1-1-1993

Academic computing from a technological innovation perspective : faculty concerns.

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ACADEMIC COMPUTING FROM A TECHNOLOGICAL INNOVATION PERSPECTIVE - FACULTY CONCERNS

A Dissertation Presented

by

F. ELIZABETH HAWES

Submitted to the Graduate School of the
University of Massachusetts in partial fulfillment
of the requirements for the degree of

DOCTOR OF EDUCATION

May 1993

School of Education

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DEDICATION

This dissertation is lovingly and respectfully dedicated to Charles E. Bellinger who stood by me without question through the many years of my graduate education.

ACKNOWLEDGEMENT

This project could never have been completed without the support of many wonderful and helpful people. G. Ernest Anderson, my chair, spent many hours with me offering guidance, inspiration and many laughs along the way, for which I am most grateful. I am also very appreciative of the support my committee member, Gretchen B. Rossman has offered. Her expertise, as well as her taking time to listen, helped me at several key points along the way. Graham Gal, my outside committee member, I thank for his guidance and valuable suggestions throughout the study.

I would also like to thank Abhijit Sanyal and Trina Hosmer for their assistance with the statistical analysis. I give special thanks to my colleagues in the Management Department, without their help and understanding this project would not have been possible. I am especially grateful to Jay Kahn who granted me the authority to conduct this study at Keene State College and to Chuck Thompson, Director of Computing Services, for his guidance during the initial stages of this project. I would like to acknowledge the faculty of Keene State College for their participation and cooperation.

University of Massachusetts professors Linda Shay, Bill Wooldridge, and Tom Kida gave me guidance based on their research experience. Charles Larracey from the Center for Instructional Resources, Technology and Training, and Donald

Horsley of The Network-Regional Laboratory for Educational Improvement provided me with materials and advice about the Concerns Based Adoption Model.

In addition, I would like to extend my appreciation to Barbara Desmaris and Nancy Tamms for their word processing assistance. Finally, I am deeply grateful to my children Nathan, Teddy, and Elizabeth for their patience, understanding and cheerfulness throughout this process. My parents deserve a special acknowledgement for their unshakeable confidence in me, for being my most valued source of inspiration, and for instilling in me an appreciation for the pursuit of knowledge.

ABSTRACT

ACADEMIC COMPUTING FROM A

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FACULTY CONCERNS

May 1993

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The objective of computer acquisitions is generally to have the computers used in ways that assist faculty in their teaching, research, and other work-related activities. the conceptual model and the research design of this study were based on the premise that the needs and concerns of users must be understood and addressed in order to achieve a desired level of utilization of computer resources.

This study examined the perceptions of faculty members about a new networked system of microcomputers. An administrative decision had been made to provide all full-time faculty members with a microcomputer networked to shared laser printers with communications capabilities.

The concerns most frequently expressed by faculty were indicative of the early stages of using an innovation. This can be explained in part by the fact that the self-reported ratings for computer software experience indicated that as a group this faculty was at a beginner level. The faculty

expressed concerns about learning how to use the networked computers as well as concerns how the college would manage the system so that it would be a cost effective acquisition.

Statistical analysis indicated that faculty members' characteristics like age and gender were not indicators of the concerns reported. However, a statistically significant relationship was found between computer software experience and reported stages of concern. These results showed that the more self-reported computer software experience, the higher the scores on the later stages of concern: Consequence, Collaboration, and Refocusing. There was also a statistically significant relationship found between computer experience and discipline and interest in learning new software and discipline. The disciplines where it would be expected that faculty might make greater use of computer resources (i.e. Sciences) did show greater self-reported experience amongst the faculty. Also, those in disciplines with the least self-reported experience indicated interest in learning new software sooner than those in disciplines with more experienced faculty.

The responses to the open-ended question and the interview data confirmed and added to the information gathered from the quantitative analysis. The study concludes with recommendations that may be useful to others managing technological innovations of this nature.

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CHAPTER I

INTRODUCTION

Colleges and universities are experiencing the effects of increasing dependence on information technology (Hawkins, 1989). The Carnegie Foundation for the Advancement of Teaching reports: "Higher education no longer merely anticipates a revolution in computer use; the revolution is under way" (Boyer, 1987, p.3). The impact of technology poses a set of major challenges for many institutions. These challenges include: (1) finding the financial resources to provide computing resources comparable with other similar institutions in order to attract students, (2) protecting computing resources from theft, (3) preventing improper use of system resources, (4) ensuring the privacy of documents developed using computing technologies, and (5) making available appropriate support services. Managing technological change has become of critical importance and the technical issues are only one facet of the multi-faceted change process involved. According to Rogers and Marcus (1989), in order to effectively manage change, the human component must be understood and given top priority.

This study investigated the concerns of individuals considering adopting a technological innovation. A unique opportunity presented itself because Keene State College (KSC) was involved in a program to equip the entire full-time faculty with microcomputers that would be connected to

a communications network. This academic computing project was viewed as a technological innovation. Study of this innovation was undertaken in an effort to gain insight about the change process that involves technological innovations in higher education.

Background

Academic computing and the introduction of information technologies on campus began in the 1950s and 1960s. However, the technology did not have a major effect on the scholarly work of large numbers of faculty and students until the 1980s (Weissman and Hawkins, 1989). Weissman and Hawkins (1989, p. 165) believe that the 1980s signaled the beginning of "massive implementation of distributed computing technology throughout higher education". They identified ten issues they considered the most difficult for computing in the 1990s. According to them, these issues must be given careful attention for academic computing to be well-integrated into the university life of the 1990s. The ten issues are: (1) how to use technology to provide an information-rich environment; (2) how to define an appropriate role for faculty; (3) how to develop support structures for scholars; (4) how to manage the next wave of academic computing; (5) how to balance innovation and reliability; (6) how to make networks functional and useful to all; (7) how to equip instructional and research environments; (8) how to coordinate information services

across campus; (9) how to collaborate with new partners; and (10) how to cope with the harsh realities of higher education in the 1990s, characterized in part by shrinking budgets. This study will focus on challenges related to balancing innovation (#2), reliability of the system (#5), and issues related to the harsh budgetary climate of the 1990s (#10).

The research done in this study is based upon the premise that faculty are the key to successful integration of technology into the academic world. According to Weissman and Hawkins (1989, p. 170) faculty will be, "expected to provide the vision and identify needs for instructional and research computing tools and data during the next decade. Using traditional committee structures, faculty will be essential to the process of identification and legitimation of directions for academic computing". Academic computing is vital if students are going to leave college prepared for gainful employment. One of the major challenges that faculty must contend with is the fact that technology is continually changing because this implies that faculty will continue to be regularly confronted with what Robertson (1967) calls technology-based innovations.

The abundance of literature on innovation and change suggests that innovations are frequently difficult to accept and to adopt, at both individual and institutional levels. People often resist change because it upsets their established patterns of behavior. Williams (1969) noted that

change is sometimes perceived as a threat to an individual's security. In particular, technological innovations are often viewed as undesirable because of the perception they are very difficult to use. In studying innovation Williams (1969) found that another perceptual barrier is the implied criticism that accompanies an innovation. When the innovation arrives, it is possible the individual will feel that the new development implies a criticism about how things are currently being done. Several studies have shown that introducing a computer-based information system into an organization changes the social fabric of that institution (Boland, 1978; Bostrom & Heinen, 1977; Edstrom, 1977; Ginzberg, 1978; Hedberg; 1975; Vertinsky, Barth, & Mitchell, 1975).

Techniques have been developed to ease the implementation process but have predominantly focused on technical difficulties. Yet, research and reports based on practical experience indicate that serious obstacles to successful implementation are not technical problems, but are issues related to participants in the process (Alter, 1976; Carter, Gibson, & Rademacher, 1975; Churchman & Schaniblatt, 1965; Dickson & Powers, 1973; Edstrom, 1977; Garrity, 1963; Lucas, 1976; Manley, 1975; Nichols, 1982; Schultz & Slevin, 1975). For example, Nichols' (1981) research on the implementation process showed that in order to achieve successful implementation the effects of the system on potential adopters must be clearly understood and taken into consideration. It

seems quite likely that the implementation of an innovation, such as using microcomputers, can have the effect of altering the duties and responsibilities of the institution's members. Thus, if the implementation takes place without the support of the organization's members, the innovation may not be successfully adopted (Coleman, 1977; Vertinsky, Barth, & Mitchell, 1975).

This lack of support helps explain why, despite the acknowledged power, usefulness and potential of the computer as an aid to the academic, a broad chasm exists between the prospects viewed by the "enthusiastic technologist" and the actuality faced by the "disenchanted users" (Levien, 1972). Any previous frustrating experience with technology has the potential to cause an individual to view technological change as something to be carefully evaluated before adopted and implemented only slowly and with great caution. Research shows that many proposed changes have failed during the implementation stage (Fullan, 1982; Rossman et al., 1988).

The ubiquitous nature of change has stimulated a tradition of change management research (Kolb & Frohman, 1961) and innovation research (Allen, 1977) that provides specific strategies for providing a supportive environment for change. A review of this literature will be presented in Chapter Two. This body of knowledge supports the perception that technology can provide new opportunities for developing

education, while supporting current structures, so that change may proceed in the organization.

Statement of the Problem

The premise of this study is that it is important to have a faculty that integrates current technology in their teaching methods, research activities, and institutional record-keeping responsibilities. The problem is how to develop better methods for facilitating the adoption of computer-based technologies.

The importance of integrating technological change into the campus curricula on an ongoing basis is widely reported in the education literature (Heerman, 1988; Paisley & Butler, 1983; Graves, 1989; Hawkins, 1989; Marcus, 1985; Roark, 1985; Masland, 1982; Scott, 1986). However, examples of problems with computers gaining acceptance are also widespread and discussed by a number of researchers (Young, 1982, Flanagan, 1982, Dos Santos, 1982, and Lucas 1978). Several researchers have concluded that the implementation and adoption problems occur as technology develops because the human element has not been given enough attention (Lucas, 1976; Domb, 1979; Lignon, 1978; and Kenny, 1978). Keen (1976) summarized this type of problem succinctly:

> Technicians in the computer field have concentrated on design independent of implementation, assuming that the power of a good idea is enough to assure its adoption.

> Reality is painfully different. 'Good ideas' are not always accepted. Change is slow and invariably incremental, requiring nurture and constant facilitation. It cannot be mandated. The introduction of any technical innovation into an organization brings uncertainty - even threat - and makes effective, established routines obsolete (p. 2).

Despite the giant strides in technology, many faculty resist changes which involve retooling their skills. People, and specifically faculty, have always had a tendency to resist change (Heerman, 1988).

This study investigated the perceptions of faculty members who were part of a campus-wide project that resulted in having a microcomputer on the desk of each faculty member, with clusters of computers sharing laser printers, and with all the computers connected to a campus network. This researcher's first impression of faculty computing before data was gathered, was that the majority of faculty who use microcomputers do so for wordprocessing. It did not appear that microcomputers were used by many as an instructional tool to improve teaching, aid in research, expedite communications, or alleviate some of the burden of institutional record keeping. There was also a suspicion that the administrators who made the decision to undertake this project may not have been aware of faculty concerns related to the acquisition of the network and microcomputers or concerns faculty had about using their machines in ways currently not familiar to them. Given this assessment, the presumption was that it would be difficult to prescribe

appropriate implementation strategies that would meet the needs of this group. Further conjecture was that if faculty concerns were not recognized and responded to, it would probably take a much longer time for the microcomputers to be used in ways that would improve the educational process. This study was designed to elicit faculty concerns regarding this project in order to make a contribution to the research that investigates ways in which the adoption of technological innovations might be improved.

The Purpose of the Study

The purpose of this study was to address the problem stated in the previous section by designing a study that would determine if the faculty at Keene State College (KSC) had concerns about receiving the networked computers, what those concerns were, and if they fit into identifiable patterns. Identifying concerns and patterns of concern was important so that intervention strategies could be prescribed to facilitate the adoption of the computer technology.

The following research questions were examined.

1) What are the perceived concerns of the KSC faculty about the system of microcomputers being provided for all full-time faculty members?

2) Is there a relationship among the faculty members' demographic variables and reported concerns about the project to equip faculty with microcomputers?

3) Is there a relationship between other key factors (e.g. the participative nature of the decision-making process and computer experience) and perceived concerns?

Significance of the Study

This study has the potential to make contributions to the areas of policy, theory, practice, and research methodology.

Policy

The impact of information technology has been felt in most, if not all, institutions of higher education. Many contend that the use of computers for instruction, research, and communication will be critical if institutions are to address the public's demand for a better educational experience at a reasonable cost. Molly Corbett Broad (1992, p. A21) senior vice-chancellor for the California State University System, said "We are in the throws of a sea of change in institutions of high education". She added that the need to address the erosion of quality in American higher education, will result in a greater use of technology. William C. Jennings, vice-provost for computing at Rensselaer Polytechnic Institute agrees that the broader use of technology is crucial to providing affordable education (DeLoughry, 1992).

Colleges and universities of all types and sizes must be mindful of these ongoing changes and develop policies on

how to integrate new technology into their institutions. Two examples of how colleges have attempted to organize policy making bodies follow.

Maricopa Community College District formed the Information Technologies Executive Council (ITEC) as the policy-making body for all information technologies within the college district. The ITEC approves all equipment acquisitions and promotes compliance with established standards. ITEC members are the four vice chancellors of the District, a member of the governing board, a representative from the college presidents, a representative from the faculty, and two ex-officio members (Baltzer, 1991).

The second example describes the situation at Keene State College which is the campus that is the focus of this study. The President of Keene State College reestablished the Academic Computer Steering Committee in 1988. The charge to the committee was:

- To formulate a five-year computing acquisition, maintenance, and replacement plan within each academic division.

- To review and promulgate policies about the use of computing resources, including legal and ethical uses.

- To recommend procedures and incentives to encourage faculty to make appropriate and innovative uses of information technology to improve the academic programs.

- To advise on the purchase, distribution, and cataloging of software required to serve and support the faculty and students.

The membership included:

Two faculty members form each division
Library Representative
Instructional Innovation Center Representative
Director of Continuing Education
Director of the Computer Center
Manager, Academic Computer Services

In the Fall of 1991 the committee was renamed the Technology Integration and Networking Committee (TINC) to reflect a new focus of the committee, that of making recommendations about networks and network services delivered to the academic community.

These are two examples of college committees involved in formulating policy about information technology. This study did not examine the effectiveness of these policy making bodes. However, most institutions of higher education will be dealing with issues related to management of information technology, if they are not already doing so. The findings of this study could be useful input to committees like these that are in charge of setting policies for information technology on their campuses. This contribution is discussed in Chapter Five.

Practice

A major assumption of this paper is that faculty are the key to the successful integration of technology in higher education. Given the continually changing nature of technology, support will be needed for faculty to learn to use new technology. This can take many forms including

technical, psychological, and financial support, and even release time to learn a new system. A 1990 survey on desk-top computing found that although many institutions report a desire to use information technologies, few offered faculty incentives to support its development and use (EDUCOM/ University of Southern California, 1990). This study examines a method for investigating faculty concerns so that appropriate support systems can be put in place to aid innovation adoption. This process has the potential to enhance the benefits accrued from the use of microcomputers in higher education.

Theory

There is little theoretical background to explain the process by which faculty adopt computers in higher education. The change literature has focused primarily on decision-making, the adoption and the diffusion processes associated with innovations. The information technology literature that includes management information systems and academic computing literature speaks primarily to the issues surrounding systems planning and development. There does exist some discussion of the implementation process including a call for more research in this area (Rogers, 1983; Leonard-Barton, 1988).

More knowledge is needed about the actual process of implementing change. According to Roark (1986) this process is not well understood and does not have a single theore-

tical basis for conducting empirical testing. Since many institutions of higher education get involved in implementing systems of new educational technology, a better understanding of this process could be useful. The findings from this study offer first hand insights from faculty who have just been given a technological innovation. This view of a particular implementation project provides insights that can assist in the development of a better theoretical framework for understanding this process. The implementation process model that was used as a basis for this research suggests a useful theoretical framework for understanding the change process from the introduction of an innovation, throughout the implementation process to adoption.

Methodology

The Stages of Concern Questionnaire (see Appendix C on p. 159) was the instrument used as one way to collect data about faculty concerns. The questionnaire has been used previously to assess the seven hypothesized stages of concern about different innovations. Loucks & Melle (1982) used the instrument to study staff development; Hall, George and Rutherford (1979) and Mitchell (1988) studied educational innovations. Randall (1991) researched participative decision-making amongst school principals and Baltzer (1991) researched a computer-literacy project. According to Loucks-Horsley and Stiegelbauer (1991, p. 8) the question-

naire is "psychometrically rigorous and reliable enough to provide both meaningful research data and information for planning change strategies". This study provides evidence that this instrument can be used as originally designed to gather meaningful data on concerns related to technological innovations in education. This offers additional validation of the concerns theory upon which the questionnaire is based. The Stages of Concern Questionnaire and concerns theory will be discussed in Chapter Two of this paper.

Limitations of the Study

In the course of this study quantitative and qualitative data have been collected and analyzed from the faculty at one college. The limitations of the research design are described here for consideration when reading the analysis and conclusions of the study.

Response effect can occur when the researcher relies on a respondent to complete an instrument carefully and honestly. The questionnaires in this study were filled out voluntarily and independently. This raises the question of whether or not responses were a true reflection of participants' perceptions.

The Stages of Concern questionnaire was given in its original form in order to preserve its reliability and validity. As a result, some questions may seem to need more interpretation than meets a respondent's comfort level.

The interview process was an interaction between the respondent and the interviewer. Borg and Gal (1983) in their analysis of the interview process note that this introduces the possibility of response effects. Response effects may result because an interview is potentially subject to bias from many sources. The respondent may be eager to please the interviewer, or there may exist a vague antagonism between the two parties, or the interviewer may have a tendency to seek certain answers to some questions. Steps were taken to avoid response effects but the possibility of inaccurate responses remains. Finally, the study was based on a selected group. The sampling was not random and therefore, the results may not be able to be generalized to another population.

Summary

This chapter described the study that was done, and its potential contributions and limitations. The study provided descriptive detail about the implementation of a campus-wide networked system of microcomputers. The findings have potential as a contribution to an understanding of the issues faculty face when challenged by this type of technological innovation. This enriched understanding of the process of introducing a technological innovation may lead to the development of strategies which promote the adoption of an innovation.

Chapter Two is a review of the literature that was used to build a conceptual framework as a basis for determining the important dimensions of the innovation process that were critical to this study. The key variables are discussed as well as the presumed relationships between them. Chapter Three provides a description and justification for the research design and methodology. It includes a description of the group that was studied and details about how the data were collected. Chapter Four is the presentation and analysis of the data. The findings and their potential contributions to the areas of policy, practice, theory, and methodology are discussed in Chapter Five. Finally, recommendations based on the findings of this study are offered for those involved with managing technological innovations.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The widespread use of computer technology over the past decade, has resulted in an increased interest in investigating the process by which innovations are adopted. Proponents of the use of information systems generally wish to shorten the time required for a technological innovation to be put to efficient use. The computer industry's frequent introduction and marketing of costly new hardware and software that offers greater capability and speed presents a unique challenge to information system managers. Difficult decisions must be made about how to allocate financial resources when decision makers are interested in keeping their institution up-to-date, but the availability of funds is limited. Therefore, when funds are committed for acquisition and installation of updated technology, it is in the best interest of the institution to have the new system used in a cost-effective manner.

This chapter presents a review of the literature that contributed to the development of a framework that is the theoretical basis for this study. This includes the findings from theoretical and empirical research relevant to this study.

The chapter is organized according to the three major types of literature important to this study. First the

innovation literature will be presented according to the following topics: (1) General Factors that Influence the Successful Adoption of Innovation, (2) Technological Innovation, (3) Why Innovations Fail, (4) Models of the Implementation Process, and (5) Concerns Theory. Second, the relevant information technology literature will be presented; and third, research about faculty attitudes and concerns toward computer-based technology is reviewed. Research findings from these bodies of literature provided a critical foundation for an in-depth investigation of faculty attitudes about a specific technological innovation, a networked microcomputer system.

Innovation Literature

General Factors That Influence the Successful Adoption of Innovation

Theoretical and empirical research contributions have been made from many fields including education, management, marketing, organizational theory, sociology, agriculture, and the sciences. Many attempts have been made to organize and categorize the literature on the factors that influence the successful adoption of innovation. Gatigon and Robertson (1985) inventoried research relevant to consumer behavior from a variety of fields. They reported the propositions authors made about the diffusion of innovations according to the following conceptual categories: (1) the adoption process, (2) personal influence and opinion

leadership, (3) the social system, (4) the diffusion process, (5) personal characteristics of innovators, and (6) perceived innovation characteristics.

Propositions about the factors that positively influence adoption are very prevalent in the literature. Table 2.1 (page 58) lists and describes elements of the innovation process that have been proposed as factors that influence the successful adoption of a variety of innovations. This table draws primarily from the works of the following researchers. Rogers (1983, p. 85) who has studied innovations from a number of traditions, promotes the belief that although scholars from different disciplines are studying innovation relevant to their area "an integrated body of concepts and generalizations" has emerged.

