
Totals	**89**	**61**	**150**

No statistically significant results were obtained. It can thus be safely concluded that whatever the conventional wisdom may suggest, the use of interactive information technology in teaching among the members of the purposive sample used for this study does not vary by Faculty affiliation or rank.

Summary and Conclusion

In summary, it would appear that the use of interactive information technology in teaching at the University of British Columbia is a relatively recent and modest phenomenon. There was virtually no application of interactive information technology to teaching at the University before 1990. E-mail and the Web are the technologies used most in teaching, while CD-ROM is used to a much lesser extent. There appears to be very little use of video, computer and audio conferencing technologies in teaching. Most of

the faculty members who use interactive technology in teaching would be described as light users. Only very few would be classed as intensive users. The great majority of users do not rely solely on technology in transmitting course materials, assignments, and feedback to students or in receiving work from them. The greatest use of technology for these purposes is in transmitting to students. Far fewer faculty members receive work from students by means of technology. It is perhaps interesting that for one way communication to students, the Web is the most frequently used technology, whereas for more interactive purposes (receiving assignments and providing feedback), E-mail is the favoured medium. Data indicate that interactive information technology is used in teaching both graduate and undergraduate courses at the University. When it comes to the use of interactive information technology in distance education, data suggest that not much distance education is facilitated by technology. Concerning patterns in the data, analyses indicate that there is no relationship between the use of interactive information technology in teaching and the Faculty or rank of the user. This suggests that users of interactive technology in teaching at the University of British Columbia can be considered as one group, irrespective of Faculty or rank. We now move on to examine the effect of other factors internal and external to the University on the use of interactive information technology in teaching.

CHAPTER 5

PROMOTING THE PROMISE: CONTEXTUAL INFLUENCES FAVOURING THE USE OF THE TECHNOLOGY IN TEACHING

This chapter examines the data available on the external and internal factors exerting a positive influence on the use of interactive information technology in teaching at the University of British Columbia. The chapter draws on data collected both from documents and interviews. Four elements of the external context and two elements of the internal context are discussed. The first section of the chapter examines the broader external or societal context and the second section deals with the governmental context by identifying a number of government policies of relevance. The third and fourth sections are devoted to elements of the internal context: the kind of initiatives taken by the university leadership, and the attitudes of faculty members. The chapter concludes with a summary.

The Broader External Context

It will be recalled that the study's conceptual framework identified three particular elements of the broader external context as being influential with respect to the use of interactive information technology in teaching at the university. These elements are (a) the nature of current demands on higher education, (b) the nature of the fiscal context, and (c) the existence of a culture favourable to the use of technology. In the following pages, each of these is discussed. The section ends with a brief summary.

Demands on Higher Education

It seems clear that two key public demands on higher education, namely the demand for greater and more flexible access, and the demand for technologically literate graduates, are among the external factors driving the use of interactive information technology in teaching.

Concerning demand for access, the Province of British Columbia (1996) states that:

> The greater importance society is now placing on post-secondary education and training is causing a dramatic increase in the number of British Columbians seeking further education (1996, p. 22).

In addition, there is statistical evidence of rising demand for access. As can be seen in Table 5.1, full-time equivalent (FTE) enrolment in public universities in the province has increased during the period 1991 to 1996 by 15.1%, from 49, 656 to 57, 132.

Table 5.1: Full-time Equivalent (FTE) Enrolments at Public Universities in British Columbia from 1991/92 to 1996/97

Year	Enrolments	% Increase	Cumulative % Increase
1991/92	49, 656	N/A	N/A
1992/93	50, 506	1.7	1.7
1993/94	51, 019	1.0	2.8
1994/95	53, 723	5.3	8.2
1995/96	54, 316	1.1	9.4
1996/97	57, 132	5.2	15.1

Source: Post-Secondary Division, Ministry of Education, Skills and Training, Victoria, B.C.

Demand for flexible access or distance education in the province is equally strong. According to the Open University Planning Council, "Since 1990, annual enrolments in university open learning courses have risen by 50%" (Open University Planning Council, 1994/95, 1995/96). Table 5.2 shows distance education enrolment increases between 1993/94 and 1995/96 at the University of British Columbia (UBC), Simon Fraser University (SFU), University of Victoria (UVic), and Open University (OU).

Table 5.2: Distance Education Course Enrolments at UBC, SFU, UVic, OU in 1993/94 and 1995/96

Institution	1993/94	1995/96	% Increase
UBC	4, 115	9, 445	129.5
SFU	10, 771	12, 091	12.2
UVic	6, 143	6, 058	- 1.4
OU	19, 025	21, 378	12.3

Adapted from Open University Planning Council 1994/95 and 1995/96 Reports

The increase at the University of British Columbia is particularly noticeable, although much of it is attributable to non-credit students. Other evidence from within the University, however, indicates that distance education enrolments have increased by 22% from 1995/96 to 1997/98 (The University of British Columbia, 1998).

The demand for distance education is further corroborated by the result of a 1994 survey of distance education students who registered for courses at the University of British Columbia, Simon Fraser University, and the University of Victoria. The study which was conducted by the Research Office of the Open Learning Agency found that 53% of the 339 respondents "chose to study at a distance because it was more convenient than taking the course on-

campus" (Open University Planning Council, 1994/95, p. 9). Even though a significant number of distance education students in the study preferred distance education because of the convenience it apparently affords, it would also appear that another reason for the rather strong demand for distance education is lack of space in the conventional higher education institutions in the province. It was estimated that "In 1994, approximately 8, 000 qualified applicants to the provincial post-secondary system were not admitted" (Province of British Columbia, 1996, p. 23). In this regard, Table 5.3 shows UBC Admissions Office data, indicating that qualified applicants were refused admission to undergraduate programs due to lack of space from 1990 to 1996.

Table 5.3: Eligible Applicants Refused Admission to UBC Undergraduate Programs due to Lack of Space

Year	Refused	% of Number Accepted
1990	1, 293	10
1991	1, 708	12.9
1992	3, 134	26.2
1993	3, 708	30.3
1994	3, 356	29
1995	2, 448	20.8
1996	1, 884	14

Source: UBC Admissions Office

In the face of the burgeoning demand for access and the shortage of on-campus space, higher education institutions appear to be under pressure to use interactive information technology to provide distance education or flexible access as a way of addressing the phenomenon of greater demand.

The interview data indicated that faculty members are also aware of this demand and its probable effect:

> *I think there are many students that universities cannot service because the students cannot come to the university or can't stay here for long periods of time. And certainly, interactive technologies have the potential for people being able to get quality education where they live, and not have to come to the university* (F211).

> *The public wants to see they are getting value for their money from the University. And one way we can do that is providing distance education, providing educational services they can access on the Web* (F378).

> *There's going to be much more demand for continuing education, for updates, for conversion courses, to move from particular skills, to implement new skills, new techniques. And the electronic media is a prime candidate to supply that sort of education, that sort of training into the workplace, and to people who need that. Not necessarily on-campus. You can certainly supply that at a distance* (F381).

With regard to the second kind of demand, namely, that for technologically literate graduates, documentary evidence indicates that it is a contemporary societal need. For instance, the British Columbia Human Resource Development Project urged "all education and training institutions to explore opportunities to increase applications of technology to the teaching, training, and learning processes" (Province of British Columbia, 1992, p. 55).

The need for educational institutions to produce technologically literate graduates required by the economy is also alluded to in other documents:

> Technological change occurs as new products and processes are developed and as new technology is applied to old tasks. It creates obsolescence of products and skills. Different skills are demanded of workers as industries develop new products. Technological applications now place a premium on workers with computer, mathematics and science knowledge. Many researchers anticipate that the pace of technological change and the need for workers with these skills will accelerate during the 1990s (Province of British Columbia, 1994b, p. 6).

> If we, as British Columbians, are to promote and foster the acquisition of knowledge about science and technology, should we not do so at the very fundamental level of its use in instruction and learning? (Standing Committee on Educational Technology, 1993, p. 3).

Interview data corroborated this evidence of demand for technologically literate graduates:

> *Well, I think ... society seems to have turned university into another job-training place .... I think it's more of an implicit pressure to be right up-to-date, and to be at the cutting edge, so that people that come to the university are trained in cutting edge things ... like the Information Superhighway, like using the Internet, like building Web pages* (F688).

> *People are using the technology in businesses. We should be exposing our students to it, and using it ourselves* (F594).

> *I see the potential future job of the student as one of the driving forces -- that the student really needs to be prepared for a job where they will have to be informed as to how to obtain data, how to use data, how to take advantage of the Internet. And if you don't teach them at UBC, I don't think that would be a good thing* (F641).

> *There's an increased awareness of information technology by employers, by students, by society as a whole. And their expectations are that students who graduate from university will have these skills and will be able to use them effectively. So, I mean, I think there's just a sense that that's expected* (L104).

> *I suppose the job market where people are being made more and more aware of the potential of the computer in business and research. So, our students do need to know about how interactive information technology works, and how it might be applied within their own university experience to give them some preparation to help them prepare for that world of work outside the university* (L101).

Tight Fiscal Context

This increased demand for higher education has, for a number of years, operated in a tight fiscal context. Both the federal government of Canada, and the province of British Columbia have been grappling with budget deficits. In addition, the federal government has made considerable cutbacks on grants to the provinces as a deficit reduction measure. Consequently, the provinces, including British Columbia, find themselves in a tight fiscal situation. As stated in the Province of British Columbia (1996):

> The federal government, in an attempt to reduce its deficit spending to three per cent of the GDP by 1997/98, is amalgamating and reducing transfer payments for health, Income Assistance and post-secondary education. This will result in $842 million less funding available to the province. After several years of increasing provincial commitment to the post-secondary system, the provincial government realizes that federal cutbacks of this magnitude have the potential to seriously erode the advances made to date (p. 22).

The austere fiscal climate seems well known in the University. More than two thirds of the faculty members and members of the university leadership interviewed were of the view that UBC is operating in a tight fiscal environment and that this is due to the inauspicious fiscal circumstances in which the Federal government and the government of British Columbia now find themselves. This has resulted in "reduced budgets," "declining budgets" for the University, and is likely to put pressure on UBC to use interactive information technology in teaching:

> *I would think that also reductions in amounts of money to the University will hurt us fairly soon. We've been very lucky compared to other Canadian universities and even American ones. But that problem will come to us. We will be looking at shortfalls. We will still be paid, or allocated our resources on a per student basis, but we will have fewer resources. We will want to try and maintain ourselves and therefore the resource problem,*

> *which starts with the federal government and comes to the provincial government and then comes to us, is another driving force [for the use of interactive technology in teaching]* (F696).

The interviews with government officials also confirmed the existence of the tight fiscal context in which the University has been operating since the beginning of the 1990s:

> *Right across the nation at least, if not the world, but certainly across the nation, the provincial governments and the federal government, are struggling with their own fiscal situations -- attempting to create balanced budgets and to control their debts .... In the case of British Columbia specifically, the decrease in grants provided from the federal government to the province for post-secondary education, the number -- it's a bit of a confused area -- but the number that most people accept as the cut in federal grants to the province for post-secondary education is in the order of $80 million just in 1996/97. And so, -- "Why have provincial governments not been providing the level of funding to the universities that they would like?" -- it's because of the fiscal situation that each of the provincial governments, and the federal government is struggling with on its own* (G112).

> *Well, very briefly, the federal government has cut transfer payments to the province dramatically .... So, there's an enormous reduction in the transfer payments that come into the province. Now, that really drives the province's finances. At the same time, you know from all the stuff in the press, that the Canadian public has almost been whipped up into a frenzy over concern of the debt and the deficit. So, the government has to pursue a very much more conservative fiscal policy than it probably would wish .... You know, forest revenues and those sort of things are down -- So, there's a lot less money around* (G113).

The tight fiscal situation is forcing universities to look for more efficient ways of delivering instruction. And there is a widespread perception that the application of interactive information technology to teaching is one promising possibility:

> *It's also the case that reduced budgets, reduced funds for post-secondary education systems throughout North America are forcing universities to look for ways to provide -- better ways to teach and learn more efficiently. And certainly, people have to try to use information technology as a way to do that. Whether it actually does allow you to do it more cheaply is, I think, a big question* (L104).

> *Declining budgets are putting pressure on us to be more efficient in how we deliver educational services, and to take more students. And we can't take more students because the capacity of UBC is virtually at its limit. So, the only way to take more students is doing it at a distance* (L110).

Culture of Information Technology

Information technology is a significant feature of the culture of the Canadian and British Columbian society. As can be seen in Table 5.4, many kinds of information technology are household facilities in Canada in general, and British Columbia in particular.

Table 5.4: Percentage of Households in Canada and British Columbia with Information Technology in 1995

Technology	% of Households in Canada	% of Households in British Columbia
Telephone	98.5	98.1
Radio	98.9	99.1
Colour television	98.5	98.1
Cable television	73.4	85.4
Video cassette recorder	82.1	84.3
Cassette or tape recorder	78.8	84.6
Compact disc players	47.4	52.8
Home computers	28.8	32.7

Adapted from Statistics Canada (1995, pp. 20-21)

Virtually every household has telephone, radio and colour television. More than 80% of British Columbian households have cable television, video cassette recorder, and tape recorder, and almost one third have at least one home computer. It is noticeable that for almost all these technologies, British Columbia is ahead of the nation as a whole in ownership. Canada is described as "the most "wired" nation on earth" (Stentor, 1997, p. 2). "World-class" information technology infrastructure is available here, and the infrastructure features the latest technology, such as, fibre optics, coaxial cable, asynchronous transfer mode (ATM), and synchronous optical network (SONET) (Stentor, 1994).

The existence of these transmission systems means that people are becoming increasingly exposed to very sophisticated technologies. A fibre optic transmission system has a 'bandwith' or information capacity that is thousands of times greater than ordinary copper circuits. Fibre optics use high speed laser pulses to carry voice, data and image signals from point to point through a thin glass strand (Stentor, 1994). "Canada has the world's longest terrestrial fibre optic network" (Stentor, 1997, p. 1). Coaxial cable transmits information through a central core which conducts electricity. It is capable of transmitting more information than copper wires. Asynchronous transfer mode (ATM) directs information traffic and facilitates the efficient delivery of multimodal information. It is an ultra-high-speed switch that can simultaneously route voice, data and video over fibre optic lines (Stentor, 1994). Synchronous optical network (SONET) also facilitates the transportation of various information modes. It provides a robust platform for broadband services (Stentor, 1994).

The penetration of information technology into households and the availability of information technology infrastructure has been accompanied

by initiatives of the government of Canada in the development of Canada's Information Highway and of the government of the province of British Columbia in the construction and use of British Columbia's Electronic Highway.

The terms "information highway or electronic highway denote the advanced information and communications that is essential for Canada's emerging information economy ... this infrastructure will become a network of networks" linking Canadian homes, businesses, governments, and institutions to a wide range of interactive services from entertainment, education, cultural products and social services to data banks, computers, electronic commerce, banking and business services" (Industry Canada, 1994, p. 1). The government of Canada is committed to ensuring a universal and affordable access to the Information Highway:

> Where market forces fail to provide this level of access, the government is prepared to step in to ensure affordable access to essential Information Highway services for all Canadians, regardless of their income or geographic location (Industry Canada, 1996, p. 23).

Some of the programs the government of Canada has initiated, in concert with the private sector and provincial governments, towards ensuring universal access to the Information Highway include, the SchoolNet, and the Community Access programs.

The SchoolNet program is an attempt to ensure that "by 1998 all Canada's 23, 000 schools, libraries, universities are connected to the Information Highway" (Industry Canada, 1995, p. 5). The key purpose of SchoolNet is to "provide Canadian students and teachers with exciting electronic services that will develop and stimulate the skills needed in the knowledge society" (Industry Canada, 1996, p. 22).

The Community Access program is an initiative that seeks to enable "Canadians in rural and remote communities to have access to the Internet" (Industry Canada, 1996):

> The program electronically delivers government services and information to these communities and helps them develop skills for the information economy. It provides up to $30, 000 a site for equipment, connections, technical support and training .... By 1998, an estimated 1,500 rural and remote communities across Canada will have access to the Internet through schools, libraries, and other community institutions (Industry Canada, 1996, p. 24).

In the province of British Columbia, the government is committed to ensuring that the emerging Electronic Highway is accessible to and for the benefit of all British Columbians (Province of British Columbia, [Not dated]).

The provincial government is working with its partners to ensure that access to the Electronic Highway provides British Columbians opportunities for such services as:

- telecommuting (work at home and attend meetings by teleconference),
- electronic data exchange,
- telecommerce (buying and selling at "virtual marketplaces"),
- sending and receiving electronic mail,
- tele-education/distance education.

The government has initiated a number of programs to ensure that "All British Columbians have affordable electronic access to networks and services enabling them to communicate, learn, work, be entertained, and prosper in an information-based society" (Province of British Columbia, [Not dated] p. 10). Such programs include, Technology in Schools; Community Learning Network (CLN); and Provincial Learning Network (PLN).

Through the Technology in Schools program, the government seeks to ensure that "B.C. students gain the technology skills needed for future work and learning." In May 1995, the provincial government announced a 5-year $100 million School Technology program. The key objectives of the program as stated in a government document are "achieving a minimum of one computer for every 6 elementary students, and one for every three secondary students in all schools within the next five years" (Province of British Columbia, [Not dated] pp. 12-13). The program requires every school district to "develop three-year technology plans that focus on teacher training programs and equal distribution of equipment" (Province of British Columbia, p. 13).

The Community Learning Network program (CLN) seeks to provide "province-wide computer network" connecting all public schools in the province to the Internet and to other on-line services and learning resources. Through the Provincial Learning Network program (PLN), the government seeks to link schools, colleges, technical institutes, universities, the Open Learning Agency, libraries, museums "to ensure the latest interactive learning technology is available province-wide" (Province of British Columbia, [Not dated] p. 13).

There is also evidence of the contributions of the private sector. The Stentor companies -- an alliance of the major telecommunication providers in Canada, "maintain the world's longest, fully digital, fibre optic network -- one that forms the backbone of a Canadian Information Highway" (Stentor, 1994). In 1994, they announced the "Beacon Initiative." The Initiative seeks to "upgrade local, regional and national networks to provide multi-media services to homes, offices, hospitals and schools across the country" (Council of Ministers of Education, Canada, 1994, p. 2).

B C TEL, a member of the Stentor alliance, has a high-speed digital network connecting the three largest universities in British Columbia, namely: the University of British Columbia, Simon Fraser University, and the University of Victoria. The network is described as a "lightning-fast 155-megabit-per-second pipeline." It allows the three universities to transmit research findings, conduct desktop video conferences and offer interactive distance education.