Fullan (1986) concentrated on change in the education field; Leonard-Barton (1988) studied technological innovations; Gatigon and Robertson (1985) were interested in consumer behavior; Fliegel and Kivlin (1966) studied social systems including farmers; McCredie (1983) investigated campus computing; Hall and Hord (1984, 1987) studied innovations in education; and Baltzer (1991) researched computing on campus. The research findings from these authors regarding factors influencing adoption have been compiled and are summarized in Table 2.1 grouped as follows: (1) the design features of the innovation project, (2) the characteristics of the innovation itself, (3) user characteristics and perspectives, (4) characteristics of the

organization, both the organization structure and climate or culture, (5) characteristics of the external environment, and (6) implementation strategies.

These general findings from research on innovation that have relevance to many types of innovations have been presented in this section as a way of introducing the major topics of research in the innovation literature. The next section will discuss the more specialized area of technological innovation.

Technological Innovation

The process of introducing new technology into an organization is as important as the technological advance itself. If the introduction is handled correctly it offers opportunities for increased organizational effectiveness. The organizational theory literature recognizes the importance of participative processes in all aspects of bringing technologies to an organization.

The Higher Education Information Resources Alliance, which is a coalition of the Association of Research Libraries, CAUSE (The Association for the Management of Information Technology in Higher Education, formerly College and University Systems Exchange) and EDUCOM (formerly Interuniversity Exchange Council) sent a letter to 3,800 college presidents with a checklist of 11 things presidents should do to prepare their campuses for an information technology future (DeLoughry, 1992).

CAUSE is an association for college officials who manage technology resources. EDUCOM is a consortium of over 600 colleges and universities. Excerpts from EDUCOM's (1992) mission statement describe the purpose of the organization.

> EDUCOM believes that education and information technology will provide the most significant enhancements for human capability over the coming decade and that information technology will have a fundamental impact upon education's ability to fulfill its mission.
>
> EDUCOM exists to lead and support education in taking maximum advantage of information technology.

The report sent to the college presidents was a collaborative project of Brown University, California State University at Los Angeles, Indiana University, the Maricopa County Community College District, and Wesleyan University.

The eleven points in the checklist were as follows:

> 1. Develop an effective campus-wide network as quickly as possible.
>
> 2. Focus overall coordination of information resources at a high administrative level to create an intersection point for traditionally independent lines of authority.
>
> 3. Support librarians in efforts to focus on knowledge access and management as well as the traditional acquisition, organization, and preservation of information.
>
> 4. Engage faculty and staff who are affected by projects in framing questions and possible answers, and then evaluate projects by considering these factors: specific project description, value to the community, cost, and life expectancy of the result.

5. Develop motivation and support mechanisms to encourage use of information-rich data bases and new modes of interaction in the teaching/learning process.

6. Encourage innovation and exploration with judicious use of "seed money" and pilot projects.

7. Expand use of computer conferencing as a convenient discussions format for faculty and administrators.

8. Develop a plan to fund the maintenance of desktop, network, and classroom technology as a vital capital asset. Replacement of the technological infrastructure at most institutions closely parallels the deferred maintenance crisis which faces their physical plants, with the difference that any deterioration or even relative obsolescence has immediate, obvious consequences for productivity.

9. Require cost-benefit analyses and assessment mechanisms of technology investments, with attention given to innovative ways of recouping some of the investments through the benefits they will yield.

10. Be on the lookout for signs of "magical thinking" unfunded goals, projects without budgets. In a fixed-resource environment, if you are not re-thinking old functions, you cannot be funding new strategies.

11. Move aggressively toward paperless administration beginning with analysis and planning to manage campus printing and publishing activities, which have been estimated to consume as much as 15 to 20 per cent of operating budgets.

The authors of the report recognize that this is a time when campuses are financially strapped and that investments in technology must be cost-effective. The report states that institutions need to change organizational structures "to accommodate and exploit what is valuable in these technological developments".

The federal government is taking an active role in computer networks. A high-speed network for educators is being built called (NREN) the National Research and Education network. Vice President Gore won approval for this in 1991 when he was a senator. Early this year (February 1993) the Clinton administration announced its plan for an information superhighway. It is as yet unclear how NREN fits in with the plan for the superhighway (DeLoughry, 1993). Institutions of higher education are providing input into the federal government's attempt to link computers on national networks via the Coalition for Networked Information. This coalition is a joint project of the Association of Research Libraries, CAUSE, and EDUCOM.

Communications capabilities through computer networks are changing how knowledge is shared and information is exchanged. The ASHE-ERIC (Association for the Study of Higher Education-Education Resources Information Center) Higher Education Report No.7 (Ferrante, 1988) reported that college planning for microcomputers has not been effective, in part because of the continually changing technology. A better understanding of how and why faculty respond to technolo-gical change could provide useful guidance to the policy-making bodies that are faced with the need to provide educational systems characterized, in part, by technology immersion.

The effects of the changes resulting from technological innovations depend primarily upon the attitudes and actions of those involved. Heerman (1988) believes that it is important to understand faculty concerns when trying to create a supportive and productive environment for institution-wide computer resources. Graves (1989, p. 425) calls for faculty representation on the use and development of academic tools to add value to education. He advocates faculty investments related to technology "at a time when colleges and universities are competing vigorously for students".

Researchers including Dickenson (1972), Winner (1978) and Wynne (1983) have studied the process of introducing technological change and reject the premise that resistance comes from ignorance or malice. They discovered the importance of considering technological impacts within the social and organizational framework. When users participate in the development process of new systems, it avoids unrealistic demands being placed upon the human systems which promote the successful introduction and usage of the new system. Case reports by Buchanan and Boddy (1982) illustrated the limitations of computer-based systems designed on the recommendations of experts alone. Similar conclusions were drawn by Blackler and Brown (1985) in their analysis of sociotechnical experimentation in Scandinavian countries.

When considering an appropriate strategy for introducing new technologies, Gouldner (1954) reports that organizations need to be managed as "social systems" rather than "rational systems". Recognition of the plurality of interests must be acknowledged. Pettigrew (1973) described the change process as highly complex and influenced by "organizational politics".

The literature specifies that the social and functional priorities of a new system need to be articulated; users and others affected by the new technologies should be involved in the planning and review process and reviews of the systems should continue throughout the life of the systems. Kling (1983) cited thirteen social considerations to be taken into account when dealing with new technologies. These included: effect on quality of life, employment opportunities, infrastructural demands, intelligibility of the system, underlying ideology of the system, and any possible social carrying costs. Taking these issues into account will encourage the development of an "information habitat" that is acceptable to the users and those affected by the system.

Zmud and Cox (1979) found that in instances where technological change is being promoted: (1) the user must assume overall responsibility for the innovation implementation; (2) all affected organizational members must give input into the process; (3) education or training program must be provided; and (4) mutual trust must be established

among participants so that a free exchange of ideas is possible. These findings are congruent with the factors presented in Table 2.1.

One thing all the research findings point to is the importance of providing a supportive environment and participatory management. Allen (1977) in his book, Managing the Flow of Technology, suggests tactics for how to achieve participatory management during the initiation stage of the innovation process. His work supports the idea that faculty issues must be considered if new technology is to be perceived as providing opportunities. If faculty can use existing systems and take time to learn and integrate a new system, the implementation process is proceeding in a way that suggests change is occurring in the institution.

An organizational development approach to the implementation process was described by Kolb and Frohman (1970) in their work on management consulting. They took the view that implementation was an organizational innovation achieved as specific goals are met. This view offers a sound theoretical basis for most information systems implementation and organizational development strategies. Henderson and Treacy (1986) found this is a view which is particularly appropriate in terms of an organization's initial use of new technology because of its consistency with research on innovation. This approach also acknowledges that the interdependent nature of the elements of the technological system must be emphasized at all times.

Studies that explore receptivity to change go back as far as the famous Hawthorne studies where Roethlisberger and Dickerson (1939) found that employees responded better to change when they were paid attention to than if left alone. Caruth's (1974) study of systems management resulted in similar findings; individuals were most receptive to change when they perceived that administrators were supportive of the change, when they understood what the change was all about, and when they participated in the change process.

A study commissioned by EDUCOM (McCredie, 1983) investigated information processing at ten colleges and universities that were considered innovative. Eight elements were found that contributed to success of these schools in managing the academic computing.

1. Organizational Structure: Eight of the ten institutions had a single individual or administrative office to coordinate computer-related issues.

2. Decentralization: All institutions are moving toward more decentralized computer facilities.

3. Personal Computers: All the institutions are actively encouraging innovative uses of personal computer systems.

4. Networking: All ten organizations are involved with both local and national networking activities.

5. Library Automation: All ten organizations are involved with or planning a collaboration between computers and library resources.

6. Information Processing Literacy: All ten campuses have assigned task forces to examine computer literacy and administrative support in all institutions.

7. Text Processing: Text processing is considered to be an important element to academic computer literacy and administrative support in all institutions.

8. Electronic Mail: All the organizations have either established or are actively considering establishing electronic mail systems to allow informal communication among faculty, students, and administrators.

Dorothy Leonard-Barton (1988) studied a number of organizations in order to determine the characteristics of innovations that make implementation most likely to succeed. She found that for technological innovations with which users are unfamiliar, implementation is more likely to be successful if: (1) users are willing to share with developers the risks and responsibilities of further technical development, (2) at least one advocate for the change comes from the user organization and all sponsors of the technology project consider the project as an experiment rather than as a demonstration, and (3) users allow and guide mutual adoption of the organization and the technology.

Research by Leonard-Barton (1988) found that a technology with high implementation complexity was more likely to be successfully implemented if: (1) all major users' perspectives were represented at the early stages of

the project design, (2) a sponsor was able to authorize needed capital investments and make necessary changes, and (3) link the project to other high-priority programs of organizational change. Other aspects of implementation strategies included: (1) identifying the presence of enthusiastic initial users to promote the technology under a plan of controlled diffusion, (2) giving sponsors the ability to control the pace of the change, allowing for the potential for implementation in phases, rather than all at once and (3) treating these phases as opportunities for learning about the needed adaptations in both the technology and the organization.

Ultimately, the strategies used by a particular institution depend on the existing organization's culture and structure. An organizational culture which is characterized by shared goals and values among members, acknowledged strengths and weaknesses, involved users, involved administrators and adequate time, and funded support services is where an innovation is most likely to succeed. An organizational structure which has a bias toward action, a positive view of change, a respect for individual's autonomy and creativity, and a commitment to regular communication is one where resistance to change can likely be overcome. Institutions with these characteristics are more able to enhance acceptance of change, reduce uncertainty about the proposed change, develop demand for the innovation and see its members creating new habits.

There are so many instances when innovations are introduced but never fully used. This is often costly in terms of time and money and is therefore considered undesirable. The next section will offer some insight into the research on why innovations fail.

Why Innovations Fail

There are organizational structure and climate characteristics that can impede the acceptance of an innovation. In addition, change promoters should be on the lookout for warning flags that signal the implementation process is not going well and may be in need of immediate interventions. Change agents must be information gathers throughout the implementation process. If users report confusion, negativity, or lack of interest in learning about the innovation, interventions to address these concerns must be immediate. Users need to feel listened to and responded to. Developing workable lines of communication may be the beginnings of intervention strategy and may present a challenge to how ideas are presently communicated within the organization.

Colleges and universities have unique characteristics which distinguish them from other organizations (Baldridge, Curtis, Ecker, & Riley, 1978; Carnegie Commission on Higher Education, 1973; Corson, 1960, 1970; Perkins, 1980; Whetton, 1984). Levine (1980) reviewed the literature on obstacles to innovation. He found research on why innovations fail in

organizations by Watson (1969) and literature on why innovations fail in higher education institutions by Hefferlin. For example, Hefferlin (1969) proposed seven barriers to innovations in higher education.

1. The purposes and support are conservative, preserving tradition and customs.

2. Higher education is placed in between secondary schools and graduate schools which dictate what colleges must do.

3. Reputations are not built on innovation is higher education, therefore, there is little incentive to be unconventional.

4. Faculty members have been through a long process of socialization by the time they in the classroom.

5. Professors are treated as independent professionals. This results in a wide range of values and goals within a school. Passive resistance can be very powerful within this type of group.

6. Measuring educational output is rejected by many faculty.

7. The structure of academic institutions involves group decision making and elaborate procedures for evaluating change initiatives. This results in a slow and deliberate process subject to many varied opinions.

Whether or not an innovation is put to use and how it is used, ultimately is decided upon by individuals. Since change provokes different reactions by different people the

focus of interventions should be on the individual's needs. Researchers, Tichy (1983), Sergiovanni (1984), and Rossman et al. (1988), have found that efforts to overcome resistance to change should address the technical environment, the political environment and the cultural environment of an organization.

Examples of each of these three areas are included in Table 2.1. Implementation strategies call for training and monitoring of the innovation process. This requires that the necessary knowledge and resources are available to facilitate learning the technical aspects of the innovation. The organizational characteristics section on Table 2.1 describes features such as a bias toward change, and organizational climate that encourages change as well as involved users and administrators. Fullan (1982) and Lindelow et al. (1985) found that shared power and participative decision-making offered opportunities for a sense of ownership in the organization, its vision and its goal to embrace change.

Sergiovanni (1984) promotes development of resistance strategy that can be used to maximize acceptance of a change. This can be helped by an understanding of the organizational culture. How faculty view their connection to the school they teach in must be understood in order to develop strategies that can rally support for a common goal or cause. Organizational culture can offer additional support for change leaders or can cause complexities.

Positive outcomes can best be achieved if the culture of the organization is considered an important part of understanding what interventions are most likely to promote the adoption of an innovation.

Models of the Implementation Process

In order to study a topic as widely researched as innovation, it is useful to have a conceptual framework that provides boundaries around the subject being studied. A framework also indicates the key variables and themes to consider.

Many models of the change process have been developed. The models most frequently cited involve a sequence of predictable stages (Levine, 1980; Hage and Aiken, 1970; Mann and Neff, 1961; Rogers, 1962, 1983; Rogers & Shoemaker, 1971; Smelser, 1959; Fullan, 1982, 1986; Fullan & Stiegelbauer, 1991; Havelock, 1971; Hall & Hord, 1984; Lewin, 1948; Lwein et. al., 1944; Utterback, 1971 & Gruber & Marquis, 1969). Although there is not exact agreement on what the stages are or how many steps exist there are central tendencies. Most models describe an initial information gathering stage when a decision is made to introduce the innovation or discard it, an implementation stage, when the innovation is presented to potential users, a diffusion stage when users are deciding to adopt or reject the innovation, and a continuation stage when the users throughout an organization are involved with the innovation.

The implementation stage is the focus of this study and therefore, the conceptual framework is based on a model of the implementation process that combines elements of three models. The first model was developed by Leonard-Barton and is shown in Table 2.2 (p. 61). The second and third models were developed by Fullan and are illustrated in Figures 2.1 and 2.2 (p. 63). A fourth model based on elements from Leonard Barton and Fullan's work is shown in Table 2.3 (page 62) and is presented as the conceptual framework for this study. The elements of the models will be described starting with Leonard-Barton's model.

Leonard-Barton's Model

This model expresses the relationship between implementation characteristics of innovation, implementation strategies and the innovation response decision. Leonard-Barton (1988) studied the interaction between a technology's implementation characteristics and the management of its implementation. The model portrays the relationship between the implementation characteristics of the innovation, implementation strategies, and the innovation response decision. The research that led to the development of this model found that technology has implementation characteristics that inherently constrain or influence the way strategies are operationalized.

Leonard-Barton's research examined interactions between the implementation characteristics of an organizational

innovation and the implementation strategies employed in fourteen case studies. Findings showed that successful managers used three types of strategies to implement an innovation, user involvement, leadership, and mutual adaptation of the organization and the change. The conclusion of the study was that, although managers usually don't have control over the implementation characteristics of change, they can design implementation strategies that take the conditions created by these implementation characteristics into account. This process increases the chances for a successful implementation effort.

Leonard-Barton argued for the importance of understanding implementation characteristics because she postulates that the management strategies which are commonly suggested and have achieved the status of implementation principles (e.g., involve user in technology design process) but when used, often result in failure.

The implementation characteristics of an innovation are: transferability, implementation complexity and divisibility. The point at which an innovation is being transferred to users is its start-up point. Transferability refers to how prepared users are to incorporate the innovation into their work and how its usefulness is communicated.

Implementation complexity is determined by organizational span and organizational scope. The organizational span means the number of people affected by the innovation. A large organizational span presents the possibility of a

number of different innovation responses. This usually means a large investment in human and physical resources. Organizational scope is the number of organizational divisions that must change their output in order to utilize the innovation. This means that different innovation responses may result due to working in different functional areas. In other words some groups may benefit from the innovation while others may not. The implementation process that affects many people across many organizational boundaries may be very complex to manage (Thompson, 1967).

Divisibility is the degree to which trial adoption is possible for individuals (Rogers, 1983) and for organizations (Zaltman, Duncan, & Holbeck, 1973). Having a trial period for an innovation provides an opportunity for feedback and learning. It also avoids the problem of trying "too much too fast" (Ettlie, 1986, p. 80) or of starting too big (Rogers, 1983, p.366). Leonard-Barton observed two types of divisibility in her research: modularization and individualization. Modularization means the technology is presented in segments. Later segments may or may not be introduced. Individualization happens when the technology is used by some organizational members to determine its beneficial uses. Leonard-Barton's view is that the implementation process would have the greatest chance for success if the innovation is transferable, has low implementation complexity, and is at the very least somewhat divisible.

Fullan's Model

Fullan's work is based on years of research on educational innovations (Fullan & Stiegelbauer, 1991). Figure 2.1 illustrates how three interactive factors, characteristics of change, local characteristics, and external factors affect implementation. The characteristics of change in Fullan's model are need, clarity, complexity, and quality and practicality. The meaning of these terms are described next followed by an explication of Fullan's meaning of local characteristics and external factors.

A. Characteristics of Change

Need refers to whether or not an innovation is perceived to be important to potential adopters. Studies on educational innovations have shown that when the innovation is a response to an identified need it is more likely to be successfully implemented (e.g., Emrick & Peterson, 1978; Louis & Sieber, 1979). One relevant complication to this notion is that some people become clearer about the need during the implementation process itself.

Clarity is a problem identified in many studies of educational innovation (e.g., Aoki et el., 1977; Charters & Pellegrin, 1973; Huberman & Miles, 1984; Mortimore et al., 1988; Weatherley, 1979). Clarity refers to understanding what should be done differently as a result of the innovation. The more unclear and unspecified the changes are,

the greater the potential anxiety and frustration on the part of the users.

Complexity can create problems for implementation as a result of the difficulty and extent of change that is required for individuals. Interestingly, some research shows that the broader and more challenging the change, the more successful it is (Crandall et al., 1986).

The quality and practicality of the program refers to whether or not the entire process is well thought out. Next steps should be in place in conjunction with the available of support systems. This does not negate the importance of being careful not to take on too much - which can result in massive failure.

B. Local characteristics

The culture of the institution affects the implementation process by presenting constraints or opportunities for change. The strategies and supports made available by the larger organization serve to enhance or restrain change possibilities. Table 2.1 lists some features of the organizational structure and culture that enhance the implementation process.

C. External factors

For the purposes of this study external factors are the pressures imposed upon institutions of higher education to prepare students for a workplace which increasingly utilizes and depends upon technology.

Another important contribution Fullan's work makes to this study is his model of the key themes affecting implementation show in Figure 2.2. This model illustrates six themes that if incorporated into the implementation process may improve the chances for a successful change. The six themes vision-building, evolutionary planning, initiative-taking and empowerment, staff development/ resource assistance, monitoring/problem-coping and restructuring are elaborated on below.

Vision-building is not well understood but greatly valued and attributed to great leadership. Its primary purpose is to imbue in a community a sense of shared purpose. Vision-building feeds into the theme of evolutionary planning.

Evolutionary planning involves adapting to changing situations which naturally occur as part of an innovation process. Taking advantage of unexpected developments or coping with problems as they arise should be expected not resisted.

Initiative-taking and empowerment has to do with getting people involved in the implementation process by sharing power. Open communications and collaborative work cultures promote the sharing of success as well as input to problem-solving.

Unfortunately, staff development and resource assistance during implementation are common problems. Fullan reported that when people actually try to implement

something new, they have the most serious concerns and doubts. Support at the early stages of the implementation are critical (Huberman, 1981). Early rewards and tangible successes improve the chances of successful adoption. Studies have shown that success is possible when support systems combine specific teacher-oriented training activities, continuous assistance, and support during implementation and regular meetings with support personnel and peers (Huberman & Miles, 1984; Joyce & Showers, 1988; Louis & Miles, 1990; Marsh, 1988; Stallings, 1989).

Monitoring/Problem-Coping means gathering data about how the implementation process is going. Given that "all serious improvement programs have problems" (Louis & Miles, 1990, p. 268) change initiators may be wary of gathering and examining the results to date. When information is gathered about the implementation process it offers very useful data. New ideas are exposed to scrutiny which can both further develop promising practices as well as identify things to avoid.

Restructuring occurs as an organization adapts to the changes the innovation promotes. To a certain extent the restructuring can be predicted yet unanticipated organizational arrangements may result. Innovation leads individuals and organizations into unchartered territory. Therefore, a certain willingness to be attentive to changes as they take place can enhance the whole process.

Working Model

This working model of the implementation process (Table 2.3 on page 62) merges the elements of the three models that were just described into one that provides a conceptual framework for this study. The structure of the implementation process is the same as Leonard-Barton's with the exception that the label - implementation characteristics of innovation - has been changed to - key considerations for the implementation of innovations. There was substantial overlap between the elements in Fullan's models and those in Leonard-Barton's so in instances where two elements expressed the same idea, those two elements are merged as one.