Faculty members at UBC seem very well aware of these developments. Most of the 31 faculty members and members of the university leadership interviewed were of the view that the availability of interactive information technology in Canadian and British Columbian society is a factor putting pressure on the University to use interactive information technology in teaching. They saw the University of British Columbia as an institution embedded in a society in which the use of information technology has become a way of life. They referred to the increasing adoption of interactive information technology in teaching by the University as an inevitable response to the general cultural swing in the wider society.

Informants referred to some of the characteristics of this cultural ambience from which the University cannot afford to insulate itself:

> *The culture of the 1990s is one of interactive technology ... being on e-mail, having access to cell phone or whatever. I mean, it seems to me that the cultural impetus is towards this new technology* (F664).

> *I would suggest it's inevitable that we will continue towards these computers ... and with these communication modes which come through the computer, and the phenomenal success or advances in, say, image compression, which allows you to do these interactive, from-a-distance conferences, to see a person at least every second or so, ... so that you feel somewhat closer. And it is immediate too, even though you might be hundreds or thousands of miles apart. So, all these lead to new means of communication which people have to get*

> *used to. And I don't see how you can do without them, now that you have them available. It's the technological imperative, isn't it? You have to -- you do it because you have to do it, and then the other imperative is, because it's there, you're going to use it eventually* (F376)

Some informants went further: not only has information technology become part of the cultural fabric, but also ubiquitous and aggressive advertising by producers and vendors of hardware and software tends to be succeeding in making the adoption of the technology in university teaching not just imperative, but also urgent:

> *Well, the media, just the hype out there that somehow technology is going to make us much more effective and more efficient. This is just a hype. It's out there. It's in the media, it's on TV, it's in the newspapers. You hear it from business people, you hear from all sorts of people who want the school system, who want the university to get involved* (L106).

> *Well, everybody's talking about the Information Highway. Every time you pick up the paper you see that. So there's this pressure that if you don't have stuff like that, then, you're behind the times ... the media keeps pushing this on us. I think the public kind of picks it up too - that this is the way to do things* (F533).

Related to the pervasiveness of information technology in society is the availability of information about the technology. This helps to accelerate the diffusion of the technology:

> *There is the simple sheer fact of availability of technology. It's being pushed fairly aggressively. You can't pick up a newspaper without seeing feature stories, whole sections in the Globe and Mail on information technology virtually once a week. Look at the magazine racks. Reviews of the hardware and software constitute huge sections of the popular media. So, there's an industrial push by Microsoft and others to put that technology in our hands* (L111).

As might be expected, there is substantial research and development activity in the area. According to Industry Canada (1995), "The information technology sector in Canada accounts for 35% of all industrial research and development (R&D) in Canada" (P. 69). In this regard, the government of Canada has put in place a number of networks for the generation of information and knowledge that will, among other things, facilitate the diffusion of the technology. Prominent among such networks is the Canadian Network for the Advancement of Research, Industry and Education (CANARIE). CANARIE was established in 1993. It is a partnership between the government and the private sector to accelerate the development and application of information technology infrastructure in Canada (1994, p. 17). As well, the government of Canada "maintains laboratories that contribute directly to R&D by the diffusion of knowledge through out the country" (Industry Canada, 1995, p. 153), for instance, the National Research Council (NRC), the Communications Research Council (CRC), and the Centre for Information Technologies Innovation (CITI). Also, there are research networks set up to generate information and knowledge in the specific area of the application of information technology to learning. Two examples of such outfits are the Telelearning Network of Centres of Excellence (TL-NCE), and the Office of Learning Technologies (OLT) of the Human Resources Development Canada.

The government of the province of British Columbia has also made substantial investment in the generation of information and knowledge on information technology:

> The province has invested $5.7 million over the past two years to support research and development in B.C's information technology sector. Funding is through the Science Council of B.C. and the Ministry of Employment and Investment. This investment

> has generated $13 million in matching support from the private sector (Province of British Columbia, [Not dated] p. 12).

In the higher education setting, students are not only getting increasingly used to the technology which has become part of their daily lives, but are also acquiring a relatively high level of technological literacy. The faculty members, and members of the university leadership interviewed indicated that students tend to expect to have the technology in the teaching and learning environment. This, consequently, puts pressure on the University to adopt interactive information technology as teaching tools. Speaking to this, and to how, generally, the technological culture is producing a generation of learners who appear to be demanding educational institutions to use up-to-date information technology one interviewee spoke of her experience while supervising student teachers:

> *We were trying to get kids to use some older programs where the graphics weren't nearly so good. The kids didn't even want to look at them. I mean the ante is up, so to speak ... now kids want good special events, good video, you know, good digital types of images, and they want good sound. They want colour screens. And that is coming from outside* (F216).

The preference students and prospective students are perceived to be showing for learning environments in which the technology is used is generating a competitive environment among universities. This was clearly expressed by members of the university leadership:

> *Other universities are making greater and greater use of information technology and we sense that we may be falling behind. So it's very important that our students not feel that they're coming to an institution that's old fashioned or backward looking .... So, I think that there's that sense that we must follow that path because others are following it. And, in some ways, I think that's been a very positive pressure because it's pushed the administration into making more*

funds available more quickly than they might have done otherwise (L101).

I mean, the rest of the world, people, other universities and institutions that we compete with for students, in trying to get the best students, if they're offering things that are attractive to the students that we don't offer then we'll lose out. So, it's more competition within the environment (L105).

There is competition between different universities because, I think, it's widely viewed by many students that effective access to information technology as part of the learning experience is an important thing for students to have. And if one university is doing a good job with that, it provides a force on other universities to match their efforts in that area (L104).

Summary

The broader context in which the University of British Columbia operates appears to be bringing three kinds of pressure to bear on universities which can push them in the direction of adopting interactive information technologies. Demand for higher education is increasing, and it is of two kinds -- for greater access and for increased flexibility. The former is shown by steadily increasing enrolments, the latter by increases in demand for places in distance education. A second kind of pressure is exerted by shortage of public money. The tight fiscal context leads to constant calls for universities "to do more with less", and the potential of technology for cost effective program delivery is seen to be high. Finally, it seems very clear that Canadian and British Columbian culture is now increasingly a culture in which information technology is an important element. Not only are sophisticated transmission networks available, but the public, and students in particular are both computer literate and demanding of computer-provided service.

Government Policies

As already indicated, the government of British Columbia is a major force driving the use of interactive information technology. A number of specific policy areas are seen to be particularly important. These are access, funding, and the use of information technology in teaching.

Access Policy

Since the end of the 1980s, the government of British Columbia has been expressly committed to the provision of greater access to higher education. This commitment to greater accessibility appears to be putting pressure on the University to use interactive information technology in teaching.

In 1989, the government of British Columbia developed an access policy in which it made a notable commitment to the provision of greater accessibility to colleges and universities. The policy was referred to as "Access for All." The government grounded the Access for All initiative on the following rationale:

> University training and university degrees have become progressively more important in an advanced technological society and an increasingly competitive world. For the citizens of B.C. to compete and prosper, there must be greater access to university training throughout the province (Province of British Columbia, 1989, p. 10).

Under the Access for All policy, the government sought to provide:

> increased access for the growing number of students in the lower Main Land, increased access in smaller cities, and increased access for Native people, disabled people, and students with special learning needs (Province of British Columbia, 1989, p. 1).

More specifically, the Access for All initiative was to create 15, 000 new spaces in university degree programs at colleges and universities by 1995 (Province of British Columbia, 1989). The objective was pursued through a budget of $696 million. Of this amount, $480 million was operating costs for the 15, 000 new student places, while $210 million was capital funding for new facilities needed for the expansion (Province of British Columbia, 1989). An informant from the government shed some light on the objectives of the Access for All initiative:

> *The Access for All initiative ... was certainly one of the major government initiatives around post-secondary education .... There were multiple purposes for the Access for All initiative. One of them was to get British Columbia's participation rate to national average .... The British Columbia's participation rate was 9th in Canada. Ninth out of 10 in Canada. In order words, British Columbia had a very low participation rate in post-secondary education. The government concluded that was an unacceptable position, and made a 6-year commitment to getting, at least, to the national average in terms of the participation rates* (G112).

The reason British Columbia's participation rate was lower than the national average prior to the Access for All initiative was probably not entirely due to a shortage of qualified people who needed access to higher education. To a considerable extent, the lower than national average was attributable to institutional or systemic impediments to access:

> *And this goes back to the Access for All initiative when the government took the position that it was unacceptable that X thousands of students who were qualified for admission to universities in British Columbia would not be able to take up a place because there wasn't the room. They'd got the grades, but there wasn't the room* (G113).

Again, in 1994, the government launched the Skills Now initiative which in part, sought to increase accessibility to higher education:

> The government's Skills Now initiative launched in 1994, injected some $200 million in additional funding for education and training over a two-year period. This package of initiatives aimed at accomplishing two important objectives: to provide yet more access through increased numbers of spaces and enhanced productivity, and to shift the system toward a better balance between academic and vocational programs by placing more emphasis on vocational and technical skills and market needs (Province of British Columbia, 1996, p. 11).

There is evidence that these access-boosting initiatives are resulting in significant enrolment increases in higher education institutions. (See Tables 5.1, and 5.2). It would appear that in order to cope with the burgeoning numbers, institutions, including UBC, are increasingly using interactive information technology in teaching. Informants from the University spoke to the trend:

> *There is in the air, nowadays, a sense that if we're going to continue to accommodate the growth in demand for university education, the growth in opportunities for lifelong learning, the growth in learning in the workplace and in the home, that we can't do that by building more and more lecture halls and laboratories* (L109).

> *We do get pressure from the government to become-- what's the word? -- more productive. And, I guess, if you're talking about productivity in education, the most obvious thing to do is to look at the number of students that a faculty is teaching. So, one way of dealing with the pressure to become more productive, might be to use technology to allow us to teach more students* (F337).

Funding Policy

A major objective of the funding policy of the government appears to be increased efficiency or productivity. The government officials interviewed

indicated that government has been using full-time equivalent (FTE) funding mechanism to pursue this objective. Explaining the mechanism, one of the officials said as follows:

> *We have a full-time equivalent, a fairly detailed, full-time equivalent funding model that is the basis of the funds that go to the institutions ... there's a certain grant per FTE student that is the province's and, when accumulated, represents the grant to an individual institution* (G112).

The drive for increased productivity is evident in the pattern of government funding in relation to the growth in the number of full-time-equivalent (FTE) students. As can be seen in Table 5.5, fluctuation, notwithstanding, the overall increase in grants for the period 1991 to 1996 is less than the overall increase in numbers enrolled.

Table 5.5: B.C. Public Universities' Full-Time-Equivalent (FTE) Enrolments and Operating Grants from 1991/92 to 1996/97

Year	Enrolment	% Increase	Grant	% Increase
1991/92	49,656	N/A	$473,390,085	N/A
1992/93	50,506	1.7	$491,559,345	3.84
1993/94	51,019	1.0	$500,595,849	1.8
1994/95	53,723	5.3	$513,873,752	2.7
1995/96	54,316	1.1	$525,272,712	2.2
1996/97	57,132	5.2	$528,394,578	0.6
Change: 1991/2 to 1996/7	**7476**	**15.06**	**$55,004,493**	**11.62**

Source: Post-Secondary Division, Ministry of Education, Skills and Training, Victoria, B.C.

While FTE enrolment in the universities climbed by 15.06% from 1991/92 to 1996/97, operating grants rose by 11.62% during the same period.

Using the FTE funding model as an instrument for pursuing increased productivity, government sets the enrolment targets it requires institutions to meet. Government officials interviewed provided some explanation on the application of the model:

> *Well, I think that, certainly, in terms of total volume, we've set targets for them [universities and colleges]. So, when we give a university its budget, usually in March, we write them a letter saying "You're getting $277, 000, 000 from the province of B.C. For that, we're expecting you to deliver 27, 000 or 28, 000 FTE students." So, there's a target immediately established around total numbers* (G114).

> *In terms of monitoring or whatever, the universities report on how many FTEs they do, in fact, serve and Ministry studies those reports with great interest. And, in fact, if a university fails to achieve its target, then, there are financial consequences* (G112).

The informants drawn from the University also indicated that government uses funding as a key strategy for pursuing increased productivity, increased access, and for stimulating and encouraging the University to use Interactive information technology in teaching:

> *They [government] would have mandated increases in enrolment of 8% over the last two years: "either you will take that many students with the same resources or we will cut your budgets by an equivalent amount". Potentially, interactive information technology could provide a way of doing this but I think that it won't happen immediately .... There are pressures but I think they're really only part of the general increase-in-enrolment pressures* (L102).

Policy on the Use of Technology in Teaching

The government of British Columbia has since 1990 been expressly encouraging and assisting educational institutions to adopt interactive

information technology for on-campus and distance teaching. Informants from the government and the University spoke to the trend:

> *I think, the rapid evolution of the technology since 1990 has really made government to sit up and say, "gee, there really is some chance to do good quality education via technology"* (G114).

> *In the last number of years, there have been a variety of initiatives to encourage greater use of the technology ... "What factors are taken into consideration to sort of promote that?" I think, there are several. One, obviously, is the perception that the technology may be a way to both increase access and decrease cost. And perhaps even increase quality* (G113).

> *The Ministry of Education is putting huge amounts of money into helping schools purchase technology for specific kinds of applications. They've also funded projects and so forth at the universities to help promote the use of telelearning, technologies for distance education. So, I perceive the Ministries of Education and Higher Education to be supportive of this method of providing instruction* (F211).

Government has demonstrated its commitment to the use of information technology in instructional delivery in higher education by putting in place a number of key structures and initiatives. These include the establishment of the Standing Committee on Educational Technology (SCOET) in 1990; the announcement of the Innovation Fund in 1994, and the Learning Highway and Technology Innovation Envelope in 1996; and the setting up of the Distributed Learning Task Force in 1996.

The Standing Committee on Educational Technology. This committee "is a college and institute system-wide committee with a mandate to monitor and assess changes in educational technology, and to propose policy directions for the system as a whole" (Standing Committee on Educational Technology,

1992, p. 1). An informant from the government said the following about the Committee:

> *We've had a long standing committee actually which is called SCOET -- which is the Standing Committee on Educational Technology -- which has been advising government around this whole area of the application of information technology. But, much more than that, they've been, they work essentially as a consortium, in order to assist each of the member institutions in advancing the application of educational technology* (G112).

There is evidence in documents that the Committee has been actively facilitating the adoption of information technology in teaching in educational institutions through research and collaborative initiatives. In 1992, the Committee carried out a major research project that sought to identify issues affecting the implementation and use of educational technology in B.C. colleges and institutes (Standing Committee on Educational Technology, 1992). Even though it would appear that the Committee's sphere of influence is limited to colleges and institutes, its collaborative activities with organizations, such as the Open Learning Agency, and the Open University Planning Council on issues pertaining to the educational application of information technology is affecting universities that deliver courses or programs using distance education methods (Open University Planning Council, 1995/96).

The Innovation Fund. The Innovation Fund was a strand of the Skills Now initiative announced in May 1994 by the Ministry of Skills, Training and Labour. The Fund was designed to "support new teaching techniques and flexible programs that increase access to academic, technical and vocational programs" (Province of British Columbia, 1994, p. 1). As one government

official interviewed said, *It [the Innovation Fund] was a means government was using to change culture* (G113).

To benefit from the Innovation Fund, institutions were required to first present proposals that would meet the goals of the Fund. In submitting its more than $15 million worth of project proposals to The Minister of Skills, Labour and Training in July 1994, the University of British Columbia stated that:

> The programs that make up this proposal are designed to extend instruction to previously unserved populations via distance/open learning developments, equip campus facilities for future extension via telecommunications and computer technology, and propel areas of on-campus instruction into 21st Century operating modes that will help prepare graduates to compete and contribute effectively in that future environment of work (The University of British Columbia, 1994, p. 2).

In the first year of the Innovation Fund, 1994/95, the University of British Columbia secured funding totalling $2.67 million for 33 projects. The University's assessment of the use of the Fund that year indicated that the Innovation Fund was having a significant impact on the use of interactive information technology at the University:

> The first year was one of enormous progress in the application of new media to learning and teaching on campus and at a distance. The infrastructure needed to enable and to sustain continuing progress and innovation has been strengthened. Major advances include improvements in the human skills needed to apply new digital media, a collaborative organization and operating style to ensure effective and efficient use of limited media resources, and critical developments in the communications and networking infrastructures which deliver multimedia services. There has also been renewed campus commitment to improving the undergraduate teaching and learning environment and in bringing UBC to the forefront in the application of electronic technology to the enhancement of teaching as noted in the Fall 1994 Senate Report

> of the Teaching and Learning Subcommittee (University of British Columbia, 1995, p. 1).

In the second and last year of the Innovation Fund, 1995/96, the University received a total of $1.33 million as funding for 29 Innovation Fund projects.

Although the Innovation Fund lasted only two years, it would appear that it has considerable impact on the use of interactive technology for educational delivery in the province. While reviewing developments in the area of application of technology to distance education in British Columbia in 1995/96, the Open University Planning Council noted that "Much, but by no means all, of this activity has been stimulated by the Innovation Fund established by the Ministry of Skills, Training and Labour" (Open University Planning Council, 1995/96, p. 17).

The Learning Highway and Technology Innovation Envelope. This initiative is, in a sense, a reincarnation of the Innovation Fund. The initiative which was announced in 1996 "will provide a combination of capital funds targeted for infrastructure and operating funds targeted for program development and pilot project delivery" (Province of British Columbia, 1996, p. 48). Referring to the Learning Highway and Technology Innovation Envelope, one of the government officials interviewed said:

> *We've created new Funds. Particularly for the colleges, we've created an electronic Highway Fund. And for both colleges and universities, as I said, we're are going to be using a significant part of our capital budget over the next 4 years targeted directly at electronic infrastructure* (G112).

The Distributed Learning Task Force . This Task Force was established in January 1996. Its mandate is to make proposals for the use of distributed learning systems in the college, institute and agency system and the

universities in British Columbia. In 1997, the Task Force published a report that recommended a stronger role for distributed learning.