This model is an illustration of an implementation process with key considerations for the implementation of an innovation setting the parameters for the development of implementation strategies which determine the response to innovation. According to Leonard-Barton's and Fullan's work as expressed in my aggregate model, in order to effect substantial change, the characteristics and strategies of an implementation are orchestrated so they complement each other and the result is a successful implementation process.

Concerns Theory

Frances Fuller (1969) identified a predictable, developmental sequence of concerns from her research on teachers facing innovation, ranging from self, to task to

impact (Hall et al., 1973). This work evolved into the concerns hypothesis which says:

> When an individual encounters a new situation that requires interaction with others, his behavior is initially governed by concerns about himself and the demands that the situation makes upon him. As these self concerns become resolved, the individual moves to concerns focusing on the nature of the task and on the quality of task performance. Ultimately, the individual becomes concerned about the impact he is making upon others and strives to optimize his efforts for others (p.6).

This led to the Concerns-Based Adoption (C-BAM) developed by Hall, Wallace & Dossett (1973). C-BAM is a change model that can be used to describe what is happening at the individual level when an innovation or change is introduced into an organization. The C-BAM perspective asserts that "diagnostic data can be used for making informed decisions about the allocation of resources and support; these decisions can be articulated in the design and selection of appropriate 'interventions' that are targeted by change facilitators toward users in order to encourage and help them in their individual change efforts" (Hall et al., 1982, p.8). Hall (1979) reports that C-BAM is based on the following assumptions:

> 1. Change is a process rather than an event. Change does not occur at any one point in time, but, rather, unfolds within an organization.
>
> 2. Change is made by individuals, not by the institution. Without change at the individual level, it is virtually impossible for institutional change to occur.

3. Change is a personal experience. Because institutional change is dependent upon individual change, the individuals within the organization need to know and understand why they are being asked to make changes and what these changes will mean to them personally.

4. For change to occur there must be a formal or informal change agent facilitating the adoption of the innovation (p. 3).

The Concerns Based Adoption Model was developed to provide "a means to understand and describe innovation, adoption, and implementation" (Hall et al., 1980). The model is based on two beliefs about the adoption of an innovation. First, it is primarily an individual process and second, it is a developmental process (Hall, Wallace & Dorset, 1973).

There are two instruments associated with C-BAM: the Stages of Concern Questionnaire (SoCQ) and the Levels of Use Questionnaire. The SoCQ can be used to categorize concerns about an innovation or change into one of seven stages:

0 AWARENESS: Little concern about or involvement with the innovation is indicated.

1 INFORMATIONAL: A general awareness of the innovation and interest in learning more detail about it is indicated. The person seems to be worried about himself/herself in relation to the innovation. She/he is interested in substantive aspects of the innovation in a selfless manner such as general characteristics, effects and requirements of use.

2 PERSONAL: Individual is uncertain about the demands of the innovation, his/her inadequacy to meet those demands, and his/her role with the innovation. This includes analysis of his/her role in relation to the reward structure of the organization, decision making and consideration of potential conflict with existing structures or personal commitment. Financial or status implications of the program for self and colleagues may also be reflected.

3 MANAGEMENT: Attention is focused on the process and tasks of using the innovation and the best use of information resources. Issues related to efficiency, organizing, managing, scheduling, and time demands are utmost.

4 CONSEQUENCE: Attention focuses on impact of the innovation on students in his/her immediate sphere of influence. The focus is on relevance of the innovation for students, evaluation of student outcomes, including performance and competencies, and changes needed to increase student outcomes.

5 COLLABORATION: The focus is on coordination and cooperation with others regarding use of the innovation.

6 REFOCUSING: The focus is on exploration of more universal benefits from the innovation, including the possibility of major changes or replacement with a more powerful alternative. The individual has definite ideas about alternatives to the proposed or existing form of the innovation (Hall, 1979, p. 6)

According to Hall (1979, p. 4), concerns "relates to the feelings, perceptions, motivations, and attitudinal dynamics of individuals as they first become aware of an innovation, approach use and gradually become increasingly confident in their use of the innovation". The Stages of Concern model implies that faculty cannot consider how to use an innovation to improve their work with students (Level of Consequence) until they have passed through the preceding four levels (Baltzer, 1991).

The Stages on Concern Questionnaire has been used in at least the following studies: Hall, George & Rutherford (1979), Hall Rutherford and Griffin (1982), Randall (1991) and Baltzer, (1991). In addition a series of validity studies were conducted by Hall, George and Rutherford (1979) which indicated that the SoCQ was measuring the hypothesized Stages of Concern.

The second component of C-BAM is the Levels of Use questionnaire (Loucks, Newlove, Hall, 1975). It focuses on an individual's behavior approaching and using an innovation. Levels of Use as defined in C-BAM are defined as follows:

0 NON-USE: The individual has little or no knowledge of the innovation and is doing nothing to become involved.

1 ORIENTATION: The individual had acquired or is acquiring information about the innovation and has done some exploratory work with it.

2 PREPARATION: The individual is preparing for his/her first use of the innovation.

3 MECHANICAL USE: The individual focuses most effort on short-term, day-to-day use of the innovation. The focus is on mastering the tasks required to use the innovation.

4A ROUTINE USE: The individual is using the innovation on a routine basis, making few if any changes to the innovation or how it is used.

4B REFINEMENT: The individual begins to vary the use of the innovation to achieve new outcomes.

5 INTEGRATION: The individual begins to combine his/her own efforts with related activities of colleagues.

6 RENEWAL: The individual begins to reevaluate use of the innovation and to seek major modifications or alternatives to achieve increased impact or efficiency (Hall, 1979, p.10).

Using this part of C-BAM is beyond the scope of this study. However, its potential use in a follow-up study is discussed in Chapter Five.

Hall, Wallace and Dorsett (1973) built their model on the assumption that those responsible for facilitating change could initiate strategies to encourage adoption which were based on the developmental levels of those involved. The SoCQ component of the Concerns-Based Adoption Model became a powerful tool for identifying the stages of concerns for individuals facing an innovation. Analysis of

concerns led to suggested interventions to enhance the adoption process.

Interventions to promote the change effort have been proposed by Hall, Zigarmi, and Hord (1979). Their Taxonomy of Interventions identifies six levels of interventions.

1. Policy: rules or regulations that direct procedures and actions of an organization.

2. Game Plan Components: a checklist of suggested change facilitator actions to support change that cover six different categories for intervention: developing supportive organizational arrangements, training, consultation and reinforcement, monitoring, external communication, and dissemination.

3. Strategy: a framework for action, translating the game plan design into concrete action.

4. Tactic: operationalizes the strategy to affect attitudes regarding innovation usage.

5. Incident: a singular occurrence or event that usually covers small amounts of time and can be targeted at one or more individuals.

6. Theme: a set of repeated actions that accumulate to produce unexpected effects on an innovation. This is an unplanned occurrence.

Specific interventions are suggested by these authors that are related to individual stages of concerns. These are shown in Appendix F (p. 167).

Concerns theory in combination with the working model of the implementation process developed in the preceeding section, provide a conceptual framework for studying the implementation process. In the next section of this paper justification for studying the implementation process of an educational innovation such as an academic computing project will be presented. This will be followed by presenting research studies on faculty attitudes toward computers.

Information Systems Literature

Evidence of and interest in academic computing is increasing. EDUCOM has seen attendance at their annual conference increase ten times what it was in 1980 (Hawkins, 1989). The Chronicle of Higher Education has had regular articles on computers for the last fifteen years. Periodicals such as Academic Computing, EDUTECH Report, THE Journal, Change, Journal of Research on Computing in Education, Journal of Educational Computing Research, and Cause/Effect continue to report on the computing challenges faced by colleges and universities. The information explosion has been fueled by the decentralization of computing resources due to the proliferation of microcomputers on campus and the increased availability of electronic communication.

A 1990 survey studied desktop computing across community colleges, four-year public and private institutions, and public and private universities. This

national survey was co-sponsored by EDUCOM and the University of Southern California. Out of the more than three thousand higher education institutions (Ryland, 1989, p.18), 1,148 two-and-four year colleges and universities across the United States participated in the study. According to the study "the ratio of institutionally-owned desktop computers (including all systems in labs and faculty offices) ranges from an average of 34 students per computer in community colleges to 10 students per computer in public universities. "...the estimated student-owned computers runs from 14 percent in community colleges to 29 percent in private universities" (EDUCOM/University of Southern California, p.1).

Kenneth C. Green at the University of Southern California's (USC) Center for Scholarly Technology was the director of the study. He noted that more "research-oriented institutions and more affluent campuses invest a greater proportion of their desktop computing resources in their faculty" (p. 1). Finally, related to the theme of managing technological innovation, the study reported "that over two-thirds of the nation's campuses reported that "upgrading aging hardware will be a very important institutional priority over the next few years " (p. 4).

Institutions of higher education are committing substantial financial resources to academic computing. Turner (1986) reported that Sun Microcomputers estimated that 20 universities have annual computing budgets of

between $25 million and $50 million and that an additional 100 post secondary schools commit $20 million every year.

Advances in institutional computing closely reflect societal trends. Schneider (1992) reports that we have entered the age of multi-media technology, where video, animation and sound can be as easy to use in computer programs as text and graphics. Increased speed and storage capacity influence what computers can offer society. Schwartz (1992) wrote in Newsweek magazine that future computers will be measured in gigabytes - one billion bits - approximately a 20-volume encyclopedia and will move across distances in a second or less. The same article reported the $3 billion High-Performance Computing Act signed by President Bush in December of 1991. The money would be used to develop and install systems amongst more than a dozen of the nations' leading research facilities. The connected centers will form the National Research and Education Network (NREN). Then Senator Al Gore of Tennessee said NREN "will revolutionize almost every facet of business and commerce and communication in the United States." He added NREN "will allow us to leapfrog the Germans and the Japanese, who are building networks of their own" (Schwartz, 1992, p. 56).

On campus, the proliferation of microcomputers has led to instantaneous communication across campuses, the decentralization of computer resources and increased use of computers in teaching, research, and office work. CAUSE

reports regularly on these aspects of the campus computing environment. CAUSE publishes a quarterly journal Cause/ Effect, and a Professional Paper Series. The CAUSE literature offers many insights into managing academic computing. For example Penrod and Dolence (1987, pp. 15-16) reported on California State University/Los Angeles which identified eight key trends as it embarked on campus-wide long range computer planning:

- Information technology will increasingly impact curricula and the teaching-learning processes.

- Decreases in traditional enrollments and funding for education will result in a need for more effective administrative processes and productivity.

- Rapidly advancing technologies are fostering increased linkages between universities and industry.

- Hardware capacity will continue to grow, allowing software developers to make available increasingly powerful software tools.

- The rates of change in hardware and software, and the advent of converting technologies, will require continued institutional attention.

- Growing numbers of increasingly sophisticate users will necessitate expanded technical and consultative support.

- Ethical and legal issues regarding the uses of information technology will demand increasing institutional attention.

- The continuing impact of the divestiture of AT&T will result in incremental increases in telecommunications costs.

Computing and telecommunications are an integral part of our culture to the extent that the nature of the work

force as changed. The Bureau of Labor Statistics indicated that the majority of jobs created through 1995 would be in the service industries and the largest number of jobs would go to managers, professional workers, and technicians, all of whom will be required to use computers (U.S. Department of Labor, 1985). These predictions have been a driving force for changing the curriculum requirements in higher education. In order to compete for the declining student population, colleges and universities recognize the need to offer affordable education that prepares students for the challenges of the high-tech work force.

Educational change depends first and foremost on the faculty members who either embrace or resist the change. According to Nisbet (1969) teachers need to understand themselves as well as be understood by others in order for change to happen. Land (1981) went further to say that strategies to promote change must be able to overcome an individual's proclivity for finding patterns in life and protecting established patterns. The arrival of technology finds some people attempting to protect established patterns. The result is a resistance to technological change despite an understanding of its potential benefits for teaching and learning. The technological innovation may be perceived as a threat because it could cause sweeping changes in traditional ways of doing things. Heerman (1989) found that historically, major technological changes have often resulted in additional changes in how people live

their lives and how they view themselves and their world. Steven Muller, as president of Johns Hopkins University said, "We are, whether fully conscious of it or not, already in an environment for higher education that represents the most drastic change since the founding of the University of Paris and Bologna, some eight or nine centuries ago" (Bok, 1985, p. 3).

The effects of the changes resulting from technological innovations will depend primarily upon the attitudes and actions of those involved. Heerman (1988) reports that it is important to understand faculty concerns when trying to create a support environment for an institution-wide computer environment. Graves (1989) calls for faculty representation on the use and development of academic tools to add value to education.

A better understanding of how and why faculty respond to technological change could provide useful guidance to administrators who are faced with the need to provide educational systems characterized, in part, by technology immersion. This study provided information about the perceived concerns of faculty members faced with a technological innovation and makes suggestions for interventions to facilitate the adoption effort.

Faculty Attitudes and Concerns

Faculty are recognized as the purveyors of knowledge and therefore, must be counted on to prepare students to use

the technology they will encounter in the workplace. Fauri (1984) suggests that how educators perceive computers can influence the use of computers as a professional tool. Many studies have sampled attitudes toward computers and their use (e.g. Levin & Gordon, 1989; Chen, 1986; Turnipseed and Burns, 1991). Instruments have been used to measure a range of factors related to computer attitudes. Computer attitude scales have been developed and/or used by Griswold (1983), Stevens (1980, 1982), Norales (1987), Byrd & Koohang (1989), Levin & Gordon (1989), Reece & Gable (1982), and Gressard & Loyd (1986). A range of factors have been measured by attitude scales. One of the first instruments developed was the Minnesota Computer Literacy and Awareness Assessment (MCLAA) instrument which sampled attitudes toward computers using a twenty item Likert-type scale (Anderson, Klassen, Krohn, & Smith-Cunnien, 1982). Other scales looked at the relationship between attitudes towards computers and experience with computers. Positive attitudes were found to be significantly related to experience with computers (Kulik, Bangert & Williams, 1983; Bear, Richards & Lancaster, 1987; Byrd & Koohang, 1989; Levin & Gordon, 1989).

Some scales have linked gender with computer attitudes (Chen, 1986; Loyd & Gressard, 1984, 1986). These studies found that males exhibited more positive attitudes than females towards computers. Scales have measured the computer attitudes of students and teachers. Findings showed that age was positively correlated with positive attitudes

and that educators were more positive towards computers than were students (Bannon, Marshall, & Fluegal, 1985; Marshall & Bannon, 1986). All of these scales measured the same attribute: attitudes toward computers in one or more attitude domains: affective, behavioral and/or cognitive.

Examples of other studies include studies done by Bear et al. (1987) who looked at: computer use, Computer Aided Instruction, programming, social history and history. Chen (1986) used a five dimensional definition of computer attitudes: computer interest, gender equality in computer use, computer confidence, computer anxiety, and respect for computers.

Affective dimensions tested for in several scales included enjoyment, anxiety, efficacy (confidence), gender-typing, policy concerns, and educational computer support (Anderson et al., 1982). Gressard & Loyd (1986) divided the items on their scale into three subscales corresponding to three affective dimensions: computer anxiety, computer confidence and computer liking.

The cognitive portion of a scale relates to knowledge of computer uses and to knowledge of computer operations. The five cognitive domains measured on the MCLAA are (1) hardware, (2) software and data processing, (3) applications, (4) impact, and (5) programming and algorithms (Anderson, et al., 1982). Behavioral questions on these scales look for how a respondent might use a computer (Reece and Gable, 1982). Finally, Heerman (1988), proposed a needs

assessment questionnaire that can be used to plan faculty development and support programs.

Studies on computer attitudes are important because negative attitudes are detrimental to the educational process if the computer is to be maximized as a learning tool. Chen (1986) and Loyd and Gressard (1986) did studies that reported findings that males view computers more favorably than females. Marshall and Bannon (1986) found age was positively correlated with positive attitudes toward computers and that educators were found to have more positive attitudes toward computers than their students. Bear et al. (1987) reported that experience was positively correlated with positive attitudes. Finally, Turnipseed and Burns (1991) found that such a significant number of people hold negative attitudes about computers that there is cause for concern.

Summary

The literature on technological innovation is vast and covers a wide range of innovations - from machinery and equipment in agriculture, to manufacturing, to computer-based technology in higher education. Technology, as defined in this paper, is made up of two components: hardware, which is the material object and software, which is the knowledge-base for the hardware or tool. Innovation as defined by Tornatzky in a National Science Foundation (NSF) publication is anything which is perceived as new to a given

organization (Tornatzky, Eveland, Boylan, Hetzner, Johnson, Roitman, and Schneider, 1983). The NSF document distinguishes between knowledge of a technology and the active consideration of it. It is the latter that constitutes an innovation. In this framework academic computing is not an innovation until the campus takes active steps to use it.

Keene State College equipped all full-time faculty with microcomputers. This presented a superior opportunity for studying an academic project from the perspective of technological innovation theory. The literature review presented in this chapter described the factors that are believed to contribute to the successful adoption of a technological innovation as well as some evidence about why innovations fail. Several models that have been used to study innovations are also presented. This literature review became the basis for the conceptual framework of this study as expressed by the working model proposed in this chapter. The framework for the research that was conducted was the implementation model described in this chapter. The next chapter will describe the research design and methodology used as well as other details important for understanding how the study was conducted.

TABLE 2.1 Factors That Influence The Successful Adoption Of Innovation

Design of the Innovation Project	Characteristics of the Innovation	User Characteristics and Perspectives
all major users perspectives were reported at early stages of project design	considered better than what has been used	users see a need for the innovation
planned availability for needed capital investments	consistent with existing values, past experiences needs of receivers	users understand the innovation
project is linked to other hi-priority programs of organizational change	can be experimented with on a trial basis	users perceive the innovation in a positive way
	the results of using it are observable	users understand how the innovation can be used in a helpful way
	low level of risk is associated with using it	users are prepared to incorporate the innovation into their work
	considered useful (e.g., saves time, helps get job done)	
	perceived as having a reasonable financial cost	
	considered a quality innovation	

Continued on next page

TABLE 2.1 Factors That Influence The Successful Adoption Of Innovation (Continued)

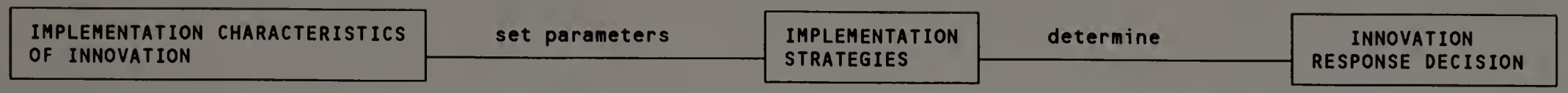
Characteristics of the Organization (structure and climate)	Characteristics of the External Environment	Implementation Strategies
a single individual or office is responsible for computer related issues	availability of feder funds	emphasis on presence of enthusiastic initial users to promote innovation under a plan of controlled diffusion
programs, practices and processes are coordinated to achieve goals	community support/pressure	sponsors of the innovation control the pace of change allowing for implementation in stages
involved administrators	central legislation or policy	adaptations are made as needed
involved users		access to information about the innovation is readily available
established communication lines exist		users allow and guide mutual adoption of the organization and the innovation
shared goals and values among members		supportive organizational arrangements exist (scheduling, staffing, providing materials, space, and equipment)
strengths and weaknesses of organization are understood		training is provided (workshops and demonstrations)
a bias toward action		external communication (innovation is described to those outside the organization at meetings or conferences)
encourages change		adequate time to learn the innovation is available
respect for individuals		
autonomy and creativity are valued		
training and resources to support the innovation are available		

Continued on next page

TABLE 2.1 Factors That Influence The Successful Adoption Of Innovation (Continued)

	Implementation Strategies
	opinion leaders/change agents are identified and used to promote change
	consultation and reinforcement is provided (individuals are encouraged,. coached, hints are shared, attempts at change are facilitated, success is celebrated)
	monitoring (data is gathered, evaluated, and outcomes are shared)

TABLE 2.2 Leonard-Barton's Model Of Implementation Characteristics, Implementation Strategies, And Innovation Responses



CHARACTERISTICS

- TRANSFERABILITY
  - PREPAREDNESS
  - COMMUNICABILITY
- IMPLEMENTATION COMPLEXITY
  - ORGANIZATIONAL SPANITY
  -ORGANIZATIONAL SCOPE
- DIVISIBILITY
  - MODULARIZATION
  - INDIVIDUALIZATION