Summary

The three policies through which government drives the use of the technology in instruction are inter-related and inter-penetrating. In a climate of tight fiscal resources, government pressures the university to "increase productivity," or to achieve "greater efficiency." This requires the university to increase enrolment significantly at about the same funding levels. At the same time, government encourages and motivates the university, through targeted funding, to use interactive technology, first, in on-campus teaching as a possible way of increasing efficiency given the potential of the technology to distribute learning; and second, in distance education as a way of providing access to people who cannot participate in on-campus education. Thus, the access, funding, and use of technology policies appear to be intricately implicated in one another. They are discernibly separate only analytically. This is clearly seen in some comments by interviewees:

> *Ultimately, even though the use of interactive technologies may not be cheaper in operating expenses, it may diminish the need for capital investment in buildings, per se. So, there is a certain amount of pressure in public expectation, in government expectation, and so on, that we will use interactive technology as a way of diminishing the requirement for capital facilities* (L109).

> *Several years ago, the provincial government gave the University some extra funding under the title of Innovation Fund which was specifically to develop ways of using information technology in the classroom* (F337).

> *I think that most of the influence from the government comes from -- it's more the carrot than the stick. In the sense they tend*

> *to have put in place funds that institutions can access if they're going to do innovative things with information technology ... they [government] certainly are engaging the post-secondary institutions in dialogue about how information technology can be used. They're doing things to try and facilitate this through things like the provincial learning network .... So, I mean, I think they're trying to influence moves in this direction. I think they're doing it largely, however, by techniques ... it's basically bribes to do this rather than threats to do this* (L104).

The government of British Columbia has initiated measures that pressure the University of British Columbia and other higher education institutions to use interactive information technology in teaching. The measures pertain to access, funding, and use of interactive information technology in teaching. With regard to the access policy, the government has, since the end of the 1980s, been pursuing greater accessibility to higher education. Consequently, enrolment in public institutions in the province has gone up significantly. The use of interactive information technology in teaching at the University of British Columbia is partly an attempt to exploit the capacity of the technology for distributed learning in order to cope with the burgeoning number of on- and off-campus students resulting from the access policy. Regarding the funding policy, given the tight fiscal climate, government funding for higher education has been restrained. Besides, using funding as a lever, the government has been requiring higher education institutions to achieve increased productivity. A result of this is that the rate of enrolment increase is higher overall than the rate of increase in funding. In effect, having found themselves in a situation where they are constrained to be more efficient in the conduct of the teaching and learning enterprise, higher education institutions are beginning to think of using interactive information technology in teaching because of the economies of scale it can afford, based on its capability to support distributed learning.

Government's policy on the use of interactive information technology itself has a more direct influence on the use of the technology in teaching at the University than the other policies. Government has put in place various initiatives and structural mechanisms to encourage and assist higher education institutions in the province to use interactive information technology in instructional delivery. Government's rationale for these initiatives appears to be largely grounded in the access-expanding capability of the technology, the economies of scale that can result especially when the technology is used in distance education, and on the need to produce technologically literate graduates needed by the economy.

The Internal Context: Leadership Initiatives

Consideration of the internal context of the University of British Columbia begins with discussion of the various initiatives which the leadership of the University has put in place to enable the use of interactive technology in teaching.

In a number of statements and declarations, the leadership of the University has given indication of plans to integrate technology into the University's instructional delivery system. (See, for instance, The University of British Columbia, 1994). At the time of data collection, the University did not have a comprehensive policy on the use of interactive technology in instructional delivery. Nevertheless, in spite of this policy vacuum, the University has a number of disparate initiatives that facilitate the use interactive information technology in teaching. These initiatives pertain to

infrastructure, equipment, internet access, funding, seminars, workshops and demonstrations, and university publications.

Infrastructure

More than half of the faculty members, and members of the university leadership interviewed were of the view that the availability of infrastructure for interactive information technology in the University is a vital enabling condition for the use of technology in teaching. They indicated that the campus is being networked in order to ensure that members of the University community have access to both the campus network and the Internet:

> *We're beginning to see now that the University as a whole is going through a period of connectivity, so that everybody in one way or another is going to be linked, and have access to this new information technology* (L101).

A number of steps are being taken to provide information technology infrastructure at the University. The University set up the Advisory Committee on Information Technology (ACIT) in the Fall of 1995 to review and advise on the development and use of information technology -- computing and data processing, as well as voice, video, and data communications -- in support of teaching, learning, research, and administrative activities (The University of British Columbia, 1996). Among the sub-committees of ACIT is the Student Information Technology Access Committee (SITAC) whose membership is 50% students. The sub-committee advises the Vice-president, Student and Academic Services on matters related to students' access to information technology.

A key project of the Advisory Committee on Information Technology has been "Campus Connectivity" – the provision of high-speed connectivity

to UBC offices, classrooms, laboratories, student residences, and other appropriate spaces by July 1999:

> The University of British Columbia (UBC), like many other universities, has a communications infrastructure that was built prior to the widespread use of network-intensive computing technology. While the University has made a valiant effort to address the networking needs of specific buildings, departments and units, through such funding vehicles as public works and renovation (PWR) and on an ability to pay basis, it has not been able to accommodate the almost overnight demand for universal access to digital scholarly resources. In response to the situation, the Advisory Committee on Information Technology (ACIT) of the Vice President (Student and Academic Services) has charged the Campus Connectivity Project's (CCP's) Steering and Working Committees with the task of advising the Vice President and ACIT on how to provide high-speed connectivity to every appropriate UBC space (The University of British Columbia, 1997, p. 3).

Meanwhile, technology that allows "fast Ethernet" connections to the UBC network backbone which facilitates data transmission at a speed of 100 mpbs (megabits per second) is being provided. This will enhance considerably the transmission of video and graphical data which requires high-bandwidth (Campus Computing & Communications, Jan. 1997).

One of the key infrastructural initiatives at the University is the ResNet. ResNet is the UBC Residence NETwork. Its goal is to provide UBC residences direct connectivity to UBCnet (the campus network) and to the Internet. A number of residences, such as, the Thunderbird, Place Vanier Okanagan House, and Ritsumeikan-UBC House have been connected. ResNet allows users unlimited access to Netinfo or Interchange (UBC's Internet services) without dial-in time fee (Campus Computing & Communications, April, 1997).

Computing and Communications, an unit of the University has been playing a vital role in the provision, maintenance and enhancement of information technology infrastructure at UBC through its various subsidiaries (Campus Computing & Communications, Jan 1997). Computing and Communication falls within the ambit of the responsibilities of Associate Vice President Information Technology -- a position that was created in 1996 and to which an incumbent was appointed in 1997.

Equipment

Availability of equipment in the University is another important enabling condition for the use of the technology in teaching. Faculty members interviewed consider that computers are the most available interactive information technology that can be used in teaching. The hardware and software with which almost all those identified as users do their teaching are provided by the University through the departments, Faculties, the Innovation fund, the Teaching and Learning Enhancement Fund, and the Faculty Workstation Initiative.

It would appear that every faculty member has access to a computer:

> *This machine was given to me -- I'm pointing to my computer here -- by the department. It was hooked up to the Internet by the departmental technician* (F664).

Informants indicated that there are computer laboratories where students can access computers. It would appear that every department has such a lab, or access to one:

> *It's becoming essential that we have more computers available for students .... So, everybody seems to be trying their hardest to make the students able to find someplace that they can get on*

a computer during the working day or during the school day (F641).

A major facility at the University that can be used for the production and delivery of technology-based learning is the TELEcentre. The centre has state-of-the-art multimedia production and presentation equipment that are available to faculty members and departments. The TELEcentre is located within the University Building in the South end of the Campus (University of British Columbia, 1995b).

Internet Access

The provision of free Internet access to faculty and students, through what UBC calls Interchange and Netinfo accounts, facilitates the use of interactive information technology in teaching. In the view of the informants, this allows faculty and students access to world-wide resources on the Internet, as well as provides them opportunity for e-mail communication, and computer conferencing:

> *I have an Interchange account which is paid for by the Faculty of Arts* (F664).
>
> *One thing that has been done to start to address this ... is to give every student some level of free computer use in terms of dialing into the University. So, if they have a computer at home and a modem, they have some level of free use. So I, as an Instructor, anywhere can put stuff online and so long as my students have computers, I can assume that they will have access to this material* (F497).

Documentary evidence corroborates the interview data regarding free Internet access for faculty and students through Interchange and Netinfo accounts:

> Throughout the year UCS [University Computing Services] concentrated on providing even better information system resources for university community through Interchange (the Internet access service for UBC students, faculty, staff, alumni and others) and Netinfo (the free Internet access service for students funded by the UBC library) (Campus Computing & Communications, 1997).

Funding

Some funding is available in the University to support teaching by interactive information technology.

However, just over a quarter of the 89 users who returned the questionnaires in the present study obtained some funding for their teaching by interactive information technology. They indicated that funding was provided through the Teaching and Learning Enhancement Fund, the Innovation Fund, and the Faculty Workstation Initiative.

The Teaching and Learning Enhancement Fund was instituted in 1991 by UBC Board of Governors to help improve teaching and learning generally including ancillary activity like library work. However, it would appear that in approving applications for the Fund, some preference is given to proposals that seek to use interactive technology in teaching (Vice President, Academic & Provost, 1996). Data from the interviews indicated that the Teaching and learning Enhancement Fund has helped to support technology-based teaching:

> *The first, and I think best initiative within the University is the existence of the Teaching and Learning Enhancement Fund which I'm quite proud of UBC for sponsoring .... It's a small step but I think in the right direction* (L111).

As we have already seen, the Innovation Fund which totalled about $4 million was provided by the provincial government in 1994/95 and 1995/96 to encourage innovative teaching , such as, teaching by means of interactive information technology (Centre for Applied Studies in Evaluation, 1996). As one member of the university leadership noted:

> *... through the use of 4 million dollars initially, or 2.7 million dollars in the Innovation Fund and the next year 1.3 million; through the use of a large share of the Teaching and Learning Enhancement Fund -- there has been a stimulus to students and faculty talking about teaching and learning* (L109).

A report on the implementation of the Innovation Fund at the University of British Columbia, states that "The Innovation Fund has helped put UBC in a position to take a leadership role in the development, application, and testing of new media technologies in educational and research settings" (Centre for Applied Studies in Evaluation, 1996).

Faculty interviewees noted the Faculty Workstation Initiative (FWI) as one of the sources of funding that support teaching by interactive information technology at the University:

> *[The Faculty Workstation Initiative] That's an Initiative where you have to send in your application -- every department sends in their application -- that's supposed to supply professors with either no computers or standard computers a certain amount of money to help them either buy a computer or upgrade their computer. And so I heard that, and actually I got one and I was able to upgrade my system as well* (F641).

> *So, for example, one of the things we did was the Faculty Workstation Initiative. And this Initiative, for the first time, made available to faculty members up to $1, 500 in matching funds to get a workstation for their office. And one of the main uses, we believe, for those workstations will be in terms of facilitating their ability to move into using interactive information technology in teaching. But it will also facilitate their research and administrative purposes and*

so on (L104).

The Initiative was instituted in 1996 by the Advisory Committee on Information Technology (ACIT). In a Sept. 8, 1996 Memorandum introducing the Faculty Workstation Initiative to the "Management and Administrative Directors and Heads of Unit", the Vice President (Student and Academic Services) who is the Chairperson of ACIT stated, in part, as follows:

> In order to provide more teaching faculty with better personal computing capabilities, ACIT's FWI [Faculty Workstation Initiative] will provide matching grants of up to $1, 500 to selected faculty for acquiring preferred FWI workstations ... or for upgrading current systems. It is anticipated that grants totalling $450, 000 will be made in each of the next three years. The FWI is part of the University's overall efforts to expand the use of information technology (IT). In particular, we desire to move, as quickly as possible, to an environment where electronic mail can replace print-on-paper as the primary means of communication among all members of the UBC community. We also hope to establish the level of workstation and network infrastructure UBC needs to keep pace with the technology required in higher education (Vice President, Student and Academic Services, 1996).

<u>Seminars, Workshops and Technological Services</u>

Faculty, and members of the leadership interviewed mentioned seminars, workshops and technological services as part of the available support for teaching by interactive information technology:

> *There are certainly lots of opportunities available on the campus here to take training sessions of one sort or another. The WebCT, for example, there's training sessions going on, I think, now, on how to use that to mount courses and put them on the Web. There are other courses in learning how to use multimedia technology or teaching with technology. So, there are resources available within the university community for people to get the necessary information* (F211).

Two centres were clearly referred to in the interviews as the providers of seminars, workshops and technological services. These are: the Centre for Faculty Development and Instructional Services, and the Centre for Educational Technology.

In the responses to the questionnaire, half of the users of interactive technology in teaching indicated that they get some help in course design, course development, instructional or technological services from centres or units within the University, such as: the Centre for Faculty Development and Instructional Services, the Centre for Educational Technology, and the Distance Education and Technology Division of Continuing Studies. They also avail themselves of the services of units set up by their departments or Faculties to help faculty members and students in matters concerning application, upgrading and repair of technology.

Informants who have attended seminars or workshops organized by the centres provided some information about their impressions, and about the services offered at the sessions:

> *I went to several of the courses at CET [Centre for Educational Technology] and I not only enjoyed them but I benefitted from them too in a number of levels. They have courses where they actually show you how to do searches on the Internet, or other basic computing skills. They have had videoconference originating at other universities. There was a number of other things which happened ... presentations on how colleagues actually have created, in several departments in this University, some courses ... Web-based courses .... I happen to be quite familiar with CET and their facilities* (F376).

Some of the documents consulted provided some background information about the key units providing seminars, workshops, and technological

services. The Centre for Faculty Development and Instructional Services evolved from the Faculty Development Project which was established in 1987 by the Faculty Association. It was in 1993 that the Faculty Development Project was renamed Faculty Development and Instructional Services following the taking over of the running of the initiative by the University of British Columbia. Since then, the Centre has been operating as a unit in the Office of the Vice President Academic and Provost.

Since its inception, the Faculty Development and Instructional Services has provided "instructional enhancement opportunities for hundreds of faculty members and graduate teaching assistants" (Centre for Faculty Development and Instructional Services: Report on Activities July 1, 1993 to June 30, 1994, p. 1). The application of interactive information technology to teaching is a major concern addressed in the Centre's seminars. As stated in a report on the activities from July 1, to November 30, 1995, over 80 faculty members attended the Centre's five workshops on instructional technology. Between January 1 and June 30, 1996, 76 faculty members from 49 departments participated in seven workshops on instructional technology organized by the Centre (Centre for Faculty Development and Instructional Services: Report on Activities July 1, 1994 to June 30, 1996).

The Centre for Educational Technology was established in 1994 as Media Resources Network (MRN). It was given its present name in 1995. The mandate of the Centre was to advance the use of information technology in teaching, learning and research at the University. The Centre played a major role in the development and coordination of the University's Innovation Fund Integrated Plan. In this regard, the Centre provided "leadership, expertise, encouragement, ideas and networking opportunities to the projects included in the Plan" (The University of British Columbia, 1995b, p. 3).

The Centre organized seminars and workshops on the use of interactive information technology in teaching. It was composed of a university-wide Steering Committee chaired by a Dean, and four sub-committees, namely, Evaluation, Distributed Learning, Human Resource Development, and Research. Funding for the Centre of Educational Technology lapsed and as a consequence the Centre does not appear to be functioning currently. There are, however, indications that funding may be restored.

The Distance Education and Technology Division of Continuing Studies, as well as the Continuing Studies unit itself, engage in activities that enhance the use of interactive information technology in teaching. The appointment, in June 1995, of Director of Distance Education and Technology in Continuing Studies has given a considerable fillip to distance education activity across the University. Since the appointment, "a number of steps have been taken to bring the distance education umbrella group (UBC Access) and the distance education design and delivery system (Guided Independent Study) into closer alignment with institutional and faculty-specific goals related to distributed learning" (Open University Planning Council Report 1995/96, p. 5). The Distance Education and Technology Division delivers at a distance, degree credit, non credit, certificate and diploma courses and programs in collaboration with Faculties in the University. As stated in the Open University Planning Council Report 1995/96, most of the Division's courses are "print-based, with some video and/or audio support (cassette and/or audio-conferencing). There is also a small number of course-related television broadcasts via knowledge Network" (p. 6). However, a later report shows that the Distance Education and Technology Division makes considerable use of the new technologies in program and course delivery.

(The University of British Columbia, 1998). Besides the offering of courses at a distance, the Distance Education and Technology Division has contributed to the enhancement of the application of interactive information technology to teaching at the University through its participation in the running of the Centre for Educational Technology (when the latter was functioning).

Continuing Studies, of which Distance Education and Technology is a Division, also provides support for the use of interactive information technology in teaching through its course offerings on computer skills. It develops and offers courses dealing with such topics as "Using software," "Internet," "Multimedia," "Programing," and "Networking." In the Fall of 1997, Continuing Studies offered over 130 courses on interactive technology. Information about the courses is normally contained in a publication of Continuing studies titled "Computerskills: Opportunities for the Digital Age."

University Publications

Information materials published by some units/centres in the University are another kind of support available for the use of interactive information technology in teaching. There are a number of key publications that provide information about interactive technology and its application. The Centre for Faculty Development and Instructional Services publishes a faculty development newsletter three times a year. The newsletter has a circulation of 3,300. Computing and Communications publishes *Campus Computing & Communications* nine times a year. In recent times, virtually every issue of each of the two publications, gives a number of Web sites where information on instructional application of information technology can be found. This kind of support was referred to in interviews. For example:

> *I saved this Campus Computing & Communications, and I know they are always putting different things .... I saved one issue that was all about Web course material and how to get information at UBC. You know, here's this one [shows the researcher] "From paper to Glass: Design for Web Sites." They did have some stuff that was teaching-based before, but I haven't looked into, you know, into it (F533).*

Summary

It seems clear that the University is taking a number of important initiatives towards integrating interactive information technology in teaching. These initiatives pertain to infrastructure, equipment, internet access, funding, seminars, workshops, and technological services, as well as publications. These initiatives seem to be well known. A great majority of those interviewed for the study know of them and speak well of them.

The Internal Context: Faculty Attitudes

The responses to the questionnaire used in the present study give information of two kinds about faculty attitudes to the use of interactive information technology in teaching. First are respondents' views about the attitudes of other members of their department. Second are their own personal views.

Asked what they thought about the attitudes of their departmental colleagues towards technology, more than half of the 150 respondents described them either as "very positive" or "positive". About a third of the respondents described the attitude of faculty members in their departments as "neutral", while a mere 24 saw it as "unenthusiastic" and only two

respondents perceived the attitude of faculty members in their departments towards the use of interactive information technology in teaching as "negative". These responses, of course, include both users and non-users. It is of interest that only four of the 61 non-users of interactive information technology in teaching, indicated a "personal disapproval" of the use of interactive technology in teaching. Only five of the 61 non-users indicated that the culture of teaching in their departments is unaccepting of the use of interactive information technology in teaching. However, almost 40% of these non-users indicated that their courses could not be well-taught by means of interactive information technology.