GENERIC STRATEGIES

- INVOLVEMENT OF OTHERS
- LEADERSHIP
- MUTUAL ADAPTATION OF ORGANIZATION AND TECHNOLOGY

RANGE OF RESPONSES

- WHOLEHEARTED ACCEPTANCE OF OTHERS TO REJECTION OR SABOTAGE

TABLE 2.3 Working Model Of The Implementation Process

KEY CONSIDERATIONS FOR THE IMPLEMENTATION OF INNOVATIONS	set parameters	IMPLEMENTATION STRATEGIES	determine	INNOVATION RESPONSE DECISION
A. CHARACTERISTICS OF CHANGE 1. NEED 2. CLARITY 3. TRANSFERABILITY 4. COMPLEXITY 5. DIVISIBILITY 6. QUALITY/PRACTICALITY B. LOCAL CHARACTERISTICS 1. ORGANIZATIONAL STRUCTURE 2. ORGANIZATIONAL CLIMATE C. EXTERNAL CHARACTERISTICS 1. LEGISLATION 2. POLICY SETTING 3. MARKETPLACE PRESSURE		1. INVOLVEMENT OF OTHERS 2. USE OF OPINION LEADERS 3. VISION-BUILDING 4. FACULTY DEVELOPMENT/ EMPOWERMENT 5. RESOURCE ASSISTANCE 6. MUTUAL ADAPTATION OF ORGANIZATION AND TECHNOLOGY 7. MONITORING/PROBLEM COPING		RANGE OF RESPONSES *WHOLEHEARTED ACCEPTANCE OF OTHERS TO REJECTION OR SABOTAGE

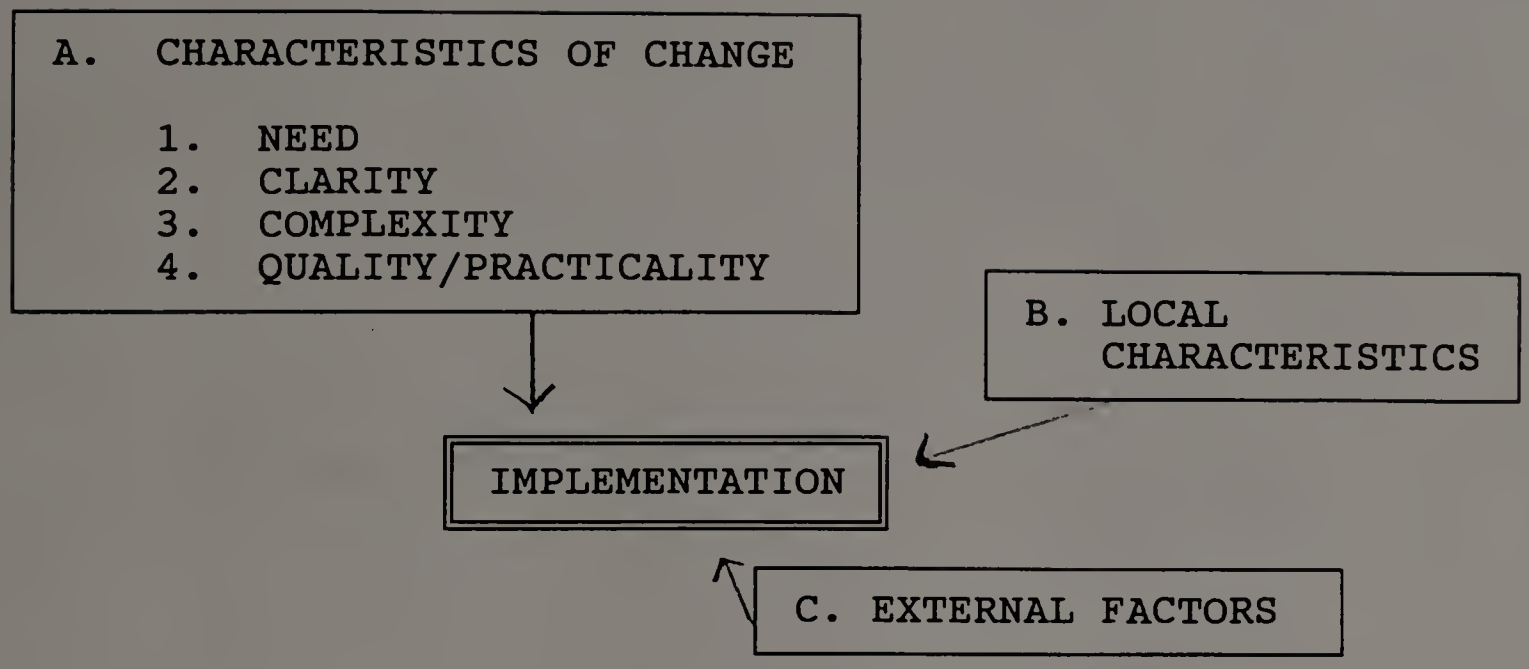


FIGURE 2.1 Fullan's Interactive Factors Affecting Implementation

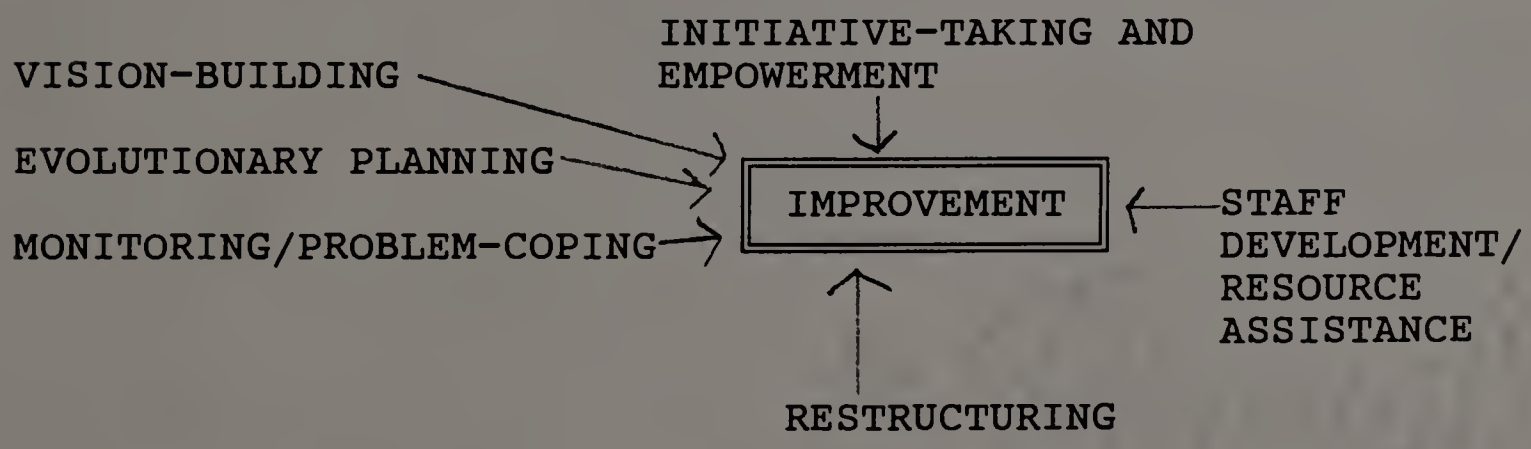


FIGURE 2.2 Fullan's Key Themes Affecting Implementation

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

Introduction

In this study faculty concerns about a technological innovation were examined as a way of gathering knowledge about the intricacies of the implementation process. This chapter will describe the research design, the methodology, the subjects, the instrumentation, the timeline and the data collection and analysis techniques for this study.

Keene State College is a multi-purpose, predominantly undergraduate state college within the University of New Hampshire system. The College confers associate's, bachelor's and graduate degrees. During the 1991-1992 academic year, more than 3,200 men and women were enrolled as full-time undergraduate students. There were 415 graduate students. There are approximately 160 full-time faculty members, the majority of whom hold a doctorate degree.

In January 1992, the President Sturnick sent a letter to the campus community informing people of the impending arrival of personal computers (see Appendix G, p. 170). All computers will be eventually connected to a network, which will facilitate communications across campus as well as off-campus. The cost to purchase the necessary new microcomputers was $838,000.

Every faculty member has a computer as a result of this project. The majority of faculty members received new microcomputers, either an International Business Machine PS/2 (IBM), a Toshiba laptop, or a MacIntosh desktop (MAC). Others have recently received a new computer paid for by the college, and still others have agreed to take a fairly new computer from a colleague. All full-time faculty members are targeted to receive this innovation. Any concerns about how this innovation has been perceived by the faculty was the focus of this study.

Using the working model framework developed in Chapter Two, initial expectations of faculty perceptions were as follows. Some faculty would express certainty about the system fulfilling a need while others would feel confused and anxious about it and therefore see little or no need for the new computers.

Clarity refers to member's understanding of what should be done differently as a result of this innovation. There was no indication that the administration can or will mandate or police use of the new microcomputer system.

The innovation could be viewed as having varying degrees of transferability. Faculty who were familiar with microcomputer technology should find the new system relatively easy to learn and understand. However, those unfamiliar with this technology may find it confusing and challenging to learn. Microcomputer usage is often described as user-friendly, yet most users have a war story

involving a detailed description about a battle between themselves and a microcomputer.

Complexity was expected to be a function of users' computer experience. Divisibility could be considered a characteristic of this innovation, however, an administrative decision was made to equip the entire full-time faculty with microcomputers at the same time. Therefore, there was no divisibility related to this innovation.

The initial view of quality and practicality of the project was mixed because some users had already informally expressed concerns about support and training availability. Others seem to be pleased with the new system.

Faculty perceptions of the local characteristics, the external factors and the implementation strategies were expected to be varied. This could depend on the faculty member's discipline, political involvement in the organization and interest in using the new system.

The innovation response decision, according to this model, is whole-hearted acceptance or rejection of the innovation. This refers to the "attitudinal and behavioral stance" (Leonard-Barton, 1988, p. 604) taken by the targeted users of the innovation. The innovation response made by users determines the extent to which the innovation is used and routinized.

According to the literature, the innovation response is influenced by two major forces: the innovation's characteristics (Leonard-Barton, 1988) and the way the innovation

is introduced (Ginzberg, 1979). Therefore, those in charge of carrying out the implementation of an innovation bear much responsibility for the degree to which the innovation is accepted by users. Understanding the characteristics of an innovation can influence the strategies designed to make it operational. The implementation process must be managed by shaping strategies that will increase the chances of the acceptance of the innovation by targeted users. It was not expected that faculty would be required to use the new system, therefore based on the presupposition that the administration would not require faculty to use the new system, innovation responses were expected to range from no use of the system to a high level of use. For the purposes of this study the innovation response decision was based on the users' perceptions of the advantages and disadvantages of the system.

Research Design

The research design for this project was the case study approach with a modified version of analytic induction (Robinson, 1951; Katz, 1983; Taylor & Bogdan, 1984). Merriam (1988) notes the case study approach has been used effectively to explore a particular event that takes place in a specific setting. The setting for this work is Keene State College in Keene, New Hampshire. According to a definition by Smith (1978) a college faculty is an example of a bounded system for the focus of investigation. The

event studied was the project to equip the full-time faculty with microcomputers. A case study design was chosen because this was a descriptive research study with findings that describe and explain rather than predict based on cause and effect. McMillan and Schumacher (1984) note that descriptive research is useful for characterizing things and may even suggest causal relationships. It differs from experimental design in that there is no manipulation of treatments or subjects. According to McMillan and Schumacher (1985, p.26) "The researcher takes things as they are".

This study has, by design, the four essential characteristics of a qualitative case study suggested by Merriam (1988): particularistic, descriptive, heuristic, and inductive. It is particularistic because it focuses on a particular event. It is descriptive because the end product is rich with detail and description about the event. Heuristic means that the study will increase understanding of the event being studied. Inductive means that the study was not driven by hypotheses but relied on emergent thinking based on the findings as the study proceeded.

A case study approach based on a modified version of analytic induction means that a conceptual framework has been suggested as a way to explain the implementation process. The data collected in this study were used to comment on a model. The conceptual framework can be reformulated as warranted by the data. The outcome may be a reformulated version of the original framework model that

reflects the majority of findings supported by the data or confirmation of the usefulness of the model in its current form.

The research design was exploratory which gave the research an openness or flexibility that allowed the particulars of the final product to evolve. The end product of this study is intended to be largely descriptive and evaluative. The descriptive data are held up to the conceptual framework presented in Chapter Two to support or to challenge the model that was developed, based on assumptions, before data gathering. Shaw (1978) called this an analytical mode of analysis because of its complexity and theoretical orientations.

In summary, the case study approach can suggest what to do or not to do in a particular situation based on its particularistic nature. It can also illustrate the complexities of a situation due to its descriptive nature. The heuristic quality of the study can help explain why an innovation worked or failed to work. According to Stake (1981) this type of knowledge is more concrete, and more contextual than that resulting from other types of research. The analytic induction process has been used to think about the data's contribution to theory formulation throughout the process.

This research process was based on a phased design using a number of different data collection techniques. The data collection process is directly linked to evaluating the

implementation process model described in Chapter Two, Table 2.3 (p. 62).

Several statistical methods were used for data analysis. The survey instrument asked about respondents discipline, age, gender, number of years at Keene State College, faculty rank, faculty status, number of years as a full-time faculty member, opportunity to give input into the decision to equip the faculty with microcomputers, perceived level of input into the decision, reasons for using a computer, software experience, and when they would be interested in learning more about the software. These results are reported in Chapter Four based on the results of frequency analysis.

The Stages of Concern questionnaire asks for reactions to statements about faculty concerns. The questionnaire was scored according to the procedures in the instruction manual for this instrument. The highest and second highest stages of concern are presented and interpreted in Section Two of Chapter Four. In addition, the scores were studied for identifiable patterns of concern. The grouping of individual scores into patterns or clusters is also reported in Chapter Four.

In order to determine if there was a relationship between the variables discipline, age, gender, number of years at Keene State College, faculty rank, faculty status, number of years as a full-time faculty member, and the reported stages of concern; repeated measures multi-variate

analysis of variance (MANOVA) was conducted. Due to the fact that the Stages of Concern scores would not be expected to be normally distributed and could have violated the assumption of compound symmetry or homogeneity of variance, the multivariate F tests are also reported because they do not violate compound symmetry. The Box's M tests verified this.

Other key factors that were analyzed included (1) the possibility of a relationship between computer experience and reported Stages and Concern, and (2) the presence of a relationship between perceived input into the decision to equip the faculty with the networked system and reported stages of concern.

Analysis of the survey instrument resulted in scores for self-reported computer software experience and scores for when an individual would be interested in learning a software package. These results stimulated further analysis to see if there was any relationship between these two sets of measurements for faculty and their demographic variables. One way analysis of variance (ANOVA) was used to test for a statistically significant relationship. Non-parametric Kruskal-Wallis analysis was also conducted because of the nature of the data.

Qualitative data analysis began with the written responses to the open-ended question:

> When you think about the microcomputers for full-time faculty, what are you concerned about?

Responses were broken down into content units of statements that were identifiable for a specific point being made. Statements were labeled for the type of concern expressed and a tally of expressed concerns according to the stage of concern represented was tabulated.

Finally, thirty-nine faculty were interviewed (27 men and 12 women). The interviewees were provided with a written assurance of confidentiality (see Appendix K, p. 185). The sessions were taped for the sole purpose of being able to better analyze the discussion. This analysis centered on (1) faculty perceptions of the characteristics of the innovation, and the implementation strategies used and (2) faculty responses to the innovation. Interview data is presented according to the outline of the working model of the implementation process presented in Chapter Two.

To summarize, analysis required both quantitative and qualitative methods as follows:

- frequency analysis to tabulate responses on the survey instrument
- scoring of Stages of Concern questionnaire according to previously developed procedures
- repeated measures, multi-variate analysis of variance to study the possibility of a relationship between the demographic variables and stages of concern
- analysis of variance to study the possibility of a relationship between input into the decision and Stages of Concern
- analysis of variance to study possible relationships between demographic variables and two other self-reported survey items: (1) computer software

experience and (2) when an individual is interested in learning a software package

- analysis of written statements according to the Stages of Concern indicated

- analysis of interview discussions according to the components of a model of the implementation process.

Detailed data analysis is presented in Chapter Four. The results showed that each data collection process provided information that contributed to an overall picture of the project at Keene State. The findings are integrated in the discussion of the conclusions in Chapter Five.

Description of the Sample

The full-time faculty at Keene State College were purposively selected for study. The administration at Keene State was supportive of the study from its inception so there were no problems with access. Response rate to the instrument was strong, in part perhaps because this researcher is a colleague in good standing at the college. There are 160 full-time faculty at Keene State College. This includes the librarians and faculty who work at the Wheelock School, an elementary school associated with Keene State. These two groups were not included in this study because the purpose was to investigate concerns of those who teach in higher education. Several faculty were on leave of absence or sabbatical which left the number available to participate in the study at 143. A brief description of this group follows based on the best available data. The

143 faculty members included 39 percent that were full professors, 34 percent associate professors, 24 percent assistant professors, leaving three percent that were instructors. There were just over twice as many men (68 percent) as women (32 percent) in this group. The frequency analyses in Chapter Four indicate that the respondents are representative of the faculty.

Faculty make particularly interesting subjects because of the uniqueness of the employee-employer relationship. In most relationships of this type the employee must fulfill certain responsibilities designated by her/his boss or risk losing the job. Employees are generally in a hierarchical relationship with their boss and are evaluated at intervals. In this relationship if one's boss requires the employee to learn and utilize a computer for the task at hand, most employees would learn the new system, however grudgingly, or risk hurting their job status.

Faculty members do not have this superior-subordinate type of relationship. They are fairly autonomous in their jobs. In terms of management structure, faculty members consider themselves in a partnership with administrators as far as how the school is run, as evidenced by the power of faculty senates and the power to strike of some unionized faculty. According to Hawkins (1989, p. 4): "It has been suggested that faculty governance was the original oxymoron, in that faculty may be lead, cajoled, and induced, but certainly not managed". Given the unique nature of the

position of a faculty member, leaders interested in promoting change must develop strategies to motivate faculty members to partici-pate in the change process.

The desire to embrace change can be intrinsically or extrinsically motivated. The 1990 EDUCOM/University of Southern California Survey of Desktop Computing reported upon earlier in this paper, noted that few institutions offer faculty incentives or rewards for developing uses of technology. One of the major objectives of this study was to discover the range of concerns faculty face when confronted with an innovation. Specific strategies for addressing these concerns were suggested by the faculty that participated in the study.

Instrumentation

Following a letter of introduction (Appendix A, p. 151), there were three parts to the instrument. The first part was the Demographic Survey (Appendix B, p. 154) followed by the Stages of Concern Questionnaire (Appendix C, 159). The last section consisted of one open-ended response question (Appendix D, p. 163). A postcard was attached to the instrument (Appendix E, p. 165) which asked participants if they were willing to be interviewed. The actual interviews involved a wide range of faculty to avoid the possibility that those were mostly enthusiastic about the project were the ones who returned the postcards. Additional names of people to interview were solicited from

the Dean and from other faculty members. These were interviews with people who were known to be disgruntled with the project, who were avid computer users or who in some way would be expected to be knowledgeable about or interested in this project to equip the faculty.

The survey, questionnaire and open-ended question were all distributed and returned through campus mail at Keene State College. The Demographic Survey was a series of demographic questions that provided background information about the respondents. The survey was designed to get at key variables about the participants that can compared to expressed stages of concern. There were also questions asking how faculty perceive their input to the decision to equip the campus with personal computers and questions about software experience.

The Stages of Concern questionnaire has 35 statements. Faculty response is indicated by circling a number between 0 and 7 based on a Likert-scale type continuum. This part of the instrument was used to collect data on perceived concerns about the innovation faculty are facing. The SoCQ was developed after three and one-half years of research and development at the University of Texas. The SoCQ was designed for studying concerns of those involved in the adoption of a process or product innovation. It has been tested for reliability, internal consistency, and validatity with different samples and at least eleven different innovations. Research results provided assurance that the

SoCQ measured the hypothesized stages of concern. The reliability and validity of the questionnaire are described in the manual for the Stages of Concern questionnaire by Hall, George & Rutherford (1979) and has been discussed in detail by Randall (1991).

The developers indicate that the slightest modification of the SoCQ could result in invalidation of the scoring and norming standards and ultimately to misinterpretation of the results (Hall et al., 1979, p.57). For this reason the SoCQ was given in its original form.

The Demographic Survey and the Stages of Concern Questionnaire portions of the instrument should take about thirty minutes to complete. The last part of this three part instrument is one open-ended question. Some responses were very brief, some quite lengthy, some wrote nothing. All responses are shown in Appendix O (p. 192).

The interviews were conducted with two primary purposes in mind. First, to understand how the subjects structure their thoughts about the project to equip the full-time faculty with microcomputers. The initial questions were open-ended, offering the interviewees considerable latitude to tell their own story in their own words. This gave the interviewee an opportunity to shape the content of the interview. Bogdan & Biklen (1992) found that this technique gavie more complete information.

The second purpose of the interview was to gather data in the form of the faculty member's words to confirm the

conceptual framework for the implementation process proposed in Chapter Two. Depending on how the interview proceeded, the conversation was guided with some topical questions of the form suggested by Merton & Kendall (1946). The initial interview protocol is shown in Appendix J (p. 180). Throughout the interview every effort was made to help the subject feel at ease so they would speak freely as recommended by Briggs (1986). The interviewees were encouraged to say if there were any questions that make her or him feel uncomfortable. However, this never appeared to be a problem.

Timeline

The instrument was mailed out to all full-time faculty at KSC via campus mail. Faculty were asked to return the questionnaires within three weeks. Those who had not returned the questionnaire were followed up by leaving a message on voice mail and by sending them another package of information. Interviews were conducted in April, May, and June.

Data Collection and Analysis

Data collection began with respondents completing the three part instrument. Once this process was completed thirty-two interviews were conducted. The research design provided for the collection of both quantitative and a qualitative data. This approach has been supported by

Rossman and Wilson (1985), Miles and Huberman (1984), and Reichardt and Cook (1979). The SoCQ and the Demographic Survey made up the quantitative portion of the study. Appendix H (p. 172) shows the 35 statements on the SoCQ arranged by Stage of Concern.