On the attitude of departmental leadership towards the use of interactive information technology in teaching, a quarter of the 150 respondents (i.e. both users and non-users), described the attitude of the leadership in their departments as "very positive," while a third described it as "positive." A further third of the 150 respondents indicated that the attitude of the leadership of their departments was "neutral." Ten respondents described it as "unenthusiastic," while only three perceived it to be "negative." Three respondents did not respond to the item.

When we turn to the respondents' views of their own personal satisfaction with interactive information technology, we need to examine only the responses of the users. One of the questionnaire items asked users to indicate their level of satisfaction with various instructional activities that take place in the course(s) in which they teach by interactive information technology. In this regard, users were asked to check any one of three levels of satisfaction ("highly satisfied," "moderately satisfied," "not satisfied") with each of the following instructional activities, "student-faculty interaction," "student-student interaction," "active participation of individual students,"

and "cooperative learning among students." The results are shown in Table 5.6.

Table 5.6: Instructional Activities Carried out through Technology by Level of Satisfaction and by Percentage of Users

Instructional Activity	Level of Satisfaction	No. (%) of Users (n=89)
Student-Faculty Interaction	Highly satisfied	38 (43%)
	Moderately satisfied	40 (45%)
	Not satisfied	2 (1%)
	No response	9 (10%)
Student-Student Interaction	Highly satisfied	17 (19%)
	Moderately satisfied	36 (40%)
	Not satisfied	14 (16%)
	No response	22 (25%)
Active Participation	Highly satisfied	26 (29%)
	Moderately satisfied	34 (38%)
	Not satisfied	10 (11%)
	No response	19 (21%)
Cooperative Learning	Highly satisfied	13 (15%)
	Moderately satisfied	36 (40%)
	Not satisfied	15 (17%)
	No response	25 (28%)

Thirty-eight of the 89 users indicated that they are "highly satisfied" with the way interactive technology facilitates "student-faculty interaction" in their courses. A further forty are "moderately satisfied." Only two of the 89 users

are "not satisfied" with the way "student-faculty interaction" is facilitated by interactive information technology. Nine of the 89 users did not respond. Seventeen of the 89 users are "highly satisfied" with how interactive information technology facilitates "student-student interaction" in their courses. Thirty-six are "moderately satisfied," while fourteen are "not satisfied." Twenty-two of the 89 users did not respond.

Concerning the way the use of interactive information technology facilitates "active participation of individual students," 26 of the 89 users indicated that they are "highly satisfied," 34 are "moderately satisfied," while 10 users are "not satisfied." Nineteen did not respond.

Thirteen of the users are "highly satisfied" with how interactive information technology facilitates "cooperative learning among students," 36 are "moderately satisfied." Fifteen users are "not satisfied". Twenty-five users did not respond.

By these measures, then, satisfaction among users is reasonably high. The proportion of those expressing moderate or high satisfaction ranges from 88% (with reference to student-faculty interaction) to 55% (with reference to cooperative learning among students).

Interview data give a fuller picture of these attitudes. All of the 31 interviewees (members of the university leadership, as well as faculty) were of the view that interactive information technology has some strengths as a teaching tool. These strengths lie in the capability of the technology to afford greater, more convenient, and more flexible educational access by facilitating place and time independent one-to-one, one-to-many, and many-to-many communication in the teaching and learning process, and also by providing access to experts and data bases world-wide. The comments are not all from users. The following excerpt is taken from an interview with a non-user:

> *I'm perceiving it [interactive information technology], thinking of it, mainly in terms of how I expect to use it .... I want to do this with use of the Web and a variety of other different things to expand how I interact with my students ... it would be really good to set up a kind of chat site for my students where they could ask me questions and where I could post answers. So that people who didn't hear those questions would be able to access that information. Or set up a place where I have lecture notes and other materials on the Web they can download as needed. And advice on the Web, and a lot of things that some students come to see me about would be much more efficient if I had used, say, the Web to convey that information. And, then, a variety of other students would be able to access that at the hours of their convenience* (F594).

Here is another perspective on the strengths of interactive information technology in teaching by another non-user who had e-mail in mind as he spoke:

> *Basically, more disciplined interaction. We all waste a lot of time when we talk to students face-to-face. Certainly, e-mail exchange is nice actually .... They [students] have to think what they're doing, write it up and send it to me. And then I can take their document and comment on what I think is relevant and then send it back to them. That's actually -- especially for some, like me, who talk too much, very useful. So, it means you focus only on -- make them focus first by writing it up, instead of just coming in and saying I don't understand. They have to actually write up what they're worried about, and then I can actually take that and respond* (F577).

Two excerpts from the interviews of users are:

> *Well, I guess it enhances the effectiveness of teaching and learning just in the sense of creating more communication between me and my students, relative to what there would be, you know, in the existing context. Which is that a lot of students aren't on campus very much, and you know, wouldn't be interacting with me, probably if they couldn't do so through e-mail .... I guess my perception is that I could be, you know, giving my students more information, I think, than I do, and that would be a contribution to their learning* (F684).

> *I would say associated with this is the distributed side, where one person can feasibly create a course, create a data base and that data base can be used by every university in the world in a very direct fashion ... there's definitely something very peculiar about that situation, where one person, one model, can be easily and so rapidly distributed across universities* (F420).

Various kinds of flexibility are seen as strengths:

> *I think one of the strengths of interactive information is the flexibility. A student can access the information any time they want, not just during class time. The second thing is speed. They can jump ahead, look at information ahead of time and it will all be laid out in hopefully a more understandable way than if they had to rely on the text book and the lecture notes that the professor would give* (F641).

> *Well, interactive information technology is nice because there's lots of information that's available to students. It's also nice because students can learn at their own pace. So, for example, if a student has difficulty with a particular concept he can, or she can sort of go back at it a few times or perhaps there's sort of extra examples for those who need extra help* (F379).

Members of the leadership who were interviewed also attributed strengths to the use of interactive information technology in teaching:

> [It] *gives more feedback to the student as it's name implies. It's two-way. It's not just a faculty member giving information. The other virtue is that using modern technology we can do it at a distance. And we can also do it on a delayed basis. So, it frees us from a rigid one-way classroom style of teaching. And that's particularly important in this era when we have no capacity on the campus* (L110).

> *It allows students to have a more individualized learning experience, so that they can go at their own pace. The choice of the materials that they actually study -- it can give them more different ways of interacting with material. It can make it possible*

> *for them to study material at different locations, perhaps, from their home or take a course at another university ... it can allow exploration and visualization of concepts that would not be otherwise possible ... it can support group interaction in more diverse ways* (L104).

The extent to which faculty attitudes have been translated into action can also be seen in the interviews. They complement the statistical findings regarding the various ways in which interactive information technology is used in teaching at the University, that is to say, E-mail and the Web. Twenty-two of the 31 university interviewees were of the view that teacher-student communication is increasingly being conducted via e-mail:

> *I tend to handle, as I mentioned earlier, a lot of my interaction with students not face-to-face but over e-mail. So that's definitively a change* (F216).

> *In the last several years, I encourage students to not come through my door -- to send me e-mail. And that worked out. And the students like it because they often have a question and they shoot it off, say, on Sunday night or whatever and the next day they have an answer. And they like that* (F376).

More than two-thirds of these informants indicated that the posting of courses or course materials on the Web is emerging as a new teaching and learning activity at the University:

> *I notice in the department that more faculty members are putting stuff related to their courses on the Web. And there's encouragement within, you know, the department to do that. So, it seems that's the accepted way. I'm not sure it's the best, but people seem to be, you know, just moving along in that direction* (F533).

> *I do have a colleague, or two who have set up, in effect, their own virtual courses on the Web ... these professors have written up their own courses, their own lectures, their own exercises which students simply log on .... Clearly, that's just a massive transformation in the nature of teaching, compared to the traditional way it's been carried out in the academy. There's no contact with students. The professors are there simply as resource people, both to set up the course and to answer any questions that go on, but there are no lectures. There is no face-to-face contact. There are no speaking heads. So, in that sense, it [interactive information technology] transforms the nature of the teaching enterprise at the University* (F664).

Regarding the use of the Web for course-related research, 18 of the 31 interviewees observed the trend:

> *I see students more and more turning in papers where they get information off the Web rather than going to the library. So, I think there's a lot less going to the library and looking around in there. And I guess, in general, I feel like there's a sort of a slow process of things being organized in such a way that it doesn't require face-to-face communication* (F684).

> *Here, at this end of the campus, Arts [Faculty] is gradually being transformed by the introduction of information technology that is now being made available to the students. They've had it for a long time in the Sciences and possibly in Education too ... instructors are now sending them [students] off to the Web to do some of the kind of research they used to do at the library .... So, we can see that the kinds of tasks students are given now are changing the way that students spend their time in preparing for classes, or in doing assignments is changing* (L101).

About three quarters of the interviewees accompanied their descriptions of the strengths of the technology with some comments about its limitations. These comments are examined fully in the next chapter. For the moment, however, it is to be noted that all those who saw limitations also saw strengths. All interviewees (users, non-users, and the university leadership)

expressed a positive attitude towards the use of the technology as a teaching tool. Earlier surveys of faculty attitudes to the use of information technology (e.g., Black, 1992) did not find this degree of favourableness. Accounting for the positive attitude in the present sample therefore becomes important. Data from the interviews provided some clues.

The favourable disposition of the informants towards the use of interactive information technology in teaching appears to stem from (1) the cultural context, (2) professional considerations, and (3) personal factors.

With regard to the cultural context factor, it is clear that interactive information technology is available and pervasive in the Canadian and British Columbian society. Information technology has become a defining feature of the culture of the society. Consequently, since the informants are, at once, members of the wider cultural environment, as well as members of the University, the pressure is strong on them, even if imperceptibly, to be carriers of the culture of information technology from the wider society to the University. This is seen in the fact that 26 of the 31 interviewees drawn from the University were of the view that the availability and permeation of information technology in society is an external force driving the University and by implication, faculty members to use it in teaching.

Concerning the professional factor, the informants, as professionals, acknowledged the relevance of interactive information technology as a tool in their profession. All of the 31 interviewees indicated that the technology is efficacious in at least some aspects of teaching and learning. For example:

> *Most, almost every faculty member is now on e-mail, and I think as that pervades the University, there will be increasing, just increasing comfort level with the technology ... as a result of increasing Internet access and e-mail access by faculty members and Web use by faculty members, there's a greater awareness of the*

> *technology and, therefore, more likelihood that it will be used in courses* (F379).

> *Certainly, the availability of technology, the Web, the Internet -- it's got an extremely high profile. And there seems to be a very widespread belief that the Web or the Internet has a major, will have a major benefit for education, and therefore, we ought to be using it* (F211).

Because of its perceived or experienced efficacy, interactive information technology is seen to have the potential for enhancing the professional effectiveness of faculty members, an observation corroborated by the questionnaire data which indicated that 85% of the 150 respondents use interactive information technology for their research.

The personal factor arises from a sense of the inevitability of the use of interactive information technology in teaching. There was a rather strong perception among the interviewees that the use of technology in teaching is inevitable. Twenty-seven of the 31 faculty and members of the leadership interviewed expressed the view that the use of interactive information technology in teaching will inevitably snowball. Expressions that spoke to the inevitability of this use often came up in the interviews: "It's unstoppable" (F664); "It will be used more and more" (F533); "It will not decrease" (F577); "It's the technological imperative ... you have to, you do it because you have to do it ... it's there, you're going to use it eventually" (F376); It's going to come no matter what" (F216); It's gradually going to become an everyday part of everybody's teaching" (L101); "There will be more offering of courses through the Internet" (L105); "It's inevitable" (L106).

The perception of the inevitability of the use of interactive information technology in teaching tends to stem from the general cultural swing towards

the use of the technology in society, as well as from the perceived efficacy of the technology as a professional tool. Consequent upon the perception of its inevitability, there appears to be a strong personal desire, or willingness, or even palpable eagerness to use or to learn to use interactive information technology in teaching in order not to fall behind – in order to appear up-to-date:

> *I think it [use of interactive technology in teaching] is going to be on-going as the technology gets better and better. And there's absolutely no way you can ignore it. You ignore it at your peril. And if you don't use it, don't get familiar with it, you're going to be completely left behind in teaching* (F381).

> *I wish I understand it [how to use the technology in teaching] better. I have a feeling that it has already left me behind. I think, a lot of education has to go on within the University, and within the Faculty to help them [faculty members] benefit from this new tool* (L101).

Summary

It is clear that elements in both the broader external context of the University and its more local internal context are exerting pressures for the adoption of interactive information technology in teaching. In the broader external context are demands for greater access and increased flexibility, the tight fiscal context which has led to calls for greater efficiency, and the culture of information technology. Three kinds of government policies have also exerted considerable pressure. The push for increased access, the use of funding incentives, and initiatives to promote the use of technology are all features of the period covered by the present study which have had the effect

of inclining the University more towards the use of interactive information technology in teaching.

In the local internal context of the University of British Columbia are seen two elements which have the effect of promoting the use of interactive information technology in teaching. The leadership of the University has paid attention to a greater or lesser extent to the provision of infrastructure and equipment, to enhancing internet access and making some funding available for technology upgrades. They have also supported seminars and workshops, as well as publications on the application of technology to teaching. Finally, as the second element in the internal context, we have examined the attitudes of faculty members. In general, these are much more positive about the use of technology in teaching than appears to have been the case some years ago. Such positive attitudes cannot but help exert pressure for greater use of technology in teaching.

Against this apparently compelling picture of encouragement for the adoption of interactive information technology as a tool in teaching, we need to set the findings of chapter 4 -- that the extent of such use is not great. Exploring this apparent anomaly is the subject of the following chapter.

CHAPTER 6

LIMITS ON THE EXPERIENCE: UNDERSTANDING THE SCALE OF TECHNOLOGY USE IN TEACHING

In spite of the generally positive attitude of faculty members towards the use of interactive information technology in teaching, and in spite of the considerable pressures from both external and internal contexts, not many faculty members actually teach by means of the technology. The data presented in chapter 4 indicate that very few of the users identified through the questionnaire would be described as intensive users of the technology in teaching. Most are light users whose use of the technology is mainly for e-mail communication with students, and to a much lesser extent via Web sites.

In this chapter are explored the reasons for this apparent anomaly. The chapter begins with an examination of faculty members' views and experiences. In a second section, the University's initiatives with respect to technology are examined and critiqued. The chapter ends with a summary and conclusions.

Faculty Views on Impediments to the Use of Technology

The interviews complement the previously reported questionnaire findings regarding the modest use of interactive information technology in teaching at the University. The following excerpts from the transcripts

indicate that the use of interactive information technology in teaching at the University is neither extensive nor intensive yet:

> *As far as I know, at present, no one in the department has a course on the Web. I believe that's correct* (F379).
>
> *Certainly, those of us that are using technology -- there are three or four of us in our department that are using technology* (F211).
>
> *It's not really being used in our department to any extent* (F378).
>
> *Only that individual faculty members have experimented with the use of interactive technologies. But there's been nothing systematic. There's just been a number of little experiments* (L110).
>
> *Information technology in teaching is so comparatively modest in terms of what most of us do .... At the present time, we don't have very much ... we have pockets of experiments I guess. And they're not in our department really* (F696).
>
> *As far as I know, no one does distance education in the Faculty, or in the department, at least* (F379).

Fuller examination of the transcripts shows a number of reasons why the adoption of technology may be slower or less extensive than might be expected. Five factors emerge: (a) the limitations of the technology for some aspects of teaching, (b) lack of time, (c) lack of professional reward, (d) lack of appropriate skills, (e) lack of resources and equipment.

Limitations of Technology

As indicated earlier, three quarters of the 31 informants drawn from the University attributed some limitations to the use of interactive information technology in the teaching and learning process. The limitations, in the views of the informants, centre around the potential for "depersonalization," "dehumanization," of the teaching and learning process. The informants were of the view that, necessarily, "something is lost" in technology-mediated educational interaction. A member of the leadership said:

> *There is something that happens between the faculty member and the class that you just don't get when you're doing it over long distances or electronically. I would say, maybe the ease of following up questions. A student has a question in a class and they ask it and you give them an answer and if you see that they don't quite get it, or you want to go over it again, and that leads to another question, it's easier to do that in the classroom situation than electronically* (L103).

A similar view was expressed by a non-user:

> *It depends on the question being posed. If it's really a subtle question or subtle misunderstanding, it'll take forever back and forth with e-mail. Discussions by e-mail, if it's a complicated issue, take a lot longer than in person* (F533).

Words and phrases hinting at the "something" that is lost in technology-mediated educational communication came up rather often in the interviews. Here are some examples: "I think they [students] need the kind of interaction that involves the bodily self," "It [e-mail] doesn't allow you to pick up mood" (F563); "Technology has no soul," "There's no warmth to it [technology]" (F379); It is difficult to get a feel of a student, if you don't have an opportunity for personal contact" (F381).

Most of the views expressed by the informants about the limitations of interactive information technology in teaching tended to pertain mainly to e-mail or computer conferencing:

> *I think, at some point, nothing can replace face-to-face interaction with a human. As good as a discussion group on-line can be in real time, or just using old fashioned e-mail technology, as good as that can be, I still think there is a necessary place for face-to-face interaction, for the unplanned, the surprise response, or the very tentative response that only an experienced university instructor can sense when a student is being a bit tentative about formulating a response. I think there are many important benefits of face-to-face exchange. Among other things, the tentative or timid or less confident student stands to benefit a lot from carefully thought through face-to-face experience with an instructor. Nothing can replace that* (L111).

In some cases, the limitation informants saw in the use of interactive information technology is a threat to the value of using books:

> *I think that the more a student uses a computer the less time they're going to spend reading real books. And I think there's really something to be said for reading a paperbound text. And being able to use your imagination to see things that have no pictures associated with them .... I've noticed that students aren't that interested in reading as much as many generations ago, and they don't seem to have the long-term stamina of going through, like, large books or long books. So, I would hate to end up with a group, or generation of students, who just don't like reading, reading a real text. They don't get an appreciation of when you hold a new book in your hand and you flip the pages that you can smell of the paper. These are things that I like ... when I go into a bookstore, a lot of the pleasure comes from just looking at the book, handling it, holding it, looking at the way the print is on the page. And I get the same pleasure out of text books. A new text book comes, I like looking at it, feeling it, looking at the pictures, looking at how the print is in two columns or one column. You know, very old books that are bound beautifully are actually quite beautiful with the edges often dyed or gilded. I like that. But in a modern computer age, I mean, this is going to be lost. We'll be looking at computer screens. Looking at the text on a computer screen. We're just not going to have that same feeling for the printed, you know, book* (F641)

And finally, technology is seen as not permitting a certain kind of group response:

> *I think there's still certain things that only happen when students are together, so you can have students helping one another. Sometimes you'll hear this low rumble in a classroom as you're teaching, and sometimes it's students talking about the baseball game that occurred yesterday, and you know, "What do you think of those Blue Jays?" But other times, it will be, "Did you understand what he was doing up there on the board?" You know, or, "I didn't follow the concept." And that sort of learning, I think, is very important and might be difficult, even with very good interactive technology* (F379).

These examples show what the respondents see as intrinsic limitations of interactive information technology for some aspects of teaching. The other four kinds of impediment to technology use are different. They refer not to limitations of the technology, but to difficulties experienced in using it.

Lack of Time

Twenty-seven of the 31 faculty and members of the leadership interviewed mentioned lack of time as a hindrance to the use of interactive information technology in teaching at the University. They were of the view that teaching by interactive technology requires a substantial amount of time which faculty members find difficult to afford, owing to commitments to research, normal/regular teaching, and committee work.

In their view, a significant amount of time is needed to learn to use the technology as well as to design and develop courses to be delivered by it. The excerpt that is presented below is from a non-user. It speaks to lack of time. From time to time, the informant received flyers or notices from some centres on campus inviting him to seminars or workshops on the use of technology in teaching, but he had been unable to attend due to lack of time:

> *It's unfortunate, it's probably unfair to the interactive information technology sector, so to speak, but they are, in some ways, emerging upon us at a time when we are so deluged with other things, at the same time as our lives are becoming intolerably busy. I, probably, unfairly throw away a lot of the stuff they send because I really can't imagine having time to think about it* (F577).

Another non-user commented:

> *The department is being cut back in faculty. We're not being allowed to replace faculty that retire or leave. And, therefore, our class sizes go up dramatically. We do a lot of teaching, you know .... There's also, it seems like there's a huge increase in administrative paperwork and committee work that I also do. Yet, I'm expected to carry out a full research program. I honestly don't have a lot of time to sit down and figure out how to design a course in a whole new way. There's no time for that* (F688).

Not only non-users saw time as a constraint. Users of the technology in teaching were also of the view that time is a hindrance. They expressed the view as strongly as non-users did. The excerpt below is taken from an interview with a user:

> *It's very time consuming to develop useful materials that really do make an impact on student learning. That's, I think, an issue that, I think, the universities do have to address. And there's obviously lots of people that are very interested in doing that [using interactive technology in teaching], but if they're having to do that and carry their normal teaching load and research load, then, it's really very very difficult to do it* (F211).

Another user observed:

> *Some colleagues are very very busy. They're extremely busy. They don't, even if they wanted to, they won't find the time. And somehow, I think, the University has to assist people like that to get those skills [how to teach by interactive information*

technology] (F376).

Elsewhere in the interview, the informant (376) threw some light on why faculty members tend to lack the time to use or learn to use interactive information technology in their teaching:

> *But it seems as if that, that set of administrative duties you get, in addition to all the other duties you have, is literally taking away a lot of time and, again, therefore, hindering learning new technologies -- using whatever* (F376).

The view that lack of time constrains faculty from getting into teaching by means of interactive information technology was not held by only users and non-users. Members of the leadership also shared the view:

> *In terms of what's limiting the growth of this kind of teaching, I think is more of an issue of faculty time and ability to take time to prepare these .... If you have a course that you've been giving in the normal lecture format and you want to now put it on the Web or put it into a form for interactive use -- it's a considerable investment in time for a faculty member to do that. We don't have any procedure yet for, kind of, giving faculty time off to do that. So, I think that may be hindering the growth of the interactive information technology -- its application to teaching* (L103).

Considering that members of the leadership were also aware of the constraining effect of lack of time, why, then, does the above-noted situation exist? Why is there no release time arrangement that would allow faculty members to learn to use the technology or to develop courses they would deliver by the technology? A typical response is:

> *Dollars. If I'm going to give someone release time, so that they can take extra time to develop courses, then I have to replace their teaching by someone else. And that costs dollars,*

and I don't have the dollars (L106).

Lack of time is, however, not the only factor which emerged as an impediment to the use of interactive information technology in teaching. Lack of professional reward also came up as an obstacle.

Lack of Professional Reward

A large majority of the 31 faculty and leadership interviewees were of the view that there is no professional reward, such as, tenure or promotion, that comes with teaching by interactive information technology. Twenty-five of the interviewees considered the lack of professional reward as a factor holding faculty members back from taking up teaching by interactive technology.

The interview data about lack of professional reward were strongly corroborated by questionnaire data. In this regard, 90% of the 150 respondents (both users and non-users) indicated that there are no "incentives/rewards" at the University for teaching by means of interactive information technology.

In the views of the interviewees, faculty members neither stand to gain nor lose anything in terms of professional rewards, whether or not they teach by interactive technology:

> *I don't see that the University is recognizing that -- whether I have my courses on Web pages, or parts of it, or whether I don't; or whether I respond to students through e-mail or whether I don't. That doesn't seem to make any difference whatever* (F376).

Elaborating on the apparent lack of professional rewards for teaching by interactive technology, the above informant (F376), who uses the technology for teaching, added:

> *At the moment, I don't see any gains. Whether he [the faculty member] does it [teaching] by lecturing with chalk in hand, or whether he does it by lecturing with overhead transparencies, or whether he does it by lecturing through and, or in collaboration with interactive technologies. At the moment, it's entirely up to him whether he feels he should do it or not. But the University, at this stage, at the departmental level head, or the Faculty level or dean, I don't see any, I don't see -- I'm not even sure whether they would be aware of it -- how the lectures are delivered. All they need to see is this lecture is being given at the right times, the students aren't complaining; they [students] get their marks at the end and that means that the person has done his duty properly. But how, it doesn't matter* (F376).

Another user on the de-motivating effect of the apparent lack of professional rewards:

> *I think ... within the University there are very few rewards for this [use of interactive technology in teaching].You know, making a transition to using this technology is something that takes quite a bit of time and effort. And I think, you know, this University, like most universities is not set up in a way that rewards that kind of effort very much. You know, you might make a small improvement in your teaching by investing a lot of time, but it won't be rewarded .... What would be rewarded is if you wrote an article instead. So, I think there are a lot of forces in this University, like any university that simply, you know, encourage conservatism in teaching by simply not creating an incentive structure to change your teaching style .... For teaching, I think the incentives in the university are largely to satisfy -- you know, I feel as if my courses are working. So they could probably be better if I invested a lot of time in this [use of interactive technology in teaching], but that would be largely at my expense* (F684).

Non-users also spoke to the absence of professional rewards accruing from investing time and effort in teaching by interactive information technology and its de-motivating influence:

> *Well, it doesn't pay me to put my time into learning it. My evaluation, as a faculty member, is more based on my research. I get reasonable teaching reviews. My classes are reasonably happy. And that's all they ask of me. And I have to produce good research if I'm ever going to be considered for merit or promotion. And so if I have to budget my time, it's not a good payoff for me to be learning a new technology and be designing a whole new course based on it. It's not an effective use of my time* (F688).

> *In looking towards what's going to get tenure for a person, your credit is from what you publish. Ok? Publishing is everything. Then teaching. And anything done beyond that in terms of interactive teaching, putting stuff on the Web, that sort of thing, it doesn't really rate. You're not going to get anything but a pat on the head for it. You're not -- it's not going to get you tenure. So, in your first five to seven years of your academic life, the time when you have the most energy, I suppose, is not the time you're going to be spending doing that sort of thing. Because, what is driving you, driving you to get tenure? What gets you tenure? Publication. There you go* (F378).

Another non-user who, probably, was not tenured, spoke in a similar vein:

> *As long as our entire, as long as we're simply evaluated based on our research, you know, as long as my evaluation is based on my research, I will take time to learn and to improve my teaching, but only because I personally think it's important. I don't feel I get the reward or recognition from the University in any meaningful professional sense for spending that time .... I'm on a tenure clock. I have to worry about getting tenure. And your tenure evaluation is based on research* (F594).

All the 11 members of university leadership who were interviewed also acknowledged the lack of professional rewards for teaching by interactive

information technology. Nine of them considered the lack of professional rewards as an actual disincentive to teaching by interactive technology:

> *There is no reward structure for that [use of interactive information technology in teaching]. In fact, there is a disincentive if it comes to that. If you spend overly much time on your teaching, your research support will decrease. Your ability to get promoted will decrease. So, I think, there is very little that really encourages people to spend their time, extra time on this [use of interactive technology in teaching]* (L103).

In the opinion of a member of the leadership from whose interview the excerpt below is taken, the lack of professional rewards for teaching by interactive information technology has the effect of a "negative reward" for teaching in that mode:

> *Well, I don't see the University reward structure as that supportive for any teaching whatsoever. It's based on research. And so if teaching through interactive technology means a huge time commitment, that's going to take your time away from research, then, people are going to see that as a problem. I mean, in a sense, it's a negative reward. Because if you're putting a lot of time into something that isn't rewarded, especially when you go up for promotion, tenure decisions, and so on, the main criteria is your research. And you could be doing the latest greatest information technology in your courses, and it won't mean a thing* (L105).

Also speaking to the issue of lack of professional rewards, another member of the leadership (L104) was of the view that since it takes faculty members longer time to develop a course based on interactive technology than is the case in normal/regular teaching, many faculty would be: *very concerned as to whether or not their promotion and tenure committees would take that into account when they come up*. In the opinion of that informant, the question of professional rewards in relation to teaching by interactive technology has

given rise to a discernible trend whereby tenured full professors tend to be "more willing" to take up teaching by interactive technology than "untenured assistant professors":

> *So, you tend to see tenured full professors being, perhaps, more willing to take on these kinds of projects than, perhaps untenured assistant professors. Because, you know, there's this worry [lack of professional rewards]* (L104).

In the absence of professional rewards, such as tenure or promotion, and given that teaching without making use of interactive information technology does not attract any professional or organizational sanctions, it is understandable that faculty members would only get into teaching by means of technology at a pace their busy schedule allows. Hence, the indication by the data that not many faculty use interactive technology in teaching.

<u>Lack of Appropriate Skills</u>

Twenty-six of the 31 faculty and members of the leadership interviewed expressed the view that the lack of technological or course material development skills by most faculty members is a drawback to the use of interactive information technology in teaching at the University: *I know the technology exists, I don't know how to use it effectively* (F594), said one faculty member. Others made similar comments:

> *I'm stuck. I don't know how to. So, I think there's a lot more that could be done in that area [use of interactive information technology in teaching] that I'm not personally aware of very much* (F688).

> *I would say, in general, what tends to hinder it [use of interactive information technology in teaching] is simply, at least, at present, the newness of the technology and people's lack of understanding*

> *of it .... I don't know it well enough .... You have to be computer literate in certain ways that I'm not computer literate* (F379).

> *I would like there to be greater training available for faculty and possibly students in the use of technology. I think we're, I feel woefully unprepared to be able to offer anything in this new mode. I pick up bits and pieces but I never get the full picture .... Until I know the stuff, I'm certainly not going to offer it to the students* (F664).

> *Well, I wish I understood it [use of interactive information technology in teaching] better. I have a feeling that it has already left me behind. I think a lot of education has to go on within the University and within the Faculty to help them [faculty members] benefit from this new tool* (L101).

> *We need training, and we need equipment, and we need support. None of which we have, or very little of which we have* (L108).

The informants mentioned places on campus, such as the Centre for Faculty Development and Instructional Services, and the Centre for Educational Technology, where faculty members, and students can get some help on the application of interactive information technology to teaching, through seminars, workshops, demonstrations or personal appointments. But the interview data indicated that not many faculty members avail themselves of such opportunities for a variety of reasons. Chief among the reasons, as we have already seen, is lack of time. Faculty members, generally, have a busy schedule that makes it hard for them to find the time for the training or demonstration opportunities:

> *I like the hype of the high tech stuff, but I don't have the skills. So, I've been to a couple of workshops on what the possibilities are, for example, using digital computer imaging, sort of, to demonstrate or illustrate things. It's wonderful. But*

I don't have several days to learn that technology (F216).

Another reason many faculty members tend not to attend the seminars or workshops, in the view of the informants, has to do with scheduling of the events. It would appear that faculty members tend to find the timing of the seminars or workshops inconvenient. There were indications in the interviews that many faculty members would avail themselves of the training opportunities if they were held in the Summer:

> *However, when you're in the situation we've been in, in this department, for the last year where we have, well, we have two vacancies and two people on sabbatical leave, and then, etc, that's really precluded more than basic outside involvement. But these things [seminars or workshops] have to be more available in Summer. And we've got to be able to get breaks to be able to go to these things and participate in them in order to make these changes [use interactive technology in teaching]* (F381).

Venue, or the location in which the workshops or seminars are held, came up in the interviews as another reason that appears to hinder many faculty members from availing themselves of the training opportunities. There were indications in the interviews that faculty members would prefer to have such training events organized by, and held in their departments or Faculties.

Another reason seems to help account for why many faculty members do not take advantage of the learning opportunities provided by the centres. This has to do with the perception that not much help could come from resource persons or facilitators who are disciplinary outsiders, lacking the content knowledge necessary for customizing presentations in ways that address problems or concerns that are unique to each discipline:

> *I have a large amount of coloured flyers from these persons offering me opportunities to improve my teaching. And I think, I, like most of us, see that as an invitation to come and waste an afternoon .... They may have great tools, but they have no idea which ones are useful for us and which ones aren't* (F577).

> *So, I see, sort of, a structure being set up and equipment being created but it all seems, sort of, very distant and not related to me* (F594).

Moreover, overcoming the distance between specialist and non-specialist is difficult:

> *But the problem is that I can't take my stuff to somebody in Computing Science. They might be the best damn programmer in the world -- but I can't just hand stuff to them and say, "go do this." There has to be a tremendous amount of interaction between myself and this person in order to implement anything, because ... you have to spell out exactly what you want to do in a tremendous amount of detail .... Well, that input, in terms of explaining in tremendous detail what needs to be done, is a tremendous amount of work and effort* (F499).

In sum, in the light of the interview data, it would seem that one of the factors hindering the use of interactive information technology at the University is that many faculty members do not have the skills needed in the application of interactive technology to teaching. Even though there are centres and units on campus where some training and help are available through seminars, workshops, demonstrations, or personal appointment, it would appear that not many faculty members avail themselves of the services offered by the centres or units. This appears to be owing to reasons of lack of time, inconvenient scheduling, 'remoteness of venue', and the perception that resource persons of the centres, or at the seminars are

disciplinary outsiders, incapable of helping faculty members to deal with discipline-specific problems in the context of using interactive information technology in teaching.

Lack of Resources and Equipment

On the basis of the interview data, it would seem that faculty members anxiously wish they could get into teaching by interactive technology. However, the interviewees indicated the kind of resource constraints that seem to hold faculty members back from doing so:

> *But I don't have the ability to experiment with it [application of interactive information technology to teaching] because I sort of feel like I'm trapped. We don't have anything we can use and we're limited, for all the reasons I said, money, size of classes, no facilities. So I'm trapped. I think it's [the use of interactive technology in teaching] a good idea, but I can't use it in a classroom setting because I'm trapped. So this is where the typical professor, I think, is frustrated. A lot of us think it's a good idea but nobody can really do anything about it* (F641).

Some members of the leadership also expressed similar anxiety tinged, perhaps, with frustration:

> *So, I mean, I think, at this point, we're still largely crippled. I mean, that's the truth of it. Crippled, in terms of implementing this stuff because we don't have the resources* (L102).

Although the informants acknowledged the effort of the University leadership in attempting to put in place information technology infrastructure they nevertheless, indicated that classrooms generally, and

some sections of the campus, are still without adequate infrastructure. This situation constitutes an impediment to the use of the technology in teaching:

> *The campus network does not reach all the corners of the campus yet, there are very few classrooms that are equipped for computer-based teaching* (F337).

> *We do not have the academic work space for the development of teaching materials .... another difficulty that I'm seeing is the nature of our teaching spaces. I work in a building that is now 15 years beyond its expected life. And the wiring is old. We're up-dating as quickly as we can afford to up-date, but frankly, the space is not flexible. It doesn't lend itself easily to the use of presentation graphics in class presentations* (L111).

> *There are several [problems]. The lack of money is one. The lack of an efficient campus network -- the fibre optic net, the backbone is very limited. It basically goes from our building to the president's office. And it doesn't have many stops in between* (L110).

Although there are computer laboratories, the informants indicated that the laboratories afford computer access to limited number of students at a time. Computers are so few, while students who need access are so many. The interviewees viewed the problem of students' access to computers as a drawback to the use of interactive technology in teaching. They made references to the small numbers of computers in the laboratories in relation to the large numbers of students who need computer access:

> *Three rooms with thirty computers .... These machines are used from 7 o' clock in the morning until 7 o'clock at night -- all of them -- everyday. There's never any vacancies. People are standing, waiting* (L102).

> *There's a tremendous shortage of computer labs on campus ... there are very few classrooms that are equipped for computer-based teaching* (F337).

Other kinds of equipment needed in teaching by interactive technology are far less accessible. Informants made a point of a general lack of equipment:

> *I have this CD-ROM ... that I would love to use .... But, I have no way to do that. Because I have a hundred students, and where am I going to have them use this CD-ROM? Am I going to ask them to buy it? Well, it's $300. I can't do that. We have a computer lab in the department, but it doesn't have, I don't believe it has CD-ROMs on every computer, and they can only get twelve to twenty people in there at a time. I've got a class of a hundred people* (F688).

> *We don't have the machines, we don't have the resources to do development* (L102).

> *The problem that I'm having in any discussion of these is classes that I've been teaching are very big .... And so, I think in terms of my own teaching ... not all of the students have convenient ready access to computers that have all of these -- that have CD-ROM drives or that would have these available ... then, I get kind of stuck* (F688).

In the excerpt that follows, an informant gave an example of a school equipped for technology-based teaching, in an attempt to highlight the general lack of equipment at the University:

> *As one example, there's a new middle school that opened up in West Vancouver that was designed with BC TEL and ... a computer company .... So, that was like a high tech middle school. But if you go into their classrooms -- and this is the kind of thing you'd like to see here [UBC] -- if you go into their classrooms, first of all, you walk in and every teacher's desk is no longer a desk any more. There's a computer module. There's a telephone. There's a thing that hooks up to TV monitors to show things. There's a dial-in for -- I mean it's just unbelievable. I mean if they [the University administration] started making that stuff available to us, we'd start using it* (F216).