The data from the Demographic Survey can be related to the SoCQ results. Statistical analysis in Chapter Four presents the survey data and the results from the concerns questionnaire. Donald Horsley, from The Network Educational Collaborative and an experienced user of SoCQ, helped with the interpretation process. The SoCQ manual also provided guidelines for interpretation. These are presented in Appendix I (p. 175). The survey data has been organized in table form and presented in Chapter Four. The thirty-nine interviews that were conducted were a useful source of data. In order to make sense out of the data recurring themes were reported.

Summary

This study used a modified case study approach to examine faculty perceptions about a new networked system of microcomputers. A survey instrument was used to gather data on demographics, computer software experience, and other factors. Faculty concerns about the project were analyzed based on responses to the Stages of Concern questionnaire, an open-ended response question, and individual interviews. The results are reported in Chapter Four.

CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA

Data collected from the demographic survey instrument, the Stages of Concern questionnaire, the open-ended question and the taped interviews will be presented in this chapter. This information will be presented in two sections. Section One presents the quantitative results: the findings from the survey questionnaires and the scores on the SoC questionnaires. Section Two describes the themes that emerge from the qualitative data gathered from two sources: written responses to the open-ended question at the end of the SoC questionnaire and taped interviews.

Section One: Quantitative Findings

The purpose of this study was to use the case study approach in conjunction with a modified version of analytic induction to examine concerns of faculty at Keene State College regarding the new system of networked microcomputers being installed at the College. Two questionnaires were sent to faculty members. The first questionnaire (Appendix B, p. 154) profiles the faculty for demographics, computer usage and experience, and perceptions about participation in the decision to equip the faculty with networked microcomputers. The second questionnaire (Appendix C, p. 159) was used to assess concerns about the new networked system of computers.

Section One - Part One: Survey Questionnaire Responses

Ninety-six questionnaires, out of a possible one hundred forty-three, were returned by Keene State faculty, however, some respondents chose not to answer certain questions so the total number of respondents varies by question. The results of the first seven questions on the first questionnaire provide a profile of the ninety-six faculty respondents as to (1) academic discipline, (2) age, (3) gender, (4) number of years at Keene State College, (5) faculty rank, (6) faculty status, and (7) number of years as a full-time faculty member (inclusive of all faculty experience).

The data indicated participants represented a broad range of disciplines. The 25 departments at KSC have been categorized according to five disciplines. This is shown in Appendix L. The majority of the participants fell in the 46-55 year old age range with male respondents outnumbering female respondents two to one. The greatest percentage of faculty participants were tenured, assistant or associate professors and had been full-time faculty for less than twenty-five years. An equal number of faculty members had been at Keene State College for under ten years or for between eleven and twenty-five years. Only a very small percentage had been at Keene for over twenty-six years.

The questionnaire (Appendix B) called for a specific numeric response for several answers (e.g. age), however; these responses are presented in interval range categories

in order to get a clearer sense of the data. In addition for reporting purposes the twenty-five disciplines at Keene State College have been condensed into five major areas (see Appendix L, p. 187). Tables 4.1-4.7 (pp. 120-123) show the actual demographic results reported by respondents.

This questionnaire was also used to gather data about computer usage and experience. Respondents reported that they primarily use computers for correspondence, teaching, research and literature searches as shown in Table 4.8 (p. 123).

Question 11 on the survey questionnaire asks respondents to: (1) identify their level of experience (e.g. none, beginner, intermediate, or advanced) for fourteen types of software packages and; (2) indicate when they would be interested in learning more about those same types of software packages (e.g. this year, next year, no interest). Part two of question eleven is not asking the respondent to take into account previous experience with a particular type of software. It is simply trying to get a feel for what faculty are interested in learning in order to propose appropriate training programs.

The responses of self-reported computer software experience were used to get an overall figure representative of the group's computer experience. A value of 1 was assigned to those checking off no experience with a type of software, a value of 2 was given to the beginner level, 3 was for the intermediate level, and 4 for the advanced

level. The average reported values were divided into four fairly equal categories. Category one included values 1.00 through 1.20 (little or no experience on average), category two values 1.23 through 1.50 (beginner level 1, on average), category three 1.54 through 2.00 (beginner level 2, on average) and category four 2.15 through 3.77 (beyond a beginner level of experience). The results of frequency data analysis that gives one score for each individual based on how they rated their experience on fourteen types of software types is shown in Appendix M (p. 189). A summary of the results from this analysis are shown in Table 4.9 (p. 124).

The interesting finding is that most of the faculty consider themselves beginners in terms of computer software experience. Word-processing is the only software package a majority reported knowing at least an intermediate level of experience. Tabulations of responses to both parts of Question 11 are shown in Tables 4.10 (p. 125) and 4.11 (p. 126). Table 4.10 shows self-reported experience by software package and Table 4.11 shows self-reported interest in learning new software according to various time frames. The problem with drawing conclusions from self-reported scores is that individuals may overclaim or underclaim their experience level. However, it is the individual's perception that is of importance in this research. These three tables (4.9 - 4.11) show that although the faculty do not report even intermediate levels of experience with most

software, the majority are interested in learning various types of software in the near future.

Other findings show that the majority of faculty in the study felt they had offered no input into the decision to equip the faculty with networked microcomputers nor had they had an opportunity to do so. Tables 4.12 and 4.13 (p. 127) provide this data. These results suggest that the majority of users did not participate in the decision to bring the networked computers on campus. The interview data provides more detail about how the faculty feel about opportunities to participate in this decision-making process. The working model of the implementation process suggests that lack of user involvement may lead to poorly designed implementation strategies.

This concludes the presentation of the responses to the first questionnaire. The demographic information presented in this chapter is useful for developing an understanding of the population under study. The other survey questions provide data which will be used to suggest interventions to further the successful implementation of the networked microcomputers at Keene State College. This will be presented in Chapter Five. In the next section, Part Two of Section One, a brief description of how meaning is derived from the SoCQ scores will be presented followed by the findings from the SoCQ instrument.

Section One - Part Two: SoCQ Scores

The Stages of Concern questionnaire is a 35 question, Likert scale instrument that has five statements for each of the seven stages of concern. The questionnaire is very easy to score. Each stage of concern receives a raw score based on respondents individual scoring on each of the five questions pertaining to a stage of concern. This raw score is converted to a percentile score using the raw score - percentile conversion chart for the Stages of Concern Questionnaire shown in Appendix N (p. 191). The percentile scores are graphed in order to get a visual sense of the relative intensity of concerns. In general, the higher the score for a stage of concern the more intense the concern is believed to be. Detailed instructions on how the Stages of Concern questionnaire is scored can be found in Measuring Stages of Concern About the Innovation: A Manual for Use of the SoC Questionnaire (Hall, George, and Rutherford, 1979).

Group and individual data are reported in this section. Group data are reported first followed by a complementary analysis of individual concerns data. The data presented include: (1) the seven stages of concern according to a tally of the number of faculty scoring highest at that stage of concern (Table 4.14 on page 128), (2) a detailed analysis of the scores on the five statements that make up the most frequently reported stage of concern, Awareness (Table 4.15 on page 128), (3) the second highest stages of concern reported by faculty members (Table 4.16 on page 129), (4) a

description of individual profile patterns with a tally of the number of faculty members that exhibit each pattern (Table 4.17 on page 129), and (5) a summary of the findings of the SoCQ scores. The procedures for analyzing the SoCQ data were based on methods recommended in the manual by Hall, George and Rutherford (1979) because they have been shown to be useful in providing more complete information about a group being studied.

Analysis of the first and second highest stages of concern offers insight into the nature of concerns of the faculty as a group. As previously noted, a high percentile score generally indicates an intense concern at a particular stage of concern. Scores on the Awareness stage are an exception. Higher scores on Awareness Stage 0 usually indicate awareness of the innovation and little concern. Low percentile awareness scores can signal concern about the innovation. The majority of respondents scored highest on Stage 0 Awareness, as can be seen in Table 4.14. This suggests that the faculty were aware of the networked microcomputers and were not overly worried about the project. The interpretation is based on previous concerns theory research using group data that showed:

- SoCQ scores < the 41th percentile indicated high concerns at this stage
- SoCQ scores > the 74th percentile indicated little concern at this stage.

Scores on Stage 0 Awareness in this study were as follows:

- 6 people (7 percent) with scores < the 41th percentile
- 48 people (55 percent) with scores > the 74th percentile
- 33 people (38 percent) with scores between 41st and 74th percentiles.

Therefore, although the greatest number of individuals reported the highest score on Stage 0 Awareness, the data suggests the faculty generally do not have strong concerns about the innovation. However, it is important to note that 45 percent of the respondents' scores do indicate at least a moderate level of concern at this stage.

Further analysis was conducted in order to substantiate this interpretation. The mean scores for each of the five statements pertaining to the Awareness concern were calculated. The average acore for the stage of concern is reported in Table 4.15.

These results suggest that the high score on Stage 0 Awareness (50 persons or 58.1 percent) mean that: (1) the group being studied is aware of the innovation (see mean scores on question #3 and #23, (2) are busy with activities that do not involve the innovation (see mean score on question #21 and #30), (3) have some concerns about the innovation (see mean score on question number #12), and (4) have some interest in learning about the innovation (see mean score on question #30). Since the faculty were given

many opportunities to become aware of the installation of the new system e.g. communication from the president's office (see Appendix G, p. 170), notices in the faculty newsletter, communication with discipline coordinators regarding the new microcomputers, and the cover letter of the questionnaire used in this study, it is reasonable to conclude that they were aware of the innovation. The scores show the highest overall Stage of Concern for the faculty as a group was Awareness. The interpretation is that the faculty are aware of the networked microcomputers and are not overly worried about them. Scores on Stage 0 Awareness are more indicative of awareness of networked microcomputers on campus than of concern. Therefore, the concerns of importance are revealed by looking at the Stage or Stages of Concern that receive the second highest scores. Table 4.16 shows the number of individuals rating a Stage of Concern as their second highest stage of concern. The greatest number of faculty indicated that Stage One Informational (25.6 percent or 22 persons) was an important concern. Stage Two Personal and Stage Three Management scores had an equal number of respondents (22.1 percent or 19 persons) with scores very close to Stage One scores.

These findings suggest a faculty profile consisting of individuals who want more information about the innovation (Stage 1), have concerns about the innovation's impact on their lives (Stage 2), and are concerned about how to manage or use this new system (Stage 3). The concentration of the

group's concerns center around a need for understanding more about the innovation and how to manage its use.

Analyzing the results of individual questionnaires enables intense concerns to be identified and suggests categories of concerns that may exist. Individual profiles are studied for patterns and separated into identifiable categories. This analysis begins by plotting individual responses as suggested in SoCQ manual patterns of concern. The SoCQ responses in this study indicate a broad range of concerns amongst this faculty. Four commonly found patterns of concerns identified by Hall, Rutherford and George (1979) are shown in Figures 4.1 through 4.4 (pp. 132-135).

Figure 4.1 (page 132) illustrates typical, positive, nonuser concerns. The highest stages of concern are 0, 1 and 2 (and sometimes 3) and the lowest are 4, 5, and 6. This profile describes a nonuser who feels positive about the innovation and is interested in learning more about it. Concerns about management that influence students, and how to maximize use of the innovation are not important at this time to an individual with this profile. Approximately 18 (21 percent) of the respondents fall into this pattern.

Figure 4.2 (page 133) illustrates the profile pattern of a nonuser who has a negative attitude about the innovation. This type of person has various degrees of doubt about its use and therefore may exhibit resistance toward its the innovation. This profile is characterized SoCQ scores that are higher for Stage Two Personal than for Stage

One Informational. Research has shown that an individual with this profile may not be interested in learning more about the innovation, and must have their personal concerns reduced before they can consider the innovation in an objective or positive manner.

Characteristic of this profile is a markedly higher score for Stage Six, Refocusing than for the previous Stage. This "tailing-up" is an indication that this person feels that there are other ideas that have more merit than this innovation. Interviews with a number of faculty who were very upset about this innovation support these SoCQ data. There are 34 (40 percent) profile patterns that indicate resistance to the networked microcomputer project. This pattern constitutes the greatest majority of the four patterns found.

The third profile pattern is one that exhibits a single peak (excluding peaks at Stage 0 Awareness). Figure 4.3 (p. 134) illustrates this profile. Evidence of a peak that is 20 percentile points above the next highest point suggests intense concern at a particular stage. The most frequently seen peak concern in this study is a Stage 3 Management concern. There were 12 incidents of this as a peak or intense concern. Other peak concerns were in evidence at Stage 1 Awareness (6 peak scores), Stage 5 Collaboration (5 peak scores), Stage 6 Refocusing (3 peak scores), and Stage 4 Consequence (1 peak score). There were a total of 27 patterns (30 percent) that showed single

peaks, excluding responses that fit better into other patterns.

A fourth profile pattern that emerges from these data is that of the user that has two relatively strong areas of concern. An example of the multiple peak profile is shown is Figure 4.4 (p. 135). This individual has management concerns (Stage 3) and at the same time is thinking about Refocusing (Stage 6) concerns. There were eight (9 percent) individuals that showed this type of profile. Table 4.17 is a summary table showing how many individuals exhibited each kind of profile.

The group data profile and the individual analysis provide a look at the concerns of the people who are potential users of the innovation. Understanding the stage of concerns most frequently identified can help with the development of appropriate interventions that may lead to greater acceptance of this innovation. A fundamental assumption of Concerns theory is that it is an individual's perceptions that arouse concerns, not necessarily the reality of the situation. Awareness of concerns can lead to personalized interventions; however, ultimately it is the individual who determines whether or not a change in attitude will take place.

Additional analysis using the SoCQ scores included investigating whether or not relationships exist between variables indicated in the first survey questionnaire and the SoCQ scores. This analysis involved matching the

responses from SoC questionnaires with available demographic data. Individuals with demographic data who did not complete the SoC questionnaire were treated as missing data. Repeated measures MANOVA was carried out with the seven Stages of Concern as the dependent variables and the seven demographic variables as independent factors. The independent factors were: (1) discipline, (2) age, (3) gender, (4) number of years at KSC, (5) faculty rank, (6) faculty status, and (7) number of years as a full-time faculty member. Table 4.18 (page 130) shows the F statistics for the three MANOVA tests reported: Pillais, Hotellings, and Wilks. An F value with a probability less than .05 would be considered significant. All MANOVA tests indicated no significance at this level. These statistical results suggest that demographic variables do not have a significant influence on reported types of concerns. This confirms previous Stages of Concern research that reported demographic variables are not the critical variables associated with implementation concerns (Hall, Rutherford, and George, 1979). This research found that the way in which the innovation was implemented, the strategies or interventions used and the conditions associated with the innovation were more critical to an understanding of the kinds of concern.

The next set of findings are the results of one-way analysis of variance tests. The non-parametric Kruskal-Wallis was also conducted in each case. The non-parametric tests supported the findings of the parametric test except

in one case. These results are included in the findings that follow.

Further analysis looked for a relationship between input into the decision and reported Stages of Concern. There was no statistically significant relationship apparent between whether or not an individual reported having input into the decision to equip the faculty with computers and reported levels of concern.

Analysis of variance techniques were also used to compare mean levels of computer experience and Stages of Concern responses to determine if computer experience had any influence upon reported levels of concern. Computer experience was quantified as the mean of the responses to question number eleven on the first questionnaire. The experience levels of the fourteen types of software packages included in this question became the fourteen variables used to determine the mean level of computer experience. For analysis purposes the reported levels of experience were subdivided into four levels.

As described earlier in the Chapter, experience level one took on values 1.00 through 1.20 as seen in Appendix M (p. 189). Experience level two included values 1.23 through 1.50; experience level three included values 1.54 through 2.00; experience level four, values 2.15 through 3.77. Analysis of variance (ANOVA) with computer experience as the independent factor and the Stages of Concern 0 through 6 as the dependent measures showed a statistically significant

difference ($p < .05$) for reported experience levels and reported stages of concern for two stages of concern: Stage 0 Awareness and Stage 4 Consequence. The results of the non-parametric Kruskal-Wallis also showed significance at Stage 5 Collaboration and Stage 6 Refocusing.

Significance for Stage 0 Awareness is consistent with previously stated analyses on highest stages of concern reported (refer to Table 4.14). High scores on Awareness were said to indicate little concern about the innovation; scores that may be attributed to those with computer software experience. Low scores on Awareness were said to indicate concern about the innovation; scores that may be attributed to those with little computer software experience.

The findings show a statistically significant difference between computer sortware experience and reported concerns at the higher Stages of Concern. This suggests that more experienced users have different kinds of concerns than less experienced users. These results are consistent with concerns theory and previous research using the Stages of Concern questionnaire. That is more experienced users would be expected to have higher stage concerns while less experienced users would show lower stage concern. An interpretation of these findings suggests that more experienced users are interested in how to use the new computer system in their work with students. They are interested in collaborating with colleagues on the use of

the system. They also have ideas on how to use the sustem in novel ways. Less experienced users are probably concentrating on how to learn to use the innovation themselves rather than thinking about the aforementioned higher levels of use.

Finally, ANOVA was done to test for any significant differences between means of reported levels of computer software experience by discipline groups and reported mean levels of interest in learning new software by discipline group. Tables 4.19 (p. 130) and 4.20 (p. 131) show the means by discipline grouping and report the F Statistics. There are significant differences between the mean levels of computer experience based on discipline grouping. Table 4.19 suggests that faculty in Sciences have greater computer experience than other disciplines.

Table 4.20 shows a statistically significant difference between the self-reported means for interest in learning new software and discipline grouping. The Arts/English and Behavioral Sciences disciplines report the highest mean levels of interest in learning new software. Tables 4.19 and 4.20 together show that faculty from two disciplines report the least software expertise, and report interest in learning about software sooner than those from the disciplines with self-reported higher levels of expertise. This result is certainly what might have been predicted and it can be used as a basis for developing discipline specific training programs. This information can also assist in

developing an action plan which prioritizes campus support resources to different disciplines. In other words where the limited support personnel should concentrate their time and the use of training labs be used over a time period specified in an action plan.

Summary of Findings from SoCQ Scores

A summary of the results from the Stage of Concern Questionnaire follows:

Group Profile

Awareness was the most frequently reported stage of concern. The explanation for this is that faculty were aware of the project to bring a networked system of micro-computers to the college. The second most frequently reported stages of concern were clustered around information, personnel and management. This may be useful information for designing future implementation strategies.

Individual Profile Patterns

Four major patterns emerged from the data: 1) positive non-users, 2) negative non-users, 3) those with a single intense concern, and 2) those with more than one intense concern. Negative non-users and those with a single intense concern were the most frequently identifiable patterns of concern. This may be useful when designing intervention

strategies because now more information is available about the characteristics of the audience involved.

Results of Statistical Analysis

1. There was no statistically significant difference found between the variables reported on the survey instrument and the Stages of Concern using repeated measures MANOVA.

2. There was no statistically significant difference between reported responses to whether or not faculty provided input into the decision to equip the faculty with the networked system and the reported Stages of Concern.

3. The more self-reported computer software experience, the higher the scores on Stage 0 Awareness and later stage concerns: Stage 4 Consequence concerns, Stage 5 Collaboration concerns, and Stage Refocusing Concerns.

4. There was a statistically significant difference between self-reported computer software experience and disciplines faculty represented. Faculty from Sciences and Management showed higher levels of experience than did faculty from other disciplines.

5. There was a statistically significant difference between self-reported interest in when faculty want to learn new software applications and faculty discipline. Those with less reported experience indicated interest in learning

new applications sooner that did those with more reported computer experience.

Section Two: Qualitative Findings

Section Two - Part One: Open-Ended Statement Response Evaluation

The first two sections of the research instrument include a demographic survey and the Stages of Concern questionnaire. These are followed by the question:

> When you think about microcomputers for full-time faculty, what are you concerned about? (Please be frank and use complete sentences.)

Analyses of the responses to this question has been guided by A Manual for Assessing Open-Ended Statements of Concern about an Innovation (Newlove and Hall, 1976). The authors promote the use of this question because it has been shown to be helpful in assessing concerns, and understanding individual perceptions. It is based on concerns theory, or the idea that individual perceptions are dependent on the unique characteristics of the multi-faceted person involved with the innovation as well as the characteristics of the innovation itself.

All usable responses to the open-ended question are shown in Appendix O (p. 192). Of the ninety-eight faculty members who returned questionnaires, seventy-three responded to the open-ended question. The responses have been separated into "content units". A content unit is a phrase,

sentence or series of sentences that expresses one central thought. Each content unit has been analyzed for both Stage of Concern and kind of concern it represents, in language specific to this project being studied.

Only five of the seven stages of concern are clearly indicated by these responses. They are Stage 0 - Awareness, Stage 2 - Personal (one response a handicapped person) Stage 3 - Management, Stage 4 - Consequence and Stage 5 - Collaboration. Table 4.21 (p. 132) shows the labeling scheme used in Appendix O and a tally of the number of people whose statements were so coded. Faculty responses to the open-ended question generally covered more than one area of concern. Although responses are not always clear cut, every effort was made to make the correct discrimination.