However, it would appear that the interviewees attributed the general lack of equipment, and inadequacy of information technology infrastructure mainly to lack of financial resources:

> *So, if we haven't yet managed to computerize the whole University, if we haven't yet managed to build classrooms with information technology capacity in them, it's because the money isn't there. The University can only build, can only put so much into capital projects every year, and the financial support isn't coming from the government to make it possible to move quickly. So, there's no administrative objection. The administration is very much in support of the use of information technology as a teaching tool, but the funds aren't there to make it possible. At least, not to make it possible, to come about quickly* (L101).

> *The major factor that I mentioned was equipment, and we don't have a budget that would provide that equipment. So, they [University administration] are really not in a position to respond* (F563).

The foregoing drawbacks notwithstanding, there are indications that the potential exists for increased use of interactive technology for both on-campus and distance teaching at the University. As has been shown in chapter 5, the climate in the broader external context appears to be conducive to the use of interactive technology for educational delivery. In addition, the rising number of users, particularly since 1994, which was shown in chapter 4, and the positive attitude of both the university leadership and faculty shown in chapter 5 all indicate that the use of interactive information technology at the University is likely to continue to increase. Both faculty members and members of the leadership interviewed spoke to this prospect:

> *Indeed, I can see courses based entirely on Web courses ... courses which are just offered through the Web. And it may be purchased through some university somewhere*

else .... And the students will have to sit down and take it through the Web. And, since it's interactive, they may even learn a lot. In fact, I imagine they will. I shouldn't say "they may." They will (F376).

I think that the use of this type of Web-based learning or virtual learning or whatever you want to call it is absolutely inevitable (F211).

One could envisage a virtual university, under the right conditions. Or, certainly, teaching virtual programs, if one had the right access to technology (L108).

Limitations of the University's Structural Initiatives

As was noted in the preceding chapter, the University has taken a number of initiatives to encourage the use of interactive information technology in teaching. These are initiatives to develop infrastructure, to provide equipment and internet access, to arrange funding, and to support seminars, workshops, demonstrations and publications. These initiatives seem to provide an enabling environment for the use of interactive information technology in teaching. However, the approach of the University to integrate the use of the technology in teaching, which the initiatives largely represent, seems to have three key organizational weaknesses. First, the initiatives would seem to be disparate efforts, and this tends to vitiate their collective effectiveness. They are not coordinated and effectively linked in pursuit of the goal of institutionalizing the use of interactive information technology in teaching. The disparateness of the initiatives is perhaps best illustrated by the lack of coordination in the organization and functioning of most of the key offices or bodies with responsibility for technology, namely,

the Centre for Educational Technology, the Centre for Faculty Development and Instructional Services, the Distance Education and Technology Division of Continuing Studies, and the Advisory Committee on Information Technology.

The lack of coherence seems to stem from the absence of an overarching policy on the use of interactive information technology in teaching. Such a policy could provide the structural ligatures linking up the various initiatives and directing them purposefully towards technology-integration. The need for a canopy policy on the use of the technology in teaching at the University emerged in the interviews. For instance, a member of the university leadership had this to say in that regard:

> *We need a coherent set of policies from the central administration. We need that to be backed up by appropriate physical resources. We need that to be backed up by a realization that our classrooms are still nineteenth century, rather than twentieth century -- we need support there. We also need many more facilities and encouragement for faculty and student training in information technology* (L108).

In the absence of an umbrella policy that provides a coherent organizational framework linking initiatives to the goal, the various initiatives remain mostly independent of one another.

Second, the University's technology-integration approach tends to focus more on hardware or infrastructure, and far less on motivational needs. For instance, the University is vigorously pursuing the Campus Connectivity project. It is also committed to providing every faculty member access to a computer. But the professional rewards that would motivate faculty members to invest their talents and time in the use of interactive information technology in teaching appear to be virtually non-existent.

An approach to technological change that concentrates solely on infrastructure or hardware is unlikely to be successful. Speaking to the weakness inherent in such an approach, Bates (1995b) states that "There is far more to successful applications of technology than merely putting in a comprehensive technology infrastructure on campus" (p. 2). The need for organizations to provide inducements in order to ensure a concerted pursuit of organizational goals by members has been more pointedly articulated. For instance, Gross and Grambsch (1968) stressed that:

> It is necessary to offer each person an inducement to participate, so that he may attain his personal goal through the group goal of the organization. He must be motivated to the extent that he will give up any dissonant goals of his own for the organization as a whole (p. 5).

As we have seen, the lack of professional rewards that would make faculty members see some association between their professional success and the use of interactive information technology in teaching came up frequently in the interviews.

The third organizational weakness in the University's approach to integrating technology in teaching is the assigning of technology responsibilities to offices or units that do not have academic policy-making authority. The units' scope of authority appears to be limited to carrying out ancillary activities related to educational application of technology. For instance, the central concern of the Advisory Committee on Information Technology appears to be access to technology. Understandably, the issue of application of technology to teaching does not seem to engage its attention in any comprehensive or fundamental way. Teaching, and how it is, should or might be carried out is outside the ambit of the responsibilities of the Vice-

President (Student and Academic Services) whom the Committee is set up to advise.

Furthermore, the Centre for Educational Technology does not appear to have the authority to make policies for the University on the use of interactive information technology in teaching. Even though the head of the Steering Committee of the Centre is a dean of a Faculty, the Centre is not invested with policy-making responsibility. The Centre seems structurally distanced from the mainstream, in terms of the academic policy-making, in a way that is similar to the structural distancing of most continuing education and distance education units in most universities. Consequently, given their peripheral standing in relation to academic policy-making, it would appear that the key units with responsibility for educational technology are handicapped when it comes to bringing about technology-integration by means of institutional or academic policy development.

There are, however, offices and organs of the University that have authority they can invoke to address the issue of integrating interactive information technology in teaching. Such offices and organs are the Vice-President (Academic and Provost), the Committee of Deans, the Senate, and the Senate Committees on Academic Policy, and Curriculum. But so far, the issue appears not to have been tackled in any fundamental way by any of these offices or organs.

It might perhaps be argued that the foregoing weaknesses identified in the University's approach to integrating technology in teaching might not really be weaknesses. They may be structural manifestations that reveal a deliberate, slow and cautious approach to the integration of technology. The 'weaknesses' could be a 'built-in buffer' against changing too drastically too quickly. This possibility is alluded to by Bates (1997) when he notes, in the

context of a discussion on the University's approach to the integration of technology in teaching, that: "It is clearly a judgement call whether to approach the introduction of technology-based teaching on a slow, incremental, and ad hoc basis, or whether to have clear long-term objectives and goals driving the use of new technologies" (p. 12).

However, even if the apparent organizational weaknesses reflect a "slow, incremental, and ad hoc" approach, the University does not have a policy in which such an approach, with its rationale, is enunciated. Either way, the effect is the same: a somewhat fragmented and at best loosely coordinated set of initiatives to promote the use of technology in teaching tends to dissipate organizational energy rather than focussing it.

Summary and Conclusion

We have seen why the apparent inclination of faculty members to get into teaching by interactive technology which we saw in chapter 5 has not resulted in widespread use of technology in teaching. A number of factors seem to account for this anomaly, namely, the perceived or experienced limitations of technology, lack of time, lack of professional rewards, lack of appropriate skills, and lack of resources and equipment.

Widespread use of technology in teaching is, in addition, impeded by the University's approach to technology integration. The approach appears to have a number of structural weaknesses. The various technology-related initiatives are not coordinated due to the lack of a comprehensive technology-integration policy. Moreover, the approach focusses more on the provision of hardware and far less on professional rewards. As a result,

faculty members tend to see no compelling professional need to invest their time and efforts in teaching or learning to teach by interactive information technology. Finally, the assigning of technology-related responsibilities to units and offices without academic policy-making authority, not only appears to give the impression, but also seems to consign technology-integration to the margins of the University's central academic policy concerns.

Nevertheless, whether or not the weaknesses in the approach to integrate technology are really weaknesses or a design to go about technology integration cautiously and slowly, it is evident that the University has put in place a number of important initiatives. These initiatives are more than symbolic gestures intended to give government and the public the impression that the University is changing in response to the needs of society. But even if the initiatives are more symbolic than instrumental, they, nevertheless, may well be paving the way for a more fundamental and effective integration of interactive information technology in instructional delivery at the University.

CHAPTER 7

SUMMARY, DISCUSSION AND IMPLICATIONS

This chapter first presents a summary of the study. This is followed by a discussion and conclusions showing the relationship of the study's findings to contemporary trends in university development. Implications for government and university policy and for further research conclude the chapter.

Summary

This study investigated the factors influencing the use of interactive information technology in teaching at the University of British Columbia and examined the changes the use of the technology is inducing in teaching at the University.

The extent to which interactive information technology is used in on-campus and distance teaching at UBC is limited. It is neither extensive nor intensive. E-mail, World Wide Web, and to a lesser extent, CD-ROM are the technologies used. Computer conferencing, video conferencing, and audio conferencing are used to a much lesser extent. The use of interactive information technology in teaching at the university seems to be a relatively recent development. Very little was going on before 1990, and the number of users of the technology in teaching at the University has markedly increased only since 1994. It would appear that the faculty members who use interactive information technology in teaching are light users whose use of the

technology is mainly for e-mail communication with their students. Only very few faculty members would be described as intensive users of the technology in teaching.

Four factors in the broader external context are driving the use of interactive information technology in teaching at the University. These are: (1) demands on higher education for greater and flexible access, as well as for technologically literate graduates, (2) the tight fiscal context in which the University operates, (3) the culture of information technology in Canadian and British Columbian society, (4) government policies on access, funding, and the use of technology in teaching.

The various ways in which the leadership of the University is responding to the external forces pressuring the University to integrate interactive information technology into its instructional delivery process were identified and explored. The leadership has put in place enabling initiatives in the following areas: (1) infrastructure, (2) equipment, (3) internet access, (4) funding, (5) faculty development, (6) university publications. The attitude of faculty members towards the use of the technology in teaching is generally positive. This is different from what was found in earlier studies (Black, 1992) and suggests a shift in the attitude of the faculty towards the use of technology in teaching. Given strong external pressures for the adoption of interactive information technology in teaching, given the existence of enabling structures and mechanisms from the university leadership, and given, finally, a marked increase in the favourableness of faculty attitudes, the question arises: Why so little use seems to be made of the technology? A number of factors tend to be hindering the use of interactive information technology in teaching at the University: (1) perceived or experienced pedagogical limitations of technology, (2) lack of

time needed to learn or use the technology, (3) lack of professional reward for teaching by means of the technology, (4) lack of appropriate skills, and (5) lack of resources and equipment. The investigation also identified three key organizational weaknesses in the technology-integration approach of the University. These are, (a) the lack of coordination of the initiatives enabling the use of interactive information technology in teaching, (b) the neglect of the motivational needs of faculty members with regard to the pedagogical application of information technology, and (c) the assigning of technology responsibility to units that do not have academic policy-making authority.

Despite the modest use of interactive technology which, to some extent, appears to be owing to the constraints and the structural weaknesses, there are indications that the prospects for the use of interactive information technology at the University for both on-campus and distance teaching are strong.

Discussion and Conclusions

The findings of the study can usefully be discussed both for the light they shed on the usefulness of the conceptual framework, and for the way they illustrate UBC's conformity with a number of contemporary trends in university development.

Conceptual Perspectives: External and Internal Forces

The conceptual framework for the study posited the use of interactive information technology in university teaching as a consequence of the influence of factors in the external and internal contexts of the university.

The broader external factors (fiscal context, demands for higher education, and increasing technological culture) influence the use of interactive information technology in teaching in two ways. First, they drive relevant government policies on higher education which in turn encourage or pressure the University to use the technology in teaching. The second line of influence is cultural. The cultural influence takes place by direct permeation through the porous organizational boundary of the University of the societal values, beliefs, mores, and practices.

Even though factors internal to the University shape the use of interactive information technology in teaching, the phenomenon is ultimately an externally motivated innovation. It is not an innovation that issues from the imperatives of disciplinary development. In this regard, the use of interactive technology appears to be the kind of innovation Becher (1989) had in mind when he observed that in some cases in higher education "both individual and group behaviour can be seen to be affected by factors outside the field of knowledge itself and sometimes outside the academic world broadly defined" (p. 1).

That the use of interactive information technology in university teaching, as an innovation, has its roots in the external environment of the University is supported by more specific postulates on sources of organizational innovation. For instance, Kanter (1988) states that:

> The ultimate set of social structural factors supporting innovation comes from the environment in which an organization operates as well as through its connections to various key units in that environment .... So it is appropriate to look beyond the borders of one organization for the determinants of innovation that occur in that organization (p. 521).

The present study's confirmation of the influence of external and internal factors on the use of interactive information technology in university teaching, therefore, underscores the usefulness of the theoretical perspectives that informed the external-internal approach of this study, namely: open systems theory (Katz & Kahn, 1966); contingency theory (Lawrence & Lorch, 1967); ecological theory (Hannan & Freeman, 1977); and institutional theory (Meyer & Scott, 1992). The four theoretical perspectives have one key commonalty -- they emphasize the susceptibility of organizations to the shaping influence of forces in the external environment.

While the four factors in the external context all drive the use of interactive information technology in teaching, the same cannot be said for the three factors in the internal context. In this regard, the study suggests that even though the external factors drive the adoption of technology, it is the internal factors that tend to determine the extent to which it is used in teaching at the University. Each of the internal factors seems to have an ambivalent influence on the use of the technology. The factors operate both to facilitate and to constrain or hinder. While the university leadership has a positive attitude towards technology and has put in place a number of enabling initiatives, they are not considered to be doing enough to enhance the application of the technology to teaching. What easily speaks to this is the lack of professional reward for teaching by interactive information technology. This issue which emerged in the study as a major drawback to the use of technology requires leadership attention. The internal factor which has been referred to as faculty attitudes and academic culture has a similar two-directional influence. Faculty members are generally favourably disposed towards the use of interactive information technology in teaching, and, indeed, much more so than seems to have been the case six or seven years

ago. However, they nevertheless have two kinds of reservations about the technology. The first is that it is not suitable for all aspects of teaching. The second is that its resource demands (time, expertise, equipment) are inadequately addressed. The reservations tend to incline them to be cautious in applying the technology to teaching. Moreover, with regard to academic culture, while it is not antagonistic to the use of the technology in teaching, its tenets do not promote a flourishing of the use of technology in teaching. A major illustration of this is the existence of 'disciplinary tribes' (Becher, 1989), on the basis of which faculty members tend to perceive facilitators of workshops and seminars on the use of technology in teaching as disciplinary aliens. An effect of the perception may be the disinclination of most faculty to participate in the learning events as presently organized.

The UBC Case and Contemporary Trends in University Development

The study shows that the University of British Columbia generally manifests characteristics and tendencies typical of four trends in the development of contemporary universities: (1) increasing acceptance of interactive information technology in teaching; (2) increasing responsiveness to societal imperatives; (3) growing government influence; and (4) institutional restructuring. Each of the trends is discussed below.

Increasing acceptance of interactive technology in teaching. How to harness information technology available in modern society for on-campus and distance education appears to be on the development agenda of most universities (Bates, 1997; Daniel, 1997). Increasingly, universities are adopting the use of interactive information technology in educational delivery as both an "outcome" and "process" (Mink, et al., 1979) or "official" and "operative"

(Perrow, 1961) goal. Considering that goals shape the behaviour, give direction to, and channel the energies of organizations, the emergence of the use of interactive information technology in teaching as a university goal is a major contemporary development in higher education.

The growing acceptance and legitimization of this new goal is occurring in a number of ways. Baker (1994) describes the process of institutionalizing the use of interactive information technology in teaching at the California State University. At the University of British Columbia, the legitimization is evident in the initiatives that enable the use of interactive information technology in teaching, as well as in official statements of the university leadership.

As is the case at the University of British Columbia, the use of interactive information technology is a relatively recent phenomenon in most universities. Most of the factors that hinder the use of the technology at the University of British Columbia appear to be similar to the factors impeding the use of the technology in other educational institutions. For instance, the lack of appropriate technological skills by faculty members which this study found as a drawback to the use of the technology would appear to be a common experience. In this regard, Kearsley and Lynch (1994) observe that:

> Most teachers had little opportunity to use and learn about advanced technology until the early to mid-1980s when computers and video technologies became affordable and widely available. This means that the majority of teachers have less than a decade of experience using technology in the classroom (p. 6).

Increasing responsiveness to societal imperatives. The growing demand for access to higher education which is one of the societal forces to which the University of British Columbia is responding by adopting technology in educational delivery, is not a phenomenon unique to Canada or British Columbia. The phenomenon is global. The universal trend of mass demand for higher education is driven by a number of contemporary social and economic developments such as credentialism (Collins, 1979; Stodt & Thielens, 1985), diploma disease (Dore, 1976), professionalization of society (Eraut, 1994), the belief that education enhances economic productivity (Shultz, 1961; Denison, 1962), as well as the institutionalization of education as a normative or inherently valuable good (Meyer, 1992). Like the University of British Columbia other institutions are responding to the pressure for greater and flexible access by adopting technology-based delivery strategies (Fisher, Rubenson & Schuetze, 1994).

Besides responding to the demand for access, higher education institutions are also responding to the demand for technologically literate graduates. The need to respond to this demand is underscored by the fear that students who lack the skills to use modern information technologies would become a new underclass. The use of interactive information technology in teaching at the University of British Columbia seems partly to be a response to this particular societal demand. The use of technology in the teaching and learning process is seen as a way of getting students to be conversant with using these increasingly important tools of work in modern society.

The need of modern economies for workers skilled in using information technology, such as the computer, and the role of educational institutions in responding to the need, is a concern for educational policy makers, and institutional administrations world-wide. As an attempt to

respond to this need, educational institutions are increasingly adopting information technology as an instructional delivery tool. Schrag (1982, pp. 102-103), like the faculty members and members of the university leadership interviewed in this study, is of the view that this response is inevitable:

> A university that does not respond to the technological developments of the current age can be said to be both non-responsive in the behavioral sense and irresponsible in the moral sense. It might seriously be questioned whether a stance of nonresponse is indeed possible. Technology is an inescapable fact of our contemporary cultural existence.

Even though response would seem inevitable, some authors urge educational institutions to be cautious in embracing technology (Weizenbaum, 1981; Newson & Buchbinder, 1988; Postman, 1992; Newson, 1994). For instance, Newson and Buchbinder (1988, p. 72), while noting the apparently inexorable penetration of information technology in universities, observe that the contemporary university is "serving as a co-operative adjunct to high-tech development."