Table 4.21 shows that management concerns were by far the most frequently cited. The four management concerns each mentioned by approximately 30 percent of the respondents include: (1) availability of training (T), (2) the type of equipment that makes up the system (E), (3) how much the system cost and where the funds will come from to keep the system running and updated (C), and (4) the plan the administration has or doesn't have for use of the system (A). This finding is consistent with Hall and Rutherford's (1990) previous research which showed that higher Stage 3 Management concerns are consistently observed during the first year of implementation. Acknowledgment of these

concerns can lead to interventions that target the problem areas expressed by participants in the change.

It is important to note that although the research question asked for concerns, about 30 percent of the faculty included a comment that indicated they were very pleased to have the new system of microcomputers. Some of the individuals made a positive comment as well as indicating their concerns; others simply made a positive comment.

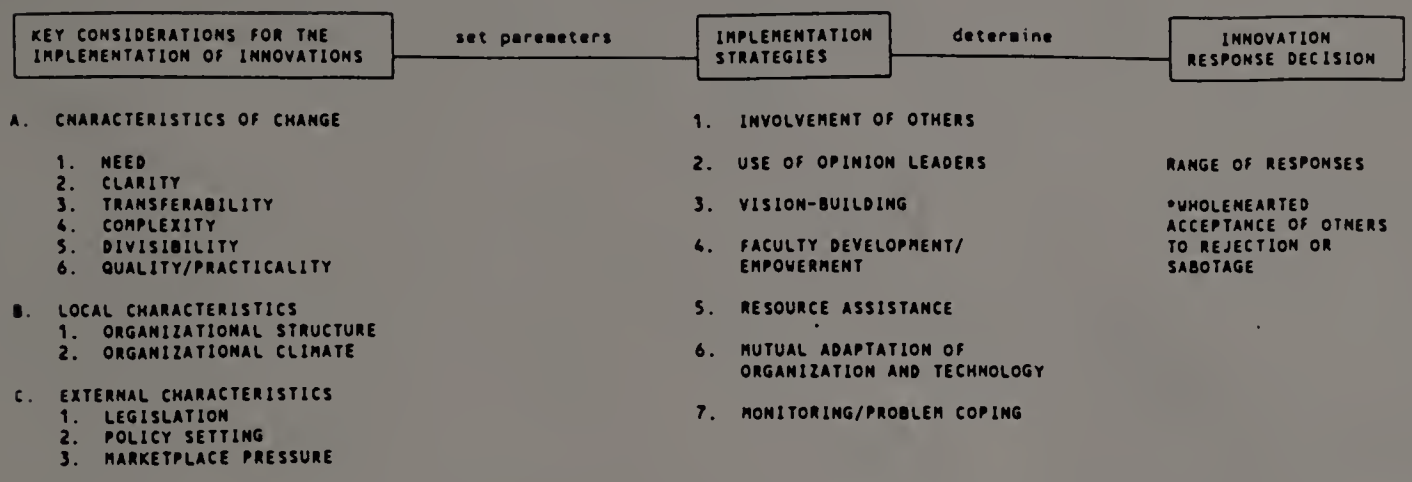
The comments do not show evidence of many higher stage concerns. Only eight faculty members expressed ideas about using the computers with students and only one talked about faculty collaborating with each other in an effort to learn how to use the system better. This would be expected given that (1) the innovation was only recently introduced and (2) that the results of the survey data indicate that, overall, this group is not highly computer literate.

The data from the open-ended question support and add insight into the findings from the Stages of Concern questionnaire. The interview data add still another dimension of richness to an understanding of faculty perceptions about this innovation. A discussion of the information from the interviews is presented in the next section.

Section Two - Part Two - Interview Data

The interview questions as shown in Appendix J (p. 180) were designed to provide additional data that could be used

to test the model of the implementation process described in Chapter Two (Table 2.3), duplicated and reduced below.



Interviewing was used for its value in data collection when using a modified analytical induction research approach (see Chapter Three for a discussion of the research methodology used in this study). In this study data were collected to discuss and to comment on the descriptive model of the implementation process shown above. As discussed in Chapter Two, the model suggests that certain implementation characteristics of innovation set parameters for implementation strategies that then determine the kind of innovation response of the people affected. The interviews for this study took place in the Spring and early Summer following a January introduction of the new microcomputer system. Each faculty member interviewed had a microcomputer on their desk, though some had not received a new model as part of this project because they had recently received a new computer as a result of other moneys being available. A small number of faculty received a used computer (but new to

them) so that a different person might make use of one of the new micros. Many faculty were not yet connected to the network and some didn't know if they were on the network or not.

The results of the interviews will be presented in this section of the paper organized according to the Working Model of the Implementation Process (Table 2.3). The components of this model are discussed in Chapter Two. The important thing to remember is that the model as it stands is based on research which suggests it is critical to understand potential users' perceptions of the implementation characteristics of an innovation so that a useful set of strategies can be developed to orchestrate change in a positive direction. Chapter Two refers to a number of authors who have reported cases where an innovation was not effectively implemented, accepted, and/or utilized by those for whom it was intended. This study attempts to offer suggestions on how implementation can be enhanced by carefully studying how the process was handled at Keene State College.

A summary of the recurring themes that faculty members mentioned are organized according to the model presented in Table 2.3 and outlined below:

A. Implementation Characteristics of Innovation

1. Change Characteristics

a) Need
b) Clarity

c) Transferability
d) Complexity
e) Divisibility
f) Quality and Practicality

2. Local Characteristics

a) Organizational Structure
b) Organizational Climate

3. External Characteristics

B. Implementation Strategies

C. Innovation Response Decision

Interviews began with a brief description of the study and an assurance of the confidentiality of the respondents' comments. Interviews were taped to help writing up results. Most interviews (all but three) were conducted in the faculty member's office. The order in which the questions were discussed depended upon how the conversation evolved but for purposes of presentation are organized here according to the model of the change process and begin with the Implementation Characteristics of Innovation.

1. Change Characteristics

a. Need

Need was asked about in relation to both microcomputers and to the need for the network. It was said over and over again that although it is clear that computers are a tool of the 90's, not all faculty will benefit from having one on their desk. There is a perception that most faculty use computers primarily for word-processing and therefore, the cost may have been excessive. However, given that the

micros were purchased, most seemed to feel the network was imperative. Some concern was expressed that using electronic mail was not very important and that using the network "just for calling up something in another building, seems unnecessary". Another individual commented that "networking for this institution is more of a toy". Other comments are listed below.

Regarding the microcomputers:

> ...some people need it more than others...I'm not sure that the arbitrary delivery of a machine to every person regardless of his or her preference was a very smart move. I mean in the sense, I'm not sure it was the best use of the resources that were being invested in this.

Regarding the network, one person said that it was great, it was wonderful, it gives rise to the possibilities of access to libraries and collaboration.

b. Clarity

There was a general consensus that no specific expectations were communicated to the faculty about how they should do their work differently as a result of having this new system of networked microcomputers. Some people had heard rumors that faculty would be expected to do new tasks now that the network was in place (e.g. register students for courses). Some expressed the wish for some information on what the computers would be used for; others said it was appropriate that no expectations were communicated because of "academic freedom".

> Well, I think that if they were going to make this an important part of the operation then they ought to say something about it. If they expect it to just develop spontaneously, it isn't going to happen.
>
> In a sense it would have been nice to have some directions so we would have a better feel for why the money was being spent, not just for the desktop computers, but for the network.
>
> Why do you give someone a tool without telling them what to use it for? To some degree faculty should have been given suggestions on how you can use it.

c. Transferability and d. Complexity

Transferability asked about how ready someone felt to use the computer while complexity asked for the person's perception of how easy or difficult it would be to use the system. Most people equated how ready they were with how interested they were either because they already knew about and liked computers, or because they welcomed the opportunity to learn to use a computer. Some did not look forward to learning to use the new technology, so the responses to this query covered a wide spectrum based on experience and interest in computers. Some expressed feelings of anxiousness and bewilderment about using the new computer, however, most of the faculty interviewed had used a computer previously and did not feel worried about using the new one.

The majority of people on campus received Macs and were aware of the MAC's reputation for being user friendly. The network, on the other hand, was somewhat of a mystery to

many. When asked if they were hooked up to the network, several people simply answered "I don't know". One faculty member said "I don't know what to do with it". Another said he would have liked "an overview of what the network means" and he suggested that a written manual of the available options would have been helpful. One person expressed great enthusiasm for the network by saying "it opens up the world for you". This science professor has used networks before to conference with colleagues and was happy to think that others at Keene State would have this opportunity. He noted that, if it is cheaper, one could "use the computer instead of the phone".

Many faculty suggested that the college could have provided more training sessions to help people get prepared for the arrival of the computers on campus. While several comments expressed the need for training sessions, it was noted that there were time constraints that could prohibit a faculty member from attending a training session. There was a suggestion that faculty be asked when they have time for training and that they be provided with a step-by-step approach. One person remarked that although the computers arrived and were set up immediately, "people weren't pre-pared" for the arrival of the computers. That is they weren't prepared as to how to use them.

Another faculty member said he "would like to have had training, but (he did not have) a lot of time" to take the opportunity to get help. In addition to training, release

time and individual training sessions were suggestions made as ways in which the college could have helped the faculty get prepared for the arrival of the computers.

e. Divisibility

Divisibility refers to the users ability to test a machine before it is introduced. The faculty were not given the opportunity to try out different machines. Therefore, the interview question asked about how faculty members chose a particular computer. Once again there were a wide range of responses to this question. For example, some people said they were simply given a computer. Others said they were asked to indicate what they wanted and to justify why this computer was the desirable system. This was generally the case where experienced users were involved. The majority were given a choice between an IBM clone and a Macintosh. Some were give a third choice, that of a Toshiba laptop computer. The following quote captures a common theme.

> Once the college made a commitment to putting a micro on each faculty's desk and networking them, they should have polled the faculty to see what they really want, perhaps giving them some options to focus on.

One faculty member mentioned several times during the interview that she thought she was getting an IBM and got a Digital computer instead. She was concerned about compatibility issues. This seems to indicate an unnecessary concern as the two computers are compatible.

It was not uncommon to hear that someone had chosen either MAC or IBM because they had used one previously or they knew someone who had. Suggestions about a selection process included providing more information about available choice with the opportunity to try one out.

f. Quality and Practicality

The project was rated both very high and very low for overall quality and practicality. The following two lists summarize what was mentioned as having been handled well and poorly related to this project.

Handled Well

- Installation of the system
- The speed at which the project was installed (particularly the Macs)
- The quality machines that were purchased
- Good software
- Helpful computer center
- The overall concept to computerize the campus was a good one.

Handled Poorly

- Preparation of the faculty
- The administrative decision to buy the computers and the network
- Printer problems
- Lack of availability of documentation
- Lack of training and support
- Location of printers - too far away from the office to ensure the privacy of the printout

- Computer furniture not available
- Acquisition of equipment
- Preparation for dealing with injuries and health problems related to the use of the computer
- Lack of useful software

A summary of the results of the interviews regarding implementation characteristics reveals that there were a substantial number of faculty who felt that the college had acquired "expensive typewriters" for the faculty who would be using word-processing packages for the most part. There were no expectations communicated to the faculty regarding use of the new system. Many were enthusiastic and ready to use their new computer and the network and were not worried about the system being difficult to use. Others showed some concern about finding the time and support to learn to use the computer and had little knowledge about a network.

The selection process was considered flawed by those who didn't want a computer or by those who wanted a more powerful computer. Others were happy to have a new computer on their desk. The overall rating for the project ranges from very well done to poorly done. When answering this question, some took the opportunity to indicate a general lack of trust in how the administration makes decisions. One person said there is a "difference of opinion about priorities" amongst faculty and administration. The influence this project has on faculty views about the

administration is to foster "a lack of confidence in their ability to set priorities appropriately".

2. Local Characteristics

a. Organizational Structure

In order to get at views about the organizational structure, questions focused on the decision making process that led to the acquisition of the networked microcomputers. The majority of the faculty did not know how the decision to acquire the networked computers was made, though several had a sense of how it was probably determined based on how past decisions at the college have been made. One individual said he believed that the vice president for Finance and Planning had a major role. He went on to say:

> I think more people should have been involved and maybe, maybe we all had: the opportunity but overlooked that opportunity, didn't realize how important it was but there are times when we are asked to be on committees or there is a new committee being formed and they want membership and we are saying I'm on too many already and I don't need to do this, then all of a sudden a decision like this is make to spend hundreds of thousands of dollars and then we look back in retrospect and wish that we had participated.

Here is another perspective from someone who said he had no idea how the decision was made.

> This is a major decision. Major decisions in my experience have been thought out pretty well, that is there has been reasonable input from appropriate constituents.

Another faculty member reflected others' views when she indicated that she did not know how the decision was made but that it was probably a top down administrative decision and that given the outcome it appears to have been made appropriately.

When asked how they would have liked to have seen a decision like this made, most people said they would like to have had more faculty input with a clear rationale for the decision presented to the faculty. For example, one person's comments reflect a common view when she indicated she had no idea how the decision was made but that she wants:

> the whole decision making process on the campus to reflect more of a faculty role. They heard us, they took it on as a project, they did it, but my sense of it is there was no real feedback from the faculty that was used to create that process.

A similar comment was made that reflected strong feelings.

> I would have preferred faculty being consulted about the potential use of computers on campus, meaning being in the offices, and had a dialogue with whoever made the decision rather than it simply being imposed. Again I'm not saying that I disagree with the use of computers. I'm just saying that I think that a dialogue was needed and then probably I would assume through the dialogue we would have been made aware of how the computers could have been integrated into what we were doing in the classrooms and through networking and I didn't get any of that information.

Several faculty acknowledged that there may have been opportunity to offer input but due to very demanding

schedules they did not get involved in the process. Some faculty who are either very involved in the political processes on campus or who are very involved in computer issues on campus are aware that a committee called TINC (Technology Integration Networking Committee) was composed of representatives from the faculty to make recommendations to the administration regarding academic computing on campus. In general, it appears from the interviews that the communication to the faculty about this decision was an area of concern to many faculty members. It should be noted that there is evidence to suggest that there were many opportunities for the faculty to offer input into this decision and communications to the faculty about this pending acquisition. However, it is beyond the scope of this study to go into this. What is important for the purposes of this study is how the faculty perceived the situation. The next summary information describes perceptions about the current relationship between the faculty and the administration on campus and whether or not this microcomputer project could influence the present relationship in anyway.

b. Organizational Climate

The one area that there was the most universal agreement was related to organizational climate. Most agreed the climate was strained in an environment characterized by no new faculty contracts and a work-to-rule situation (This means faculty adhere to the letter of their contract and do no extra work. Thus committee work on

campus has come to a halt.) However, some placed direct responsibility for the difficult labor negotiations on the high level administrators at Keene State College, while others assigned responsibility to the Board of Trustees at the University of New Hampshire system level. (Keene State College is part of the University System of New Hampshire which is comprised of Plymouth State College, The University of New Hampshire, and Keene State College.) Faculty members who have been at Keene State for a long time indicated that this was a low point in terms of organizational climate because of the contract problems. The following quote illustrates the feelings of some:

> The faculty distrust the administration and the goals and expectations are not always clearly communicated. We just don't always understand where they are coming from or what they want to do. Not that we will always agree with what they want to do or their priorities but it sure would be nice to know what they are.

The quote that best summed up the responses to the question related to organizational climate was said by one of the union leaders.

> There are people who have lost all confidence in the administration; there are other people who still support the administration.

When asked if this project could influence the relationship between the faculty and the administration, responses were varied. Even faculty who were critical of the project in many ways said that because this was a tool

that could make the job easier and more efficient, it could help the relationship. Others said they saw no relationship between the computers and the faculty/administrative relationship. A couple of individuals had a negative view.

> I think the faculty as a whole interpret bringing the computers on campus as a positive step. However, I think the way in which it was done presented a negative and so its like being given a bar of candy and being slapped across the face with it.

Once again, the responses to this question reinforced that although, in general, there is the sense that getting the campus more technologically up to date is important, there are criticisms about how the process took place. When talking about the organizational climate and the computer project, it is extremely difficult to determine if answers are related to overall concerns about how the college is being run or are specifically talking about this project. Some faculty were clearly unhappy with the decision making process on campus in general.

> To give everybody what they want when lots of folks don't even know what they want, I suppose would be difficult, but it might be a difficulty worth grappling with. We don't do much in the way of adequate deliberative processes at our college.

After asking questions about the local characteristics of the organization, the questions centered on external characteristics. Most of the responses to this question

were obtained in other answers or during the warm up discussion. The general views expressed are summarized next.

3. External Characteristics

The external forces that faculty mentioned related to motivations to use this technology. There were two primary motivating factors. First, the majority agreed that computers were here to stay and could be used to improve the faculty's office work, teaching, and research. This project therefore signaled a move forward. The majority also felt that students would have to be prepared to use computers in most fields and therefore, need access and exposure to the technology. Putting computers on the desk of the faculty was seen as a first step. For many the really important issue was getting the students access to computers.

The next section of the implementation model illustrated in Table 2.3 refers to implementation strategies. The responses to this question that are really interesting have to do with the suggestions the faculty offered. These are presented in the next section.

B. Implementation Strategies

In order to increase the efficient use of the computers the following suggestions were made by various faculty members.

- Provide individualized instruction for those who need it.
- Provide manuals.

- Provide release time from teaching to learn how to use the computer for a particular teaching application.
- Provide more software (e.g. a good grading program).
- Provide frequent training classes on how to use software packages and how to use the network.
- Provide a booklet that indicates what the network can be used for and how to use it.
- Provide a booklet with suggestions on what the microcomputer can be used for to help a professor on the job.
- Provide opportunities for faculty support groups.
- Provide information on how the system can be used to improve communication with the students.

These suggested implementation strategies come from faculty members who have computer experience but would like to expand their use and from those who have little computer experience and are interested in using their new machine productively. The nature of these suggestions may offer guidance to institutions that are going to be implementing new computer-based technologies. Materials and other types of support could be organized and made available to faculty receiving new technology. This has potential to speed up the implementation process.

Institutions that are presently in the midst of an implementation process may also find usefulness in these suggestions. Responding to faculty needs and concerns as soon as they are known is likely to encourage the use of the technology for productive activities.

C. Innovation Response Decision

The faculty expressed a range of responses to the new networked system of microcomputers. This is in part because the interview questions were structured to elicit reactions to the project and to obtain information about what could have been done better. Even the faculty who were pleased to have the updated technology had ideas about how the process could have been done better. The recurring themes that were expressed that can be considered responses to the innovation are presented below as advantages and disadvantages of the system.

The advantages of the new system that were mentioned included:

- Access to the library
- Access to E-Mail for on campus and off-campus communication with colleagues
- Access to a computer in one's own office
- Updated technology on campus
- The possibility of using the system to increase overall job efficiency and teaching effectiveness.

The disadvantages included:

- Cost of the system
- The perception that administration now has an excuse not to address the problem of inadequate secretarial support to faculty
- The concern that faculty may now have to do more administrative work, like registering students in the future

- The lack of privacy resulting from shared printers in a public area

- Printer problems

- The lack of software to help improve office work efficiency and teaching capability

- The lack of resources in the following areas make using the system inefficient and frustrating for some faculty:

  1) training
  2) support personnel on an as-needed basis
  3) hardware and software upgrades
  4) manuals
  5) printers in offices for convenience and to protect the privacy of printed documents from the public eye, and for work that does not need to be laser quality and could thus be printed less expensively.

To summarize, the innovation response is mixed which could be predicted based on the model used in this study and the nature of the change characteristics, local and external characteristics presented earlier. The quantitative data support the findings of the qualitative data. Both types of data indicate that faculty concerns exist related to the innovation; concerns that could have led to a set of implementation strategies that would have potentially resulted in a more positive response to the innovation. If the concerns are considered, implementation strategies could be designed that might improve the innovation response in the near future. Those considering the introduction of a technological innovation may be well advised to gather information about concerns before making a large expenditure in order that appropriate implementation strategies can be

put in place to improve the chances of acceptance of the innovation.

An interesting finding that resulted from the interviews was the wide variation in perceptions held by faculty faced with the same innovation. Almost without exception, for each question asked, a number of individuals responded one way and a number offered the exact opposite response. For example, when asked whether there was a strong need for these new computers to be given to the faculty, some answered the need was indeed very strong, while others felt there was little need for the project. This indicates the importance of understanding that there is a range of needs and responses when an innovation is introduced and if taken into account may improve the chances for a successful implementation.

TABLE 4.1 Discipline

Demographic Survey Instrument - Frequency, Valid Percent, Cumulative Frequency and Cumulative Percent of Responses Categorized by Five Groupings for Discipline

	Frequency/ Total Number in Discipline at KSC	Percent/Total Respondents	
Arts/English	25/44	26.3	
Behavioral Sciences	16/22	16.3	
Education	16/26	16.8	
Sciences	19/28	20.0	
Management	19/23	20.0	
Missing Case	1	1.0	n = 96

TABLE 4.2 Age

Demographic Survey Instrument - Frequency, Valid Percent, Cumulative Frequency and Cumulative Percent of Responses Categorized by Four Groupings for Age

	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Age Under 35	9	10.7	9	10.7
36 to 45	29	34.5	38	45.2
46 to 55	33	39.3	71	84.5
56 or over	13	15.5	84	100.0
Missing cases	12	12.5	96	

TABLE 4.3 Gender

Demographic Survey Instrument - Frequency, Valid Percent, Cumulative Frequency and Cumulative Percent of Responses Categorized by Gender

Gender	Frequency	Percent	
Male	67	71.3	
Female	27	28.7	
Missing case	2	2.1	n = 96

TABLE 4.4 Years At Keene State College

Demographic Survey Instrument - Frequency, Valid Percent, Cumulative Frequency and Cumulative Percent of Responses Categorized by Three Groupings of Years at Keene State College

Years at KSC	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Under10	44	46.3	44	46.3
11 to 25	44	46.3	88	92.6
26 and over	7	7.4	95	100.0
Missing case	1	1.0	96	

TABLE 4.5 Faculty Rank

Demographic Survey Instrument - Frequency, Valid Percent, Cumulative Frequency and Cumulative Percent of Responses Categorized by Faculty Rank

Faculty Rank	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Instructor	5	5.3	5	5.3
Assistant Professor	26	27.4	31	32.6
Associate Professor	32	33.7	63	66.3
Full Professor	31	32.6	94	98.9
Other	1	1.0	95	100.0
Missing case	1	1.0	96	

TABLE 4.6 Faculty Status

Demographic Survey Instrument - Frequency, Valid Percent, Cumulative Frequency and Cumulative Percent of Responses Categorized by Three Groupings for Faculty Status

Faculty Status	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Non Tenure Track	7	7.4	7	7.4
Tenure Track	22	23.2	29	30.5
Tenured	66	69.5	95	100.0
Missing case	1	1.0	96	

TABLE 4.7 Years As Full-Time Faculty

Demographic Survey Instrument - Frequency, Valid Percent, Cumulative Frequency and Cumulative Percent of Responses Categorized by Three Groupings for Years as a Full-Time Faculty Member at Any Institution

Years of Full-time Faculty	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Under 10	37	38.9	37	38.9
11 to 25	48	50.5	85	89.5
26 and over	10	10.5	95	100.0
Missing case	1	1.0	96	

TABLE 4.8 Computer Use

Demographic Survey Instrument - Frequency of Responses Categorized by Six Reasons to Use a Computer

Reason	Frequency
Correspondence and Report Writing	80
Teaching (anything that directly helps students in or out of class)	74
Research	60
Literature Searching	40
Institutional Record Keeping	39
Other	28

TABLE 4.9 Average Experience Level With Software

Demographic Survey Instrument - Summary of Average Measures of Self-Reported Level of Computer Experience with Various Types of Software

	Experience Level Label			
	None	Beginner	Intermediate	Advanced
Numerical Value Given For Analysis	1	2	3	4
Number of faculty per group	22	26	28	19
Mean	1.693			
Maximum Average	3.769			
Standard Deviation	.632			
Median	1.5			
Valid Cases	95			
Missing Cases	1			

TABLE 4.10 Experience With Software Packages

Demographic Survey Instrument - Percent of Faculty Who Reported Their Level of Experience for Various Types of Software with Highest Percent Underlined

Software	Experience Level Label None	Beginner	Inter-mediate	Advanced
Word-processing	12.6	17.9	<u>46.3</u>	23.2
Spreadsheet	<u>48.9</u>	20.2	22.3	8.5
Database	<u>44.6</u>	33.7	16.3	5.4
Desktop Publishing	<u>58.1</u>	19.4	17.2	5.4
Computer-Assisted Instruction to Teach Facts and Concepts	<u>66.7</u>	19.4	9.7	4.3
Computer-Assisted Instruction to Provide Drill	<u>68.8</u>	16.1	9.7	5.4
Statistical Packages	<u>54.3</u>	23.4	14.9	7.4
Communications Packages	<u>68.2</u>	19.3	6.8	5.7
Simulations and Role-Playing Exercises	<u>78.3</u>	12.0	6.5	3.3
Programs That Help Students Prepare Graphs, Charts, or Drawings	<u>65.6</u>	16.1	9.7	8.6
Programs That Help Students Develop Databases	<u>75.6</u>	12.2	7.8	4.4
Programs That Help Students Organize Ideas	<u>74.4</u>	16.5	5.5	3.3
Programming Languages	<u>62.0</u>	20.7	9.8	7.9
Others	41.2	23.5	17.6	17.6

TABLE 4.11 When Faculty Members Would Be Interested In Learning Software

Demographic Survey Instrument - When Faculty Member Would Be Interested in Learning Software with Highest Frequency Underlined

Software	No Interest	This Year	Next Few Years	Do Not Know
Word-processing	14.3	67.5	14.3	3.9
Spreadsheet	21.7	51.8	25.3	1.2
Database	14.1	51.8	34.1	
Desktop Publishing	16.3	43.0	39.5	1.2
Computer-Assisted Instruction to Teach Facts and Concepts	23.0	36.8	40.2	
Computer-Assisted Instructions to Provide Drill	34.1	27.3	37.5	1.1
Statistical Packages	33.3	26.4	37.9	2.3
Communications Packages	20.5	39.7	37.2	2.6
Simulations and Role-Playing Exercises	35.4	23.2	41.5	
Programs That Help Students Prepare Graphs Charts, or Drawings	36.8	33.3	29.9	
Programs That Help Students Develop Databases	38.8	23.5	37.6	
Programs That Help Students Organize Ideas	26.2	31.0	42.9	
Programming Languages	14.1	29.4	51.8	4.7
Others	58.8	29.4	11.8	

TABLE 4.12 Opportunity To Give Input Into The Decision

Demographic Survey Instrument - Frequency, Percent, Cumulative Frequency and Cumulative Percent, Yes or No Response to Question Asking if Respondent had the Opportunity to Offer Input into the Decision to Equip the Faculty with Microcomputers

Value Label	Frequency	Percent	
Yes	38	40.9	
No	55	59.1	
Missing cases	3	3.1	n = 96

TABLE 4.13 Level Of Input Into The Decision

Demographic Survey Instrument - Frequency, Percent, Cumulative Frequency and Cumulative Percent to Question Asking for One of Three Levels of Input into the Decision to Equip the Faculty with Microcomputers

Value Label	Frequency	Percent	
Gave A Lot of Input	10	10.8	
Gave a Little Input	31	33.3	
Gave No Input	52	55.9	
Missing cases	3	3.1	n = 96

TABLE 4.14 Highest Stage Of Concern

Stages of Concern Questionnaire - Frequency of Highest Concerns Stage for Respondents

	Second Highest Stage of Concern							
	0	1	2	3	4	5	6	Total
Number of Individuals	50	7	8	7	1	9	4	86
Percent of Individuals	58.1	8.1	9.3	8.1	1.2	10.5	4.7	100.0

TABLE 4.15 Awareness Concerns - Stage 0

Stages of Concern Questionnaire - Mean Responses for the Five Questions Pertaining to Stage 0 Awareness Concern

Statement Number	Statement	Mean	Interpretation
3	I don't even know what this innovation is	1.8	Not true of me now
12	I am not concerned about this innovation.	2.7	Somewhat true of me now
21	I am completely concerned about other things	3.0	Somewhat true of me now
23	Although I don't know about this innovation. I am concerned about other things in the area.	1.8	Not true of me now
30	At this time I am not interested in learning about this innovation.	1.7	Not true of me now

TABLE 4.16 Second Highest Stage Of Concern

Stages of Concern Questionnaire - Frequency of Second Highest Concerns Stage for Respondents

	Second Highest Stage of Concern							
	0	1	2	3	4	5	6	Total
Number of Individuals	13	22	19	19	1	9	3	86
Percent of Individuals	15.1	25.6	22.1	22.1	1.2	10.5	3.5	100.0

TABLE 4.17 User Profiles

Profile Type	Number of Individuals	Percent of Individuals
Positive Non-User	18	21%
Negative Non-User	34	40%
Single Peak	26	30%
Multiple Peak	8	9%
Total	86	100%

TABLE 4.18 Multi-Variate F Statistics

Multi-Variate Analysis of Variance F Statistics with Stage of Concern Responses as the Dependent Variables and Demographic Survey Data as the Independent Variables

	Independent Variables*						
	1	2	3	4	5	6	7
Test Name							
Pillais	.177	.386	.571	.181	.422	.191	.778
Hotellings	.130	.420	.571	.186	.461	.207	.788
Wilks	.152	.403	.571	.183	.441	.199	.783

* 1 = discipline, 2 = age, 3 = gender, 4 = number of years at KSC, 5 = faculty rank, 6 = faculty status, 7 = number of years as a full-time faculty member

TABLE 4.19 Computer Software Experience By Discipline

Self-Reported Computer Experience by Five Discipline Groupings and the Significance of the F Statistic from ANOVA on the Means

Discipline	Mean of Self-Reported Expertise
Sciences	2.19
Management	1.83
Education	1.80
Arts/English	1.47
Behavioral Sciences	1.40
Value of F = 4.52 with 4 df	
Significance of the F Statistic	.002

TABLE 4.20 Interest In Learning Software

Self-Reported Interest in Learning Software by Five Discipline Groupings and the Significance of the F Statistic from ANOVA on the Means

Discipline	Mean of Self-Reported Expertise
Arts/English	2.16
Behavioral Sciences	2.06
Education	1.86
Management	1.84
Sciences	1.63
Value of F = 3.46 with 4 df	
Significance of the F Statistic	.012

TABLE 4.21 Open-Ended Question Responses By Stage Of Concern

Stage 0 - Awareness		
N	(7)	- No concern indicated
Y	(24)	- Positive comment(s) made about the innovation
Stage 2 - Personal		- Concern relates to a personal situation
Stage 3 - Management		
A	(20)	- Concerns relate to how the administration planned for the new system and/or what the implication was for staffing (e.g. secretarial staff).
C	(21)	- Concerns relate to how much was spent on the system and whether or not financial resources will be available for additional and future needs.
E	(23)	- Concerns relate to the type of equipment that was purchased.
H	(7)	- Concerns are about the availability of support or help with the new system.
P	(12)	- Concern was expressed about the availability of computer supplies.
V	(6)	- Privacy issues were expressed related to tests, correspondence etc.
R	(9)	- The appropriate role of information technology was questioned.
U	(7)	- The security of the hardware form theft and/or damage was of concern.
T	(24)	- The availability of training to learn how to utilize the system is of concern.
M	(13)	- The availability of time to learn how to utilize the system is of concern.
W	(4)	- The wish to have certain capabilities on the system was expressed.
Stage 4 - Consequence		
S	(12)	- The idea of how the students can be affected by this system was mentioned.
Stage 5 - Collaboration		
F	(4)	- Faculty working together as a result of this system was commented on.