In spite of the alarms of critics, universities are increasingly responding to the demand for technologically literate graduates by adopting the use of interactive information technology in the teaching and learning process. The University of British Columbia, like other universities, is expected to produce technologically knowledgeable graduates. As the findings of the study show, the university leadership is responding to this demand by putting in place initiatives that facilitate and enhance the use of information technology in the teaching and learning enterprise.

Growing government influence. The increasing susceptibility of universities to the influence of government is another contemporary trend the University of British Columbia typifies. This study documents the substantial influence of the government of British Columbia on the use of interactive information technology at the University. The government intervenes, sometimes rather bluntly, through its policies on funding, access, and use of interactive information technology in teaching. Government intervention on the use of interactive technology in teaching at the University is predicated on the consideration that educational application of the technology can provide greater and flexible access, reduce cost, and enhance quality/relevance. Generally, these considerations are also the bases for the influence of most governments on the use of the technology in education (Daniel, 1997).

World-wide, the influence of governments on universities has been on the rise since World War II (Scott, 1995). Contemporary political economy considerations have markedly accentuated government steering of universities. Governments seem to be increasingly influencing the university, as well as other kinds of higher education institutions to pursue national social and economic policies. Such issues as democratization of educational access, public accountability, and international economic competitiveness are some of the key rationales for which governments influence university goals and processes (Neave & Vught, 1991, 1994; Mauch & Sabloff, 1995).

Institutional restructuring. A notable development observed in this study is some fundamental structural changes taking place quietly, as it were,

at the University of British Columbia. The changes are related to initiatives that facilitate the use of interactive information technology in teaching.

The University is carrying out a campus Connectivity Project that aims to install information technology infrastructure throughout the campus. In addition, the University is providing greater computer access on campus for faculty and students. There are a number of centres/units that provide services on educational application of information technology. Recently, the University made two key appointments, namely: Director of Distance Education and Technology; and Associate Vice-President Information Technology. Aside from the instrumental significance of the positions in enhancing the use of interactive information technology in teaching, they are also a symbolic evidence of the University's commitment to the use of technology in education.

These structural developments at the University of British Columbia are similar to the changes taking place in Canada and the United States of America (Sell, 1996). However, as is the case at the University of British Columbia, the academic reward structures in most universities have not been restructured to motivate faculty to use interactive information technology in teaching (Baker, 1994).

These developments indicate that the service university tradition (Burgess, 1982; Enros & Farley, 1986) is gaining ground at the University. The concept of the service university is described by the Science Council of Canada as follows:

> Just as the research university emerged in Canada at the start of the twentieth century, perhaps a new species, the service university, is evolving in its last decades. In such an institution teaching and research would not be displaced so much as they would be reoriented. The essence of such

> a university would be a dynamic, integral relationship with society (Enros & Farley 1986, p. 16).

Burgess (1982) characterizes the service university tradition as responsive, vocational, innovating, and open. The tradition, according to Burgess is marked by response to the needs of society. Burgess contrasts this tradition with the autonomous tradition which tends to resist the demands of society and the 'whims' of government.

The emergence of this service university tradition is a contemporary trend, and is generally regarded as a matter of institutional survival, in that universities, like other organizations, are realizing that in order to survive and be relevant in the contemporary society they have to respond to the imperatives of economic competitiveness and globalization. Information technology is considered a major symbolic and instrumental resource in both economic competitiveness and globalization. Hence, universities are increasingly identifying with it.

Implications

The study carries a number of implications for action and for research. In the following paragraphs are discussed implications for government, for the institution, and for further research.

The findings of this study indicate that government is pushing for increased use of interactive information technology for on-campus, as well as for distance or distributed learning. The findings also indicate that the university leadership, as well as faculty members are generally favourably disposed towards the use of interactive information technology in teaching.

The challenge for government is to capitalize on the positive attitude of the leadership, and faculty and work collaboratively with the University to address the factors the study identified as obstacles to the use of the technology in teaching.

It would appear that most of the drawbacks identified in the study that have implications for government boil down to inadequate funding. Lack of release time, lack of technical skill, lack of rewards or incentives, shortage of equipment -- all these can be remedied to some extent by the provision of funds. Moreover, the provision of funds is what people expect to see governments doing. The difficulty, however, is two-fold: (a) government does not have enough money to meet all demands, and (b) government must be careful in seeming to undermine university autonomy.

The success of the government's Innovation Fund in 1994/5 and 1995/6 suggests that targeted funding for particular initiatives is a useful strategy. However, in using such a strategy, government would be wise to consult with the University as a means of respecting its autonomy. The clearly positive attitude of both the leadership and the faculty should facilitate such consultations.

The findings of this study have implications for institutional policy development within the University of British Columbia. The university leadership has put in place a number of initiatives that are enabling the emergence of educational application of interactive information technology as an official and operative goal of the University. However, there are factors obstructing extensive and intensive application of the technology to teaching that the University might consider addressing. The study identified three key organizational weaknesses in the technology-integration approach of the University. The weaknesses are manifested in the lack of effective

coordination in the organization and functioning of the key units with educational technology responsibility; the neglect of the motivational needs of faculty; and the assigning of technology-integration responsibility to units without academic policy-making authority.

Given these weaknesses, the University might consider developing a comprehensive policy on technology integration that would coordinate the various efforts of the key units with educational technology responsibility. Such a policy could also usefully address the major hindrances to the use of technology in teaching, for example, lack of professional reward, and lack of time.

The issue of lack of professional reward emerged in the study as a major impediment to the use of interactive information technology in teaching. The University leadership might consider recognizing and addressing this factor as one of the key issues on the development agenda of the University on the eve of the 21st Century. Discussions around the issue would focus on establishing criteria for determining and rewarding excellence in the use of interactive information technology in teaching.

Given the tradition of peer review in the university, determination of excellence in this activity by peers may be problematic, considering the general lack of knowledge and skills in technology-based teaching among faculty. In the circumstances, the University might consider pursuing a more vigorous and systematic faculty development program on the use of interactive information technology in teaching. An effective policy of faculty development would pursue a decentralization of training programs whereby Faculties or departments would be supported to institute and organize training designed to respond to their particular needs. This suggestion is made in the light of the indication in this study that one of the factors

constraining faculty members from participating in seminars is the 'remoteness' of the events from their disciplines or departments. Faculty members tend to perceive the organizers and facilitators of the seminars and workshops as disciplinary outsiders.

The issue of lack of time would equally appear to deserve policy attention. However, it does not appear that the University can effectively address the issue because of the budgetary implication. The provision of release time would entail hiring substitute faculty. The University might consider capitalizing on the express interest government has shown in the use of technology in teaching and ask for targeted funding as a way of addressing the issue.

Another key issue that emerged from the study as a candidate for policy attention is the question of access to technology, especially students' access. It would appear that virtually every faculty member has a computer. However, other kinds of technology such as video conferencing equipment, and CD-ROMs appear to be in short supply. There are computer laboratories where students can access computers. However, the number of students who use the laboratories far out-number the computers in the laboratories. In the circumstance, the University might consider developing a policy on student access to technology. It might consider instituting, with government assistance, a loan scheme through which students can purchase computers. It is unlikely that the goal of using interactive information technology in teaching can be effectively pursued if many students cannot access technology when they need it.

A number of suggestions for further research emerge from this study. This study investigated a single case. The usefulness of the conceptual framework in the present study suggests that it is probably a useful tool for

comparative analysis. The present case study has a number of features which would make comparative studies interesting. For example, do other provincial governments in Canada exert comparable influence to that exerted in British Columbia? If so, by means of what policies? Similarly, the present study noted the general positive attitude of faculty to information technology. This is different from the findings of several studies ten years ago. It would be interesting to know whether faculty elsewhere have undergone a similar attitudinal change.

The present study did not tap the views of students. Future studies might consider obtaining the perspectives of students on the use of interactive information technology in teaching in order to see if the inclusion of students' views would yield new issues or result in the modification of the framework.

Third, the study did not observe any patterns along disciplinary, rank, gender or other lines with regard to the use of interactive information technology in teaching. Perhaps, this was owing to the purposive procedures used in selecting faculty members who participated in the study. Future studies might consider using stratified sampling procedures to see if there are differences among the various subgroups of faculty members regarding the extent to which the technology is used. If such are found, there may well be implications for a differential approach to the encouragement of technology use.

Finally, the findings of this study, as well as contemporary trends in university development indicate that the use of interactive information technology in teaching is not a fad. It is likely to become more entrenched as a university activity. In this circumstance, there is a need to direct research attention to technology leadership in the university. Studies that address this

emerging area of responsibility in university leadership would seek to provide understanding about strategies institutional leaders are employing to integrate interactive information technology in the teaching and learning process.

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APPENDIX A

THE UNIVERSITY OF BRITISH COLUMBIA

Department of Educational Studies
Mailing address:
2125 Main Mall
Vancouver, B.C. Canada V6T 1Z4
Tel: (604) 822-5374
Fax:(604) 822 4244

September 20, 1996

Mr. Shell Harvey,
Assistant Deputy Minister,
Ministry of Education, Skills and Training,
Victoria, B.C.

Dear Mr. Harvey,

Research Project entitled: Understanding the Changing Mode of Educational Delivery in the University: Its Implication for Education and Learning at a Distance

I am a Ph.D Candidate in the Higher Education Programme of the Department of Educational Studies at the University of British Columbia (UBC). I have received approval to conduct a study on the changing mode of instructional delivery in the university. The project is for my Ph.D dissertation. Professors Hans Schuetze and Kjell Rubenson of the Department of Educational Studies at UBC are supervising the project. The other members of the project supervisory committee are Dr. Tony Bates and Professor Graham Kelsey.

The study seeks to generate understanding about the factors influencing the use of interactive information technology in university teaching as well as about the organizational and cultural changes the use of technology in instructional delivery is inducing in the university. It is expected that the findings of the study will be useful for higher education and institutional policy development.

Theoretical exploration of the factors influencing the use of interactive information technology in education identifies government interventions in higher education as some of the key influences on the phenomenon. Consequently, data on government policies on higher education will be

critical to this study. For this reason, I request you to allow me access to your Division (Higher Education Division of the Ministry) to enable me to collect data on policies relevant to the phenomenon by consulting your documents, and by interviewing two or three members of your staff. UBC Ethical Review Committee policy requires that I obtain your written consent to access your Division. I should, however, point out that it is my responsibility to contact members of your staff for the purpose of obtaining their personal consent to participate in interviews.

If you have any questions, or require further clarification about the project, please contact me at (604) 228-0772 or Dr. Hans Schuetze at (604) 822-4860.

Thank you for your cooperation.

Sincerely yours,

Reginald Nnazor,
Ph.D Candidate.

APPENDIX B

September 26, 1996

Reginald Nnazor
PhD Candidate
University of British Columbia
Departinent of Educational Studies
2125 Main Mall
Vancouver BC V6T IZ4

Dear Reginald Nnazor:

Thank you for your letter of September 20, 1996, in which you informed me of your research project entitled "Understanding the Changing Mode of Educational Delivery in the University: Its Implications for Education and Learning at a Distance".

This letter confirms that I give my consent for you to contact senior staff members in my Division so that you may gather relevant, non-confidential information for your project.

I wish you good luck with your research.

Yours truly,

Shell Harvey
Assistant Deputy Minister

Ministry of Education, Skills and Training

Post Secondary Education Division
3-818 Broughton Street
P O Box 9179 Stn Prov Govt
Victoria BC V8W 9H8

Telephone: (604) 387-0893
Facsimile: (604) 356-8322

APPENDIX C

THE UNIVERSITY OF BRITISH COLUMBIA

Dr. Tony Bates
Distance Education & Technology
Continuing Studies
2329 West Mall, Room 1170
Vancouver, B.C. Canada V6T 1Z4

Tel: (604) 822-1646
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e-mail: tony.bates@ubc.ca

17 February, 1997

Dear Colleague,

Research into faculty use of technology

We very much hope that you can find the time to fill in the attached questionnaire. While a great deal is known about a number of high profile uses of technology for teaching at UBC, there has been no systematic research into the actual extent of use, or the views of a wide range of faculty on this topic.

Thus while this is a study being conducted by a research student, Reginald Nnazor, it will provide important basic information about the extent of use of technology for teaching at UBC, and the view of a wide range of individual faculty members about this topic.

If you have any concerns about this study, please do not hesitate to contact either one of us,

Yours sincerely,

Tony Bates

Hans Schuetze

Dr. Tony Bates,
Director,
Distance Education and
Technology,
Division of Continuing Studies

Dr. Hans Schuetze,
Acting Director,
Centre for Policy Studies in
Education
Faculty of Education

APPENDIX D

THE UNIVERSITY OF BRITISH COLUMBIA

Department of Educational Studies
Mailing address:
2125 Main Mall
Vancouver, B.C. Canada V6T 1Z4
Tel: (604) 822-5374
Fax:(604) 822 4244

February 17, 1997

Dear Professor:

I am writing to request your help in my study of the use of interactive information technology in teaching at the University of British Columbia (UBC). Specifically, I would like to ask you to complete the enclosed questionnaire dealing with your own experience of, or views about such technologies.

The study, which I am undertaking as part of my Ph.D program in Educational Studies, is titled: **Understanding the Changing Mode of Educational Delivery in the University: Its Implications for Education and Learning at a Distance.** The project is designed to shed light on the use and non-use of interactive information technology in teaching. It is being supervised by Doctors Hans Schuetze, Kjell Rubenson, Tony Bates, and Graham Kelsey.

Should you decide to participate in this study, I estimate that it would take you 20 to 30 minutes to complete the questionnaire. Please do not put your name on the questionnaire. Your identity will be kept strictly confidential. References to you and to your responses in any reports of this study will be by a code.

If you have any questions about the study, please contact me at 228-0772, or Dr. Hans Schuetze at 822-4860. I enclose a self-addressed envelope for your return of the questionnaire. If you complete the questionnaire, I will assume that you have consented to my request for your participation. I will highly appreciate it if you return the completed questionnaire **before or by March 7.**

I thank you very much for your help.

Yours sincerely

Reginald Nnazor
(Ph.D Candidate)

APPENDIX E

Questionnaire on the Use of Interactive Information Technology in University Teaching

This questionnaire is part of a study that seeks to generate understanding about the factors influencing the use of interactive information technology in university teaching as well as about the institutional changes the use of technology in teaching is inducing in the university. It is expected that the findings of the study will be useful for higher education and institutional policy development.

For the purposes of this project, **interactive information technology** means computer and telecommunication based systems with the capability to mediate one-to-one, one-to-many, or many-to-many communication by sound, visual or print modes. Examples of such technologies are: Electronic Mail (E-Mail); World Wide Web; CD-ROM; Computer Conferencing; Video Conferencing; Audio Conferencing; Audiographic Conferencing.

Please respond to the following questions.

PART A

1. Do you use interactive information technology in **research**? (Circle the one that applies)

   1. Yes
   2. No

2. If your answer is yes, which interactive information technology(ies) do you use in research? (please list below)

   1.----------
   2.----------
   3.----------
   4.----------

3. Do you **teach** by means of interactive information technology? (Circle the one that applies)

   1. Yes Go to question 5
   2. No Go to question 4, and then move on to **PART B**

4. Which of the following describes your reasons for not using interactive information technology in teaching? (Circle as many as apply)

1. Your lack of appropriate technology skills
2. Your personal disapproval of the use of interactive information technology in teaching
3. The culture of teaching in your discipline/department is unaccepting of the use of interactive information technology in teaching
4. The course(s) you teach cannot be well-taught by means of interactive information technology
5. Lack of demand from students for this mode of delivery
6. The technology is not available to you
7. Lack of support of the leadership of your department for the use of interactive technology in teaching
8. Other (Please indicate) _____

_____

5. If your answer to No.3 is yes, which interactive technology(ies) do you use in your teaching? (Circle as many as apply)

1. E-mail
2. World Wide Web
3. CD-ROM
4. Computer conferencing
5. Video conferencing
6. Audio conferencing
7. Audiographic conferencing
8. Other (Please indicate)_____

6. For each of the technologies asked in question 5, please indicate how long you have been using it in your teaching

1. E-Mail _____ Years
2. World Wide Web _____ Years
3. CD-ROM _____ Years
4. Computer Conferencing _____ Years
5. Video Conferencing _____ Years
6. Audio Conferencing _____ Years
7. Audiographic Conferencing _____Years
8. Other _____Years

7. Which of the following describe your reasons for using interactive information technology in teaching? (Circle as many as apply)

1. Your possession of appropriate technology skills
2. Your personal approval of the use of interactive information technology in teaching
3. The culture of teaching in your discipline/department is accepting of the use of interactive information technology in teaching
4. The course(s) you teach can be well-taught by means of interactive information technology
5. Demand from students for this mode of delivery
6. The technology is available to you
7 The leadership of your department supports the use of interactive information technology in teaching
8. Other (please indicate) _____

_____

8. In how many courses do you use interactive information technology **with** face-to-face classroom teaching? (Circle the one that applies)

1. One course
2. Two courses
3. More than two courses
4. None

9. How many courses do you teach using interactive information technology as the **only** mode of instructional communication with students? (Circle the one that applies)

1. One course
2. Two courses
3. More than two courses
4. None

10. At what level(s) do you teach by means of interactive information technology (Circle the one that applies)

    1. Undergraduate level only
    2. Graduate level only
    3. Both undergraduate and graduate levels

11. What category(ies) of students do you teach using interactive information technology? (Circle as many as apply)

    1. On-campus students of UBC
    2. Off-campus students of UBC
    3. Students of other university(ies)
    4. Other (Please indicate) _____

    _____

12. Is the participation of any students in the course inhibited by their lack of access to the technology used in instructional interaction? (Circle the one that applies)

    1. Yes
    2. To some extent
    3. No

13. If your answer is yes, or to some extent, please describe how you deal with the problem

_____
_____
_____
_____
_____

14 What percentage of your course materials do you transmit to your students by means of interactive information technology? (Circle the one that applies)

    1. 100%
    2. Between 80-99%
    3. Between 60-79%
    4. Between 40-59%
    5. Between 20-39%
    6. Between 1-19%
    7. None

15. By means of which interactive information technology (ies) do you transmit the course materials to your students? (Please, list)

1._____

2._____

3._____

4._____

16. What percentage of course assignments do you make available to your students by means of interactive information technology? (Circle the one that applies)

1. 100%
2. Between 80-99%
3. Between 60-79%
4. Between 40-59%
5. Between 20-39%
6. Between 1-19%
7. None

17. By means of which interactive information technology(ies) do you make the assignments available to them? (Please, list)

1_____

2._____

3._____

4._____

18. What percentage of completed course assignments do your students turn in by means of interactive information technology? (Circle the one that applies)

1. 100%
2. Between 80-99%
3. Between 60-79%
4. Between 40-59%
5. Between 20-39%
6. Between 1-19%
7. None

19. By means of which interactive information technology(ies) do your students turn in the assignments? (Please, list)

1.----------

2.----------

3.----------

20. What percentage of feedback on assignments do you give to your students by means of interactive information technology? (Circle the one that applies)

1. 100%
2. Between 80-99%
3. Between 60-79%
4. Between 40-59%
5. Between 20-39%
6. Between 1-19%
7. None

21. By means of which interactive information technology(ies) do you transmit feedback on assignments to your students? (Please, list)

1----------

2.----------

3. ----------

22. Does any of your classes have an electronic bulletin board? (Circle the one that applies)

1. Yes
2. No

23. If your answer is yes, please briefly outline the uses of the board

---

---

24. How often does electronic conferencing on course topics/themes take place in the course/any of the courses? (Circle the one that applies)

1. More than 10 times
2. Between 7 to10 times
3. Between 3 to 6 times
4. Once or twice
5. No conferences

25. What percentage of course time do you allot to electronic conferencing? (Circle the one that applies)

1. 100%
2. Between 80-90%
3. Between 60-79%
4. Between 40-59%
5. Between 20-39%
6. Between 1-19%

26 If there are conferences, what form do they take? (Circle as many as apply)

1. Discussion
2. Presentation
3. Other (Please indicate) _____

_____

27. Is group work by students part of the instructional activity in any of the courses in which you use interactive information technology? (Circle the the one that applies)

1. Yes
2. No

28. If your answer is yes, how stable are groups? (Circle the one that applies)

1. They are reconstituted after each project
2. They are reconstituted after some projects
3. They are generally intact throughout the course

29. Do any of the courses in which you use interactive technology involve laboratory work? (Circle the one that applies)

    1. Yes
    2. No

30. If your answer is yes, how do you address the requirement of laboratory work? (Circle as many as apply)

    1. By using multimedia simulation
    2. By student participation in laboratory work in video conferencing
    3. By bringing students face-to-face in real life laboratory situations
    4. Other (Please indicate) _____

    _____

    _____

31. Do any of the courses in which you use interactive technology involve practical field work? (Circle the one that applies)

    1. Yes
    2. No

32. If your answer is yes, how do you address the requirement of practical field work? (Circle as many as apply)

    1. By using multimedia simulation
    2. By student participation in practical field work in video conferencing
    3. By bringing students face-to-face in real life practical field work situations
    4. Other (Please indicate) _____

    _____

    _____

33. Is your teaching by interactive information technology carried out with the cooperation of other 'experts'? (Circle the one that applies)

1. Yes
2. No

34. If your answer is yes, who are the experts? (Circle as many as apply)

1. Faculty members
2. Computer technologists
3. Course designers
4. Sessional lecturers
5. Graduate students
6. Other (Please indicate) _____

_____

_____

35. Do the contributions of the experts to your teaching affect your control of the teaching process in any way? (Circle the one that applies)

1. Yes
2. To some extent
3. No

36 If your answer is yes or to some extent, in what specific ways is your control of the teaching process affected? (Describe briefly) _____

_____

_____

_____

_____

_____

_____

37. How satisfied are you with the way the following instructional activities take place in the course(s) in which you use interactive information technology? (Check as appropriate, and answer in a separate table for each course. Three tables are provided)

Course # 1

Instructional activities	Highly satisfied	Moderately satisfied	Not satisfied
Student-faculty interaction			
Student-student interaction			
Active participation of individual students			
Cooperative learning among students			

- Please briefly comment on your response about course #1 above _____
_____
_____
_____
_____

Course #2

Instructional activities	Highly satisfied	Moderately satisfied	Not satisfied
Student-faculty interaction			
Student-student interaction			
Active participation of individual students			
Cooperative learning among students			

- Please briefly comment on your response about course #2 above _____
_____
_____
_____
_____

Course #3

Instructional activities	Highly satisfied	Moderately satisfied	Not satisfied
Student-faculty interaction			
Student-student interaction			
Active participation of individual students			
Cooperative learning among students			

- Please briefly comment on your response about course #3 above _____

_____
_____
_____
_____

38. Who provided the interactive technology (hardware) you use in teaching? (Please, list)

    1. _____
    2. _____
    3. _____
    4. _____

39. Is your teaching by interactive information technology funded through one or more grants? (Circle the one that applies)

    1. Yes
    2. In part
    3. No

40. If your answer is yes or in part, which granting agencies fund your teaching by interactive technology? (Please, list)

    1. _____
    2. _____
    3. _____
    4. _____

41. Please list the items covered by the funding

_____

_____

_____

_____

_____

42. Are there costs not covered by the funding? (Circle the one that applies)

1. Yes
2. No

43. If your answer is yes, please list the costs not covered by the funding

_____

_____

_____

_____

_____

_____

44 Are there Units/Centres/Departments in the University that support your teaching with services (for example, course design, course development, instructional and technological services)? (Circle the one that applies)

1. Yes
2. No

45. If your answer is yes, list the Units/Centres/Departments and the type of services they provide you

Unit/Centre/Department	Services

PART B

46. Are there any **incentives/rewards** for faculty members in your Department or Faculty who teach by means of interactive information technology? (Circle the one that applies)

    1. Yes
    2. No

47. If your answer is yes, list the incentives/rewards and the provider

Incentives/Rewards	Provided by

48. Do you see any **disincentives** that tend to hinder faculty from using interactive information technology in teaching? (Circle the one that applies)

    1. Yes
    2. No

49. If your answer is yes, please list what you see as the disincentives

    1. _____
    2. _____
    3. _____
    4. _____
    5. _____
    6. _____

50. How would you describe the attitude of the leadership of your department towards the use of interactive information technology in teaching? (Circle the one that applies)

    1. Very positive
    2. Positive
    3. Neutral
    4. Unenthusiastic
    5. Negative

51. How would you describe the attitude of faculty members in your department towards the use of interactive information technology in teaching? (Circle the one that applies)

    1. Very positive
    2. Positive
    3. Neutral
    4. Unenthusiastic
    5. Negative

52. What is your gender? (Circle the one that applies)

    1. Female
    2. Male

53. What was your age on your last birthday? _____ Years

54. How long have you been a university teacher? _____ Years

55. What is your rank? (Circle the one that applies)

    1. Assistant Professor
    2. Associate Professor
    3. Full Professor
    4. Other (Please indicate) ----------

56. In which Department do you teach? ----------

Thank you very much for your time and responses.

APPENDIX F

THE UNIVERSITY OF BRITISH COLUMBIA

Department of Educational Studies
Mailing address:
2125 Main Mall
Vancouver. B.C. Canada V6T 1Z4
Tel: (604) 822-5374
Fax:(604) 822 4244

Date:

Dear Sir/Madam:

I write to request you to participate in a research project entitled: Understanding the Changing Mode of Educational Delivery in the University: Its Implication for Education and Learning at a Distance. The project is for my Ph.D dissertation. Professors Hans Schuetze and Kjell Rubenson of the Department of Educational Studies are supervising it. The other members of the project supervisory committee are Dr. Tony Bates, and Dr. Graham Kelsey.

The study seeks to generate understanding about the factors influencing the use of interactive information technology in university teaching as well as the organizational and cultural changes the use of technology in instructional delivery is inducing in the university. It is expected that the findings of the study will be useful for higher education and institutional policy development.

Should you agree to participate in the project, your participation will involve about 30 to 40 minutes interview that will be arranged to take place at your convenience. You have the right to withdraw your participation at any time.

Your responses to the interview questions will be audio-taped but will be handled strictly anonymously. Tapes will be destroyed once data collection and analysis are completed. Any references to you and to your responses in the project report will be by means of a code to be assigned by me.

If you agree to participate in this project, please sign and return the attached consent form to me in the enclosed self-addressed envelope. If you have any questions, or require further clarification about participation in the study, please contact me at 228-0772 or Dr. Hans Schuetze at 822-4860.

Sincerely yours,

Reginald Nnazor,
Ph.D Candidate.

APPENDIX G

THE UNIVERSITY OF BRITISH COLUMBIA

Department of Educational Studies
Mailing address:
2125 Main Mall
Vancouver. B.C. Canada V6T 1Z4
Tel: (604) 822-5374
Fax:(604) 822 4244

INFORMED CONSENT FORM

Project Title: Understanding the Changing Mode of Educational Delivery in the University: Its Implication for Education and Learning at a Distance

Principal Investigator: Dr. Hans Schuetze, Department of Educational Studies, University of British Columbia, 822-4860

Student Investigator: Reginald Nnazor, Ph.D Candidate, Department of Educational Studies, University of British Columbia, 228-0772

Purpose:
The purpose of the study is to identify and analyze the factors influencing the use of interactive information technology in university teaching. The various key ways in which the university is changing as a result of the use of technology in teaching will be described and analyzed

It is expected that the findings of this study will be useful for higher education and institutional policy development.

Study Procedure:
Your participation in this study will be in an interview that will be arranged to take place at your convenience. The interview will be audio-taped.

Time Required:
The interview will take about 30 to 40 minutes.

Confidentiality:
Your identity will be kept strictly confidential. Confidentiality will be ensured by using a code in place of your name. Any references to you and to your interview responses will be by a code. The code and your interview responses will be kept in a locked filing cabinet. Audio-tapes of the interview will be destroyed once data collection and analysis are completed.

Your Rights:
Your participation in this study is entirely voluntary. You have the right to refuse your permission or to withdraw it at any time.

Contact:
If you have any questions, or require further clarification about participation in the study, please telephone Reginald Nnazor at 228-0772 or Dr. Hans Schuetze at 822-4860.

If you have any concerns about your treatment or rights as a participant in this study you may contact the Director of Research Services at the University of British Columbia, Dr. Richard Spratley at 822-8595.

Consent:
Your signature on this form indicates:

- you agree to participate in this study;
- you are keeping a copy of the consent form for your own records.

If you agree to the above conditions, please indicate this by signing in the space below and return this form in the self-addressed envelope.

_____ _____

Please print your name Please sign your name

Date:

APPENDIX H

Interview Schedule: Faculty Members

The following is a list of **broad** questions posed to UBC professors during the semi-structured interviews.

1 (a) What in your experience and or perception do you consider to be the strengths (if any) of the use of interactive information technology in university teaching?

(b) What in your experience and or perception do you consider to be the limitations (if any) of the use of interactive information technology in university teaching?

2 In your view, what changes (in organization, curricular, culture, etc) have you observed to be taking place in the University as a result of the use of interactive information technology in teaching?

3 (a) What specific conditions (or pressures) **outside** UBC do you see to be driving the use of interactive information technology in university teaching?

(b) What conditions **within** the University do you see to be helping to enhance the use of interactive information technology in instructional delivery?

(c) What conditions within the University do you see to be hindering the use of interactive information technology in teaching?

4 (a) In what **specific** ways do you see the University leadership (office of the president, senate) responding to **each** of the external conditions or pressures driving the use of interactive technology in teaching?

(b) In what **specific** ways is the leadership of your Department/Faculty responding to **each** of the external forces?

(c) In what **specific** ways is University leadership (office of the president, senate) responding to **each** of the internal conditions hindering the use of interactive information technology in teaching?

(d) In what **specific** ways is the leadership of your Department/Faculty responding to **each** of the internal factors hindering the use of interactive information technology in teaching?

5 What in your view are the prospects (if any) for the use of interactive information technology in university teaching?

6 Would you like to offer any other insights or opinions regarding the use of interactive information technology in university teaching?

Thank you very much for participating in the interview

APPENDIX I

Interview Schedule: University Leadership

The following is a list of **broad** questions posed to UBC leadership (selected from the following leadership levels: office of the president; Dean/Faculty; Department Head).

1 (a) What in your experience and or perception do you consider to be the strenghts (if any) of the use of interactive information technology in university teaching?

(b) What in your experience and or perception do you consider to be the limitations (if any) of the use of interactive information technology in university teaching?

2 In your view, what changes (in organization, curricular, culture etc) do you see to be taking place in the university as a result of the use of interactive information technology in university teaching?

3 (a) What specific conditions (or pressures) outside UBC do you see to be driving the use of interactive information technology in university teaching?

(b) What conditions within the university do you see to be helping to enhance the use of interactive information technology in instructional delivery?

(c) What conditions within the university do you see to be hindering the use of interactive information technology in teaching?

4 (a) In what specific ways are you (or is your office) responding to each of the external conditions or pressures driving the use of interactive information technology in teaching?

(b) In what specific ways are you (or is your office) addressing each of the internal conditions hindering the use of interactive information technology in teaching?

5 What in your view are the prospects (if any) for the use of interactive information technology in university teaching?

6. Would you like to offer any other insights or opinions regarding the use of interactive information technology in university teaching?

Thank you very much for participating in the interview

APPENDIX J

Interview Schedule: Government Officials

The following is a list of **broad** questions posed to officials of B.C. Ministry of Education, Skills and Training with responsibility for post-secondary education policy development.

1 (a) What is government's policy on funding for post-secondary education since 1990?
(b) In what **specific** ways has government been ensuring the implementation of the policy in universities in the Province (and at UBC in particular)?
(c) What is your assessment of the implementation of the funding policy in the universities generally (and at UBC in particular)?

2 (a) What is government's policy on access to post-secondary education since 1990?
(b) In what **specific** ways has government been ensuring the implementation of the policy in universities in the Province (and at UBC in particular)?
(c) What is your assessment of the implementation of the access policy in universities in the Province (and at UBC in particular)?

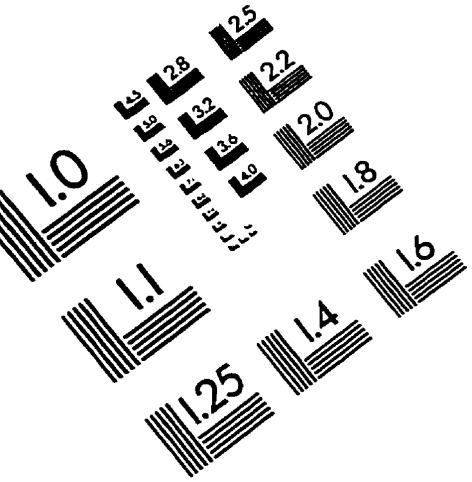
3 (a) What is government's policy on the use of information technology in teaching in post-secondary education since 1990?
(b) In what **specific** ways has government been ensuring the implementation of the policy in universities in the Province (and at UBC in particular)?
(c) What is your assessment of the implementation of the policy in universities in the Province (and at UBC in particular)?

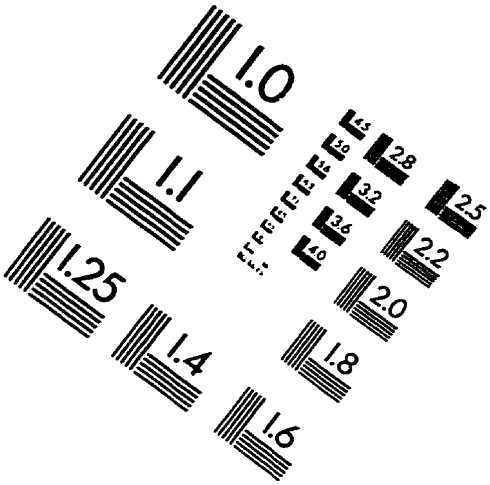
4 What in your view are the prospects (if any) for the use of interactive information technology in university teaching?

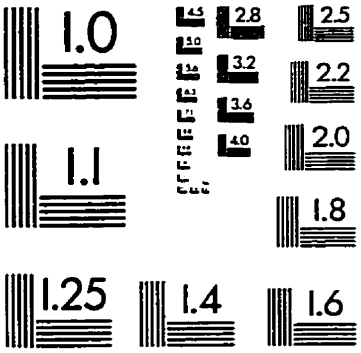
5 Would you like to offer any other insights or opinions regarding government influence on the use of interactive information technology in university teaching?

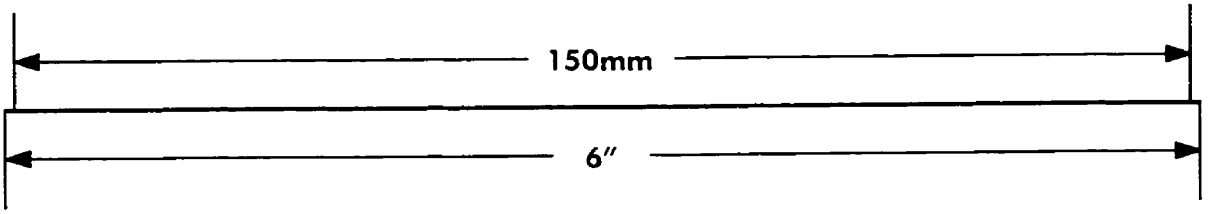
Thank you very much for participating in the interview

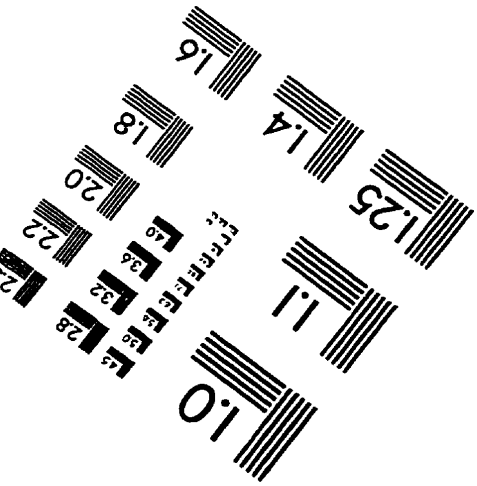
IMAGE EVALUATION TEST TARGET (QA-3)

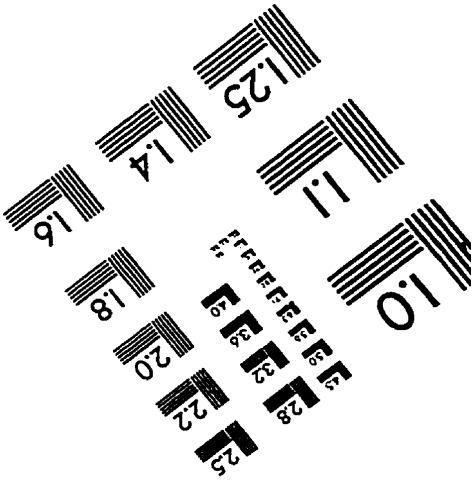












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