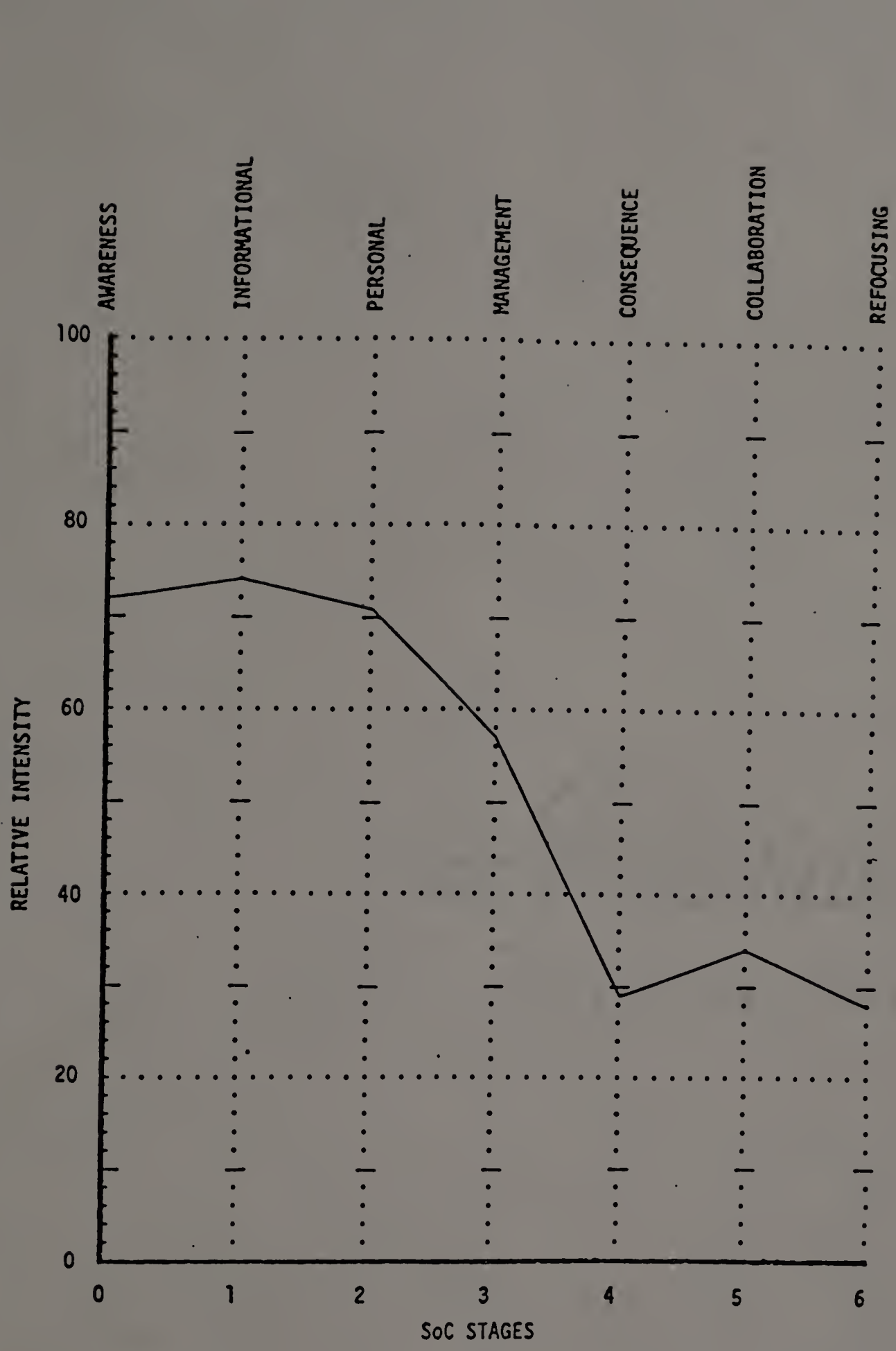


FIGURE 4.1 Profile Of A Positive Non-User

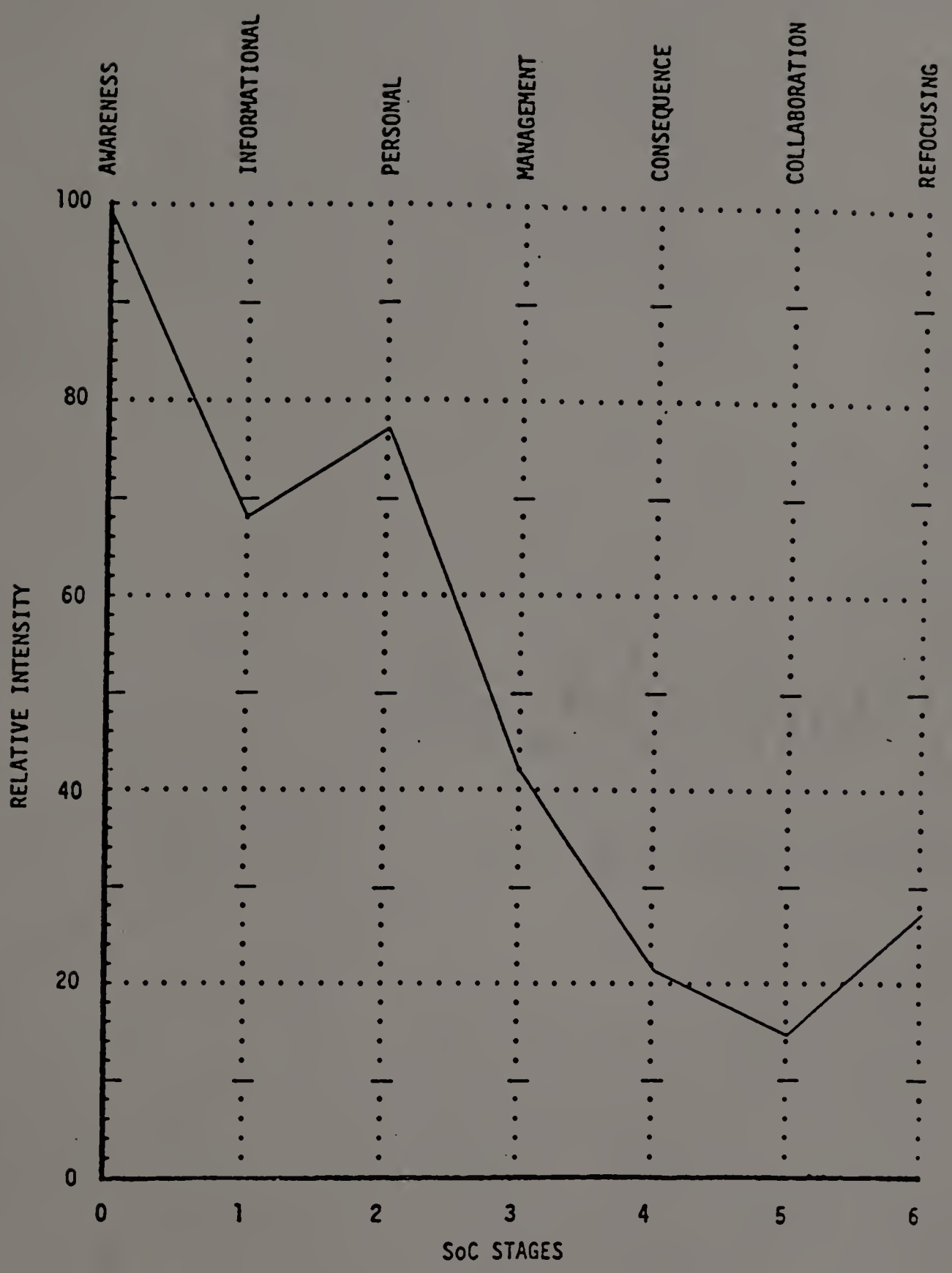


FIGURE 4.2 Profile Of A Negative Non-User

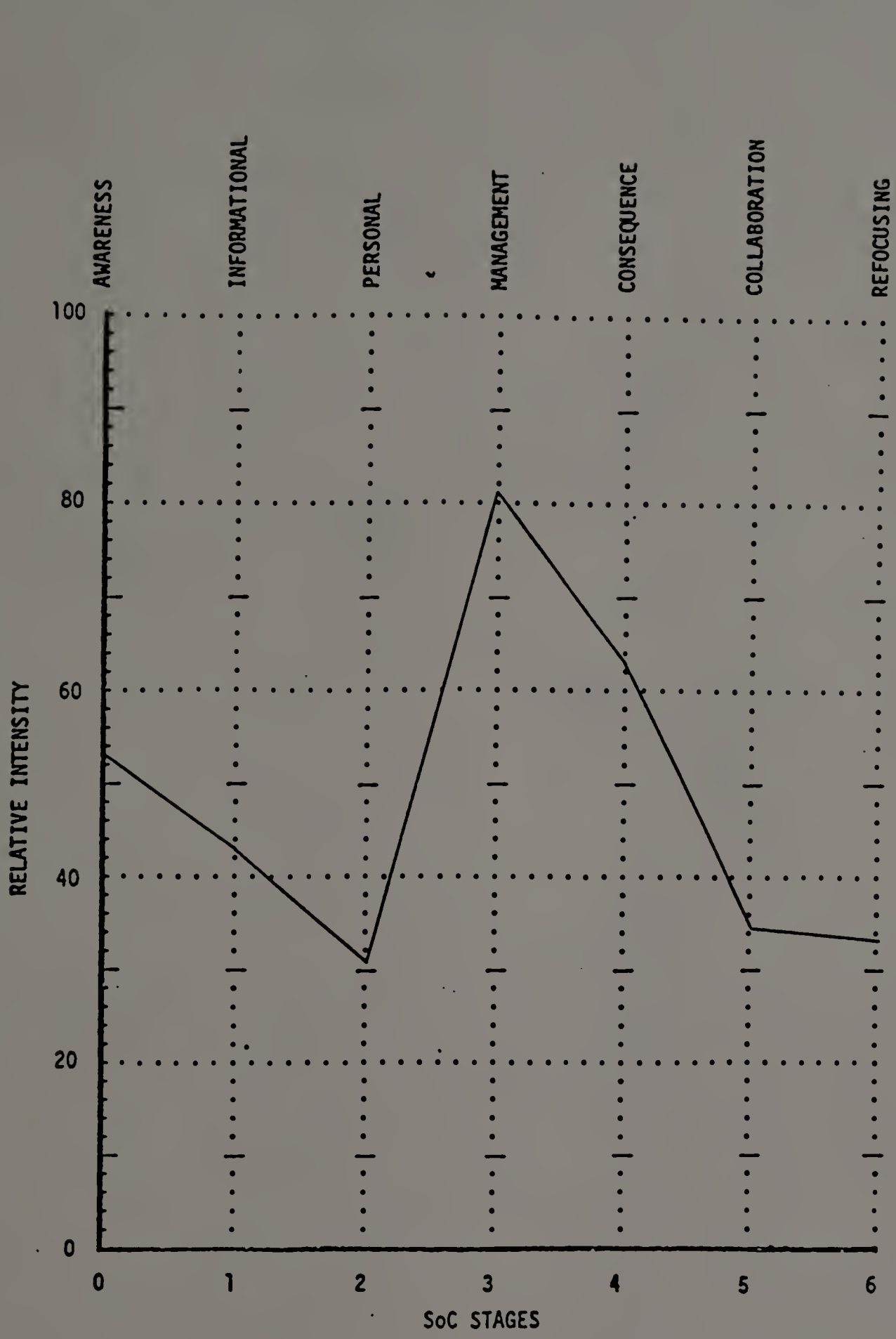


FIGURE 4.3 Profile Of A High Peak Concern

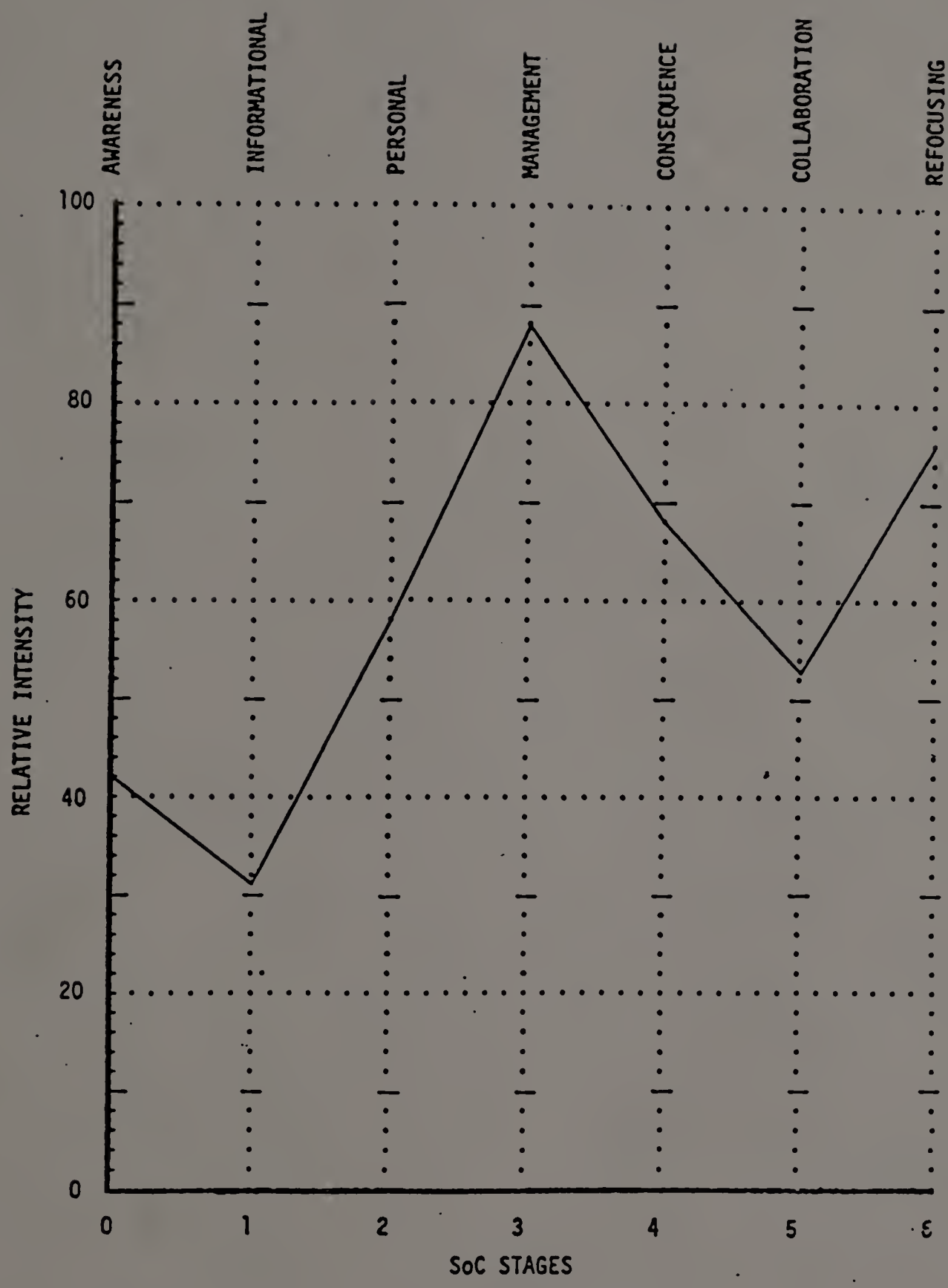


FIGURE 4.4 Profile Of Multiple Peaks Of Concern

CHAPTER V

SUMMARY AND CONCLUSIONS

Introduction

The research in this study addressed the following questions:

1. What are the perceived concerns of the Keene State College faculty about the networked system of microcomputers being provided for all full-time faculty members?

2. Is there a relationship between the faculty members demographic variables and reported concerns about the project to equip faculty members with microcomputers?

3. What is the relationship between other key factors (e.g. the participative nature of the decision-making process and computer experience) and perceived concerns?

This chapter summarizes how the findings of this study contribute to answering these questions. This will be followed by the contributions of the study to the areas of policy, practice, theory, and research methodology. The chapter will end with suggestions for further study and final conclusions.

Summary of Findings

1. Concerns

The conclusions derived from the interpretation of the results of data analysis presented in Chapter Four are that the concerns of the faculty are clustered around Stage 1 -

Personal, Stage 2 - Information, and Stage 3 - Management Concerns. This conclusion was based on analysis of the SoC questionnaire, the open-ended questions and the interview.

Even faculty members who were happy to get the networked computers expressed their awareness of problems related to the implementation process. Repeated concerns were expressed about the lack of support including hardware enhancements, software programs, technical expertise for hardware and software problems, and personnel support for group and individualized training.

The fact that the computers and the network were acquired during a time when contract negotiations were difficult and a new contract had yet to be negotiated for the current academic year meant many were not convinced of the appropriateness of spending such a large sum of money on this project. This was related to the concern that some people wouldn't use the computer enough to warrant the expenditure. It must be noted that the campus climate was strained because of the contract problems. This may have influenced how respondents reported concerns.

Frustration was expressed most often by those who didn't know how to use the new system and didn't have any ideas on how it could be useful for their teaching or research activities. The faculty members who were the most pleased to have the new system had ideas about how they wanted to use the computer. Generally speaking these were

faculty members who had already been using computers and were glad to be provided with updated technology from the college.

2. Survey Responses and Faculty Concerns

a) There was no statistically significant relationship found between the variables discipline, age, gender, number of years at Keene State College, faculty rank, faculty status, number of years as a full-time faculty member and expressed stages of concern.

b) There was no statistically significant difference found between the reported responses to whether or not faculty provided input into the decision to equip the faculty with the networked system and the reported stages of concern.

c) There was a statistically significant difference between means of self-reported levels of computer software experience and reported Stage 0 Awareness concerns and Stages 4, 5, and 6 concerns. Faculty with little to no experi-ence expressed more Awareness concerns than did those with experience. Individuals with more computer experience expressed later stage types of concerns which inferred they were thinking about how to utilize the system in productive ways.

3. Findings for Other Key Factors

a) There was a significant difference between faculty discipline and self reported computer experience. Faculty in disciplines that one would expect to be more involved in

computing (e.g. sciences) indicated the most software experience.

b) There was a significant difference between faculty discipline and how soon the faculty wanted to learn new software packages. Those with the least self-reported software experience indicated interest in learning new software sooner than those with more experience.

This section summarized the relevant findings from the survey questionnaire, the open-ended question, and the interview data. The next section will describe how the findings contribute to the areas of policy, practice and methodology

Contributions of the Study

Policy

The proliferation of information systems technology increasingly presents institutions with challenges, issues, and problems. As a result of the ubiquitous presence of computing in higher education, decision-making bodies are having to develop policies for academic computing. This study could be useful to policy makers primarily because it presents the perceptions and concerns a group of users expressed about using new technology. The study also suggests several ways of collecting information about users' perceptions.

Policies that are made about academic computing for a campus that take into account the characteristics of the

users, the concerns of the users, and the characteristics of the technology may do more to promote effective use of the technology than policies that are made without this information.

The respondents in this study expressed a need for information about how to use the new technology in their work. They also indicated that the system should be technically sound before it is introduced on a wide-spread basis. Availability of various types of support were also said to be crucial for an implementation process. There were concerns about privacy, theft, financial resources, and communication methods. Policy makers involved in decisions about the acquisition and use of computers on campus may consider the findings presented here useful when developing or reviewing policy at their own institutions.

Practice

The problem this study addresses is how to develop better methods for facilitating the adoption of computer-based technologies. The findings report intervention strategies suggested by users who have just received a technological innovation. The faculty indicated that there is a need for different types of support for learning how to use the new system. Some faculty wanted a manual so they could learn the system on their own, others preferred individual tutorial sessions, and some wanted more specialized group training classes. Many faculty members expressed

a desire for more time to be able to learn the system and more direction and guidance as to how the system could be useful. The data from this study are sufficiently detailed to be os potential use to those interested in designing an action plan to help faculty members get maximum utility from a new computer system.

Interventions that may be useful to those managing computing on campus have been hypothesized by Hall (1979). These recommendations for facilitating change have been compiled from experienced practitioners including university administrators, faculty members, state education agency officials, public school administrators and teachers, and others involved in different types of innovation implementations. Despite the lack of research to confirm the effectiveness of these interventions, Hall suggests they are worth consideration because they were made by experienced practitioners. Three predominant areas of concern in this study were Stage 1 Information, Stage 2 Personal, and Stage 3 Management. The interventions for these three stages are presented next using Hall's concerns-based approach to facilitating change.

Concerns based research would suggest that individuals with Information concerns need to learn more about the innovation. Interventions that have been suggested by Hall (1979) include: (1) sharing descriptive information about the innovation, (2) providing opportunities for individuals to see how the innovation can be useful, (3) offering

information that contrasts how things are currently being done with how things might be done with the innovation, (4) sharing enthusiasm about the new system, and (5) communicating expectations about the use of the innovation.

Individuals with strong Personal concerns may consider the innovation a personal threat. Interventions suggested by Hall include (1) offering encouragement and assurances using a personal approach, (2) clarifying how the innovation relates to other priorities the individual faces that may offer potential conflicts in terms of time and energy resources, (3) expressing ways in which the innovation can be learned gradually, (4) providing personal support by making available contact persons who are knowledgeable and can be supportive in the use of the innovation, and (5) offering opportunities for people to voice concerns that are acknowledged and addressed.

Management concerns are typically expressed by users of an innovation. This level of concern may indicate worries about finding the time and or resources necessary to utilize the innovation. These individuals need interventions that focus on "how-to-do-it" strategies according to Hall. Support may take the form of resource personnel that provide answers on how to do specific tasks. Demonstrations may be provided with hands-on access to the innovation. Collegial support groups can also offer assistance when management concerns are strong.

Early research on the Stages of Concern showed that individuals involved in implementing an educational innovation tended to have a conglomeration of concerns that centered around a particular stage. The group profile of the Keene State College faculty is congruent with previous findings in that the scores for Information, Personal and Management concerns are clustered together with very similar scores. This is useful information to have when developing interventions for the members of an organization. However, concerns theory stresses the importance of the individual's concerns as well as the value of understanding the group profile. Individual perceptions are dependent upon the unique characteristics of the multi-faceted person involved with the innovation as well as the characteristics of the innovation itself. For this reason the suggestions that the KFC faculty made during interviews about what would help them make better use of the computer system should be closely heeded. Administrative and technical leadership are essential for developing an action plan that incorporate faculty suggestions. Additionally, suggestions as to what could have made the process work better can be taken into account as future projects are considered at Keene State College and elsewhere. Most important, however, is to realize the value of gathering information about people's concerns and needs when interested in developing strategies for a successful implementation process.

Theory

The lack of a theoretical background to explain the process by which faculty adopt computers was addressed in this study. A model of the implementation process was used as the conceptual framework of the study. Decisions about what data to collect and how to structure the data collection process were made based upon the elements in the model of the implementation process.

The model was useful in guiding the data collection and analysis process. The findings suggest ways to improve the implementation process at Keene State College. That is, implementation strategies could be designed that might speed up the process of integrating the new system of microcomputers into the educational process. In this study the model provided a sound theoretical basis for empirical testing. It may therefore, have value as a theoretical basis for other research applications.

Methodology

The research methodologies used suggest the following:

1. The Stages of Concern questionnaire offers useful information for assessing the type of concerns the group has about an innovation. It is also useful for grouping faculty according to several identifiable patterns of needs by analyzing individual profile patterns. This information can contribute to the development of intervention strategies. In order to obtain this data, individuals must be willing to

fill out a Likert based questionnaire. Some faculty don't mind this; others won't take the time.

2. The open-ended question provided more useful detail about concerns. Faculty were free to express their thoughts in writing. Once again this depends on the willingness of individuals to take the time to thoughtfully answer the question.

The question itself may be easier to answer if it also asks for input about what is good about a project. Presently, it only asks for concerns. Some faculty were willing to express concerns after discussing what pleased them about the project. Knowing what works for people is as useful as knowing what doesn't work.

3. The interview responses offer the most complete source of information. In a relaxed setting, faculty members freely discussed what they liked about the project, what they didn't like, and suggestions for how it could have worked better from their individual perspective. Faculty were very willing to be interviewed and were very candid about their views. This approach allows individuals to talk through ideas and express thoughts that may not appear to be directly linked to acceptance of the innovation at hand, but as seen at Keene State College, it was difficult to ignore the impact that the current organizational climate (contract negotiations) may have on this project.

The most important result of the interview process was that faculty needs could be expressed and clarified via the

discussion. Taped interviews offer the ability to listen over and over again for different types of information. Once individual needs are understood strategies can be developed (1) to ensure that those needs are met, or (2) to communicate why the needs are not being addressed at this time, or (3) to indicate when and if the needs will be addressed. If this research has shown anything it has clearly demonstrated the importance of meaningful communication to a faculty that has been given an innovation. The more someone understands what is happening and why it is proceeding a particular way, the less chance there is for negative feelings about an innovation.

Suggestions for Further Study

This case study portrays a college that has introduced a networked system of microcomputers to a faculty that expressed a wide range of concerns about the acquisition and implementation of the system. Suggestions that may lead to the system being used to help faculty in their work sooner rather than later have been offered based on an analysis of faculty concerns and perceptions about the new system. A follow-up study could investigate the interventions that have been offered and the faculty perceptions about the interventions one year or two years after the system was introduced. This could provide additional insights into intervention strategies as part of the implementation process.

Another follow-up to this study that has potential to extend the contributions to policy, practice, theory and methodology made from this study would involve investigating the use of the new system. An instrument based on the Concerns-Based Adoption model has been developed to assess what the user is doing with an innovation. The instrument is based on an interview process designed to describe actual use rather than perceptions (Loucks, Newlove & Hall, 1975) and could connect concerns issues with use issues.

Assessing whether or not the findings in this study can be generalized to other technological innovations could be an additional study. Investigating academic computing implementation projects at similar institutions using all or parts of the methodology used in this study could provide potential useful information about the model used in this study, the research methodology used, and the findings that resulted.

This study concentrated on faculty perceptions about the implementation of a technological innovation. The decision to acquire this system was made by the administration at Keene State College. A follow-up study that looked at the process from the administration's viewpoint could provide more useful information about the acquisition, introduction, and implementation process. Analysis could include looking for differences and similarities in perceptions between the administrators who made the acquisition decision and the faculty who received the new system.

The last follow-up study to be suggested would investigate the stages of concern of the administrators and staff at Keene State College who have major responsibility for facilitating the implementation of the networked system. This could be augmented by assessing their particular leadership or change facilitator style (Hall, Rutherford, Hord & Hulling, 1984). There is an instrument and a manual written for assessing the concerns of change facilitators (Hall, Newlove, Rutherford, Hord, 1991). There is also change facilitator style questionnaire available (Hall & Vandenberghe, 1987).

Recommendations

The following recommendations are offered for consideration as the conclusion of this study.

1. Obtain early involvement of potential users in the planning, decision-making, introduction, and implementation of a technological innovation can improve the chances of adoption.

2. Establish personal communications about reasons for acquiring the innovation, its relevance, and relative advantage may stimulate interest in the new system. Typical dissemination interventions related to stages of concern that were suggested by Hall (1979) are shown in Appendix F (p. 167).

3. Understand the characteristics of potential users, i.e. experience, values, climate at work, availability of

time, attitudes towards the innovation, and external pressures, may be useful information when developing implementation strategies.

4. Develop effective leadership for innovation acceptance should (1) promote user involvement, (2) take into account the needs of users, (3) provide resources to support user needs, (4) offer encouragement, incentives and direction for adopters of an innovation, and (5) communicate regularly with the users.

5. Develop an evolving action plan that includes a list of strategies in response to user's changing needs is important for managing the change process.

6. Develop a conceptual framework about change that guides the formulation of a concrete action plan may facilitate the use of the innovation.

7. Monitor the implementation process and encouraging feedback from the users can provide input to an evolving set of implementation strategies.

These recommendations are offered as suggestions based on the careful study of an implementation process in progress at Keene State College in the hope that they can be of use to others that are or will be introducing or updating computing facilities on campus. If human reactions are not random or idiosyncratic, the findings of this study may be indicative of the perceptions of others involved in a similar kind of innovation process.

APPENDIX A

DEAR COLLEAGUE LETTER

February 18, 1992

Dear Colleague,

As you may know I am on leave of absence from the Management Department at Keene State College to work on my doctorate this year. My research at the University of Massachusetts, is on the subject of technological innovation in higher education. The purpose of my study is to gather information about an aspect of the technological innovation process.

This year Keene State College is involved in a project to equip all full-time faculty with personal computers. The focus of my study is the system of microcomputers on campus which result from this project. A letter to the faculty in January states that each computer is to be connected to the campus network. This is to provide the means for communication between computers on campus as well as throughout the University System of New Hampshire.

The enclosed three part instrument seeks to measure your present concerns about the microcomputers which are being provided for the full-time faculty. The first section is a Demographic Survey Instrument, the second section is the Stages of Concern Questionnaire, and the third section is an open-ended question. All questions are straightforward, and there are no right or wrong answers. It should take about 30 minutes to complete the instrument.

In the second section you will encounter statements about the innovation. For the purposes of this study please think of the innovation as the microcomputers which are being provided for the entire full-time faculty.

I am asking you to return a card which includes your name and willingness to be further interviewed. This will enable me to identify and follow-up non-respondents and individuals who fall into certain clusters and are willing to be interviewed. The questionnaires are numerically coded to facilitate matching clusters with willingness to be

interviewed. I promise you that the information you will provide will remain confidential. Data will be averaged across individuals and organizational units, and no individuals will be identified in any of the study findings.

The findings only will be reported as my doctoral research and will be shared with the Vice President of Finance and Planning, at KSC, Jay Kahn. He will use the findings to assist with the development of KSC's information technologies. I would appreciate it if you could return the questionnaire and the attached card as soon as possible, or no later than March 3. Thank-you for your help!

Sincerely,

Beth Hawes

Assistant Professor
Management Department

APPENDIX B

DEMOGRAPHIC SURVEY INSTRUMENT

DEMOGRAPHIC SURVEY INSTRUMENT

Please answer the following questions.

1. Discipline _____

2. Age _____

3. Gender

_____ Male
_____ Female

4. Number of years at Keene State College
_____

5. Faculty rank

_____ Instructor
_____ Assistant Professor
_____ Associate Professor
_____ Full Professor
_____ Other (Please specify _____)

6. Faculty status

_____ Non-tenure track
_____ Tenure track
_____ Tenured

7. Number of years as a full-time faculty member _____

8. Did you feel you had the chance to give input into the decision to equip the faculty with microcomputers?

_____ Yes
_____ No

9. How you perceive your level of input into the decision to equip the entire faculty with microcomputers?

_____ I gave a lot of input.
_____ I gave a little input.
_____ I gave no input.

10. Which of the following applications represent reasons you use a computer?

___ correspondence and report writing
___ teaching (anything that directly helps students in or out of class)
___ research
___ literature searching
___ institutional record keeping
___ other

11. For the following list of software please check what best describes you based on:

1) your level of experience with the software: no experience (N), beginner level (B), intermediate level (I), or advanced level (A).

2) when you would be interested in learning more about the software this year (This Year), within the next few years (Few Years), or no current interest (No Interest).

a. word processing

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

b. spreadsheet

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

c. database

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

d. desktop publishing

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

e. computer-assisted instruction (CAI) tutorial programs to teach facts and simple concepts

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

f. computer-assisted instruction (CAI) programs to provide drill and exercises

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

g. statistical packages

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

h. communications package

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

i. simulations and role-playing exercises

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

j. programs that help students prepare graphs, charts, or drawings

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

k. programs that help students prepare their own data bases

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

l. programs that help students organize ideas for analysis or writing

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

m. programming languages

____ None ____Beginner ____Intermediate____Advanced

____This year ____Next few years ____ No Interest

n. _____ others (please specify)

_____

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

o. _____ others (please specify)

_____

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

p. _____ others (please specify)

_____

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

q. _____ others (please specify)

_____

____ None ____Beginner ____Intermediate ____Advanced

____This year ____Next few years ____ No Interest

APPENDIX C

CONCERNS QUESTIONNAIRE

CONCERNS QUESTIONNAIRE

The purpose of this questionnaire is to determine what you are thinking about regarding your responsibilities with a particular innovation. The items were developed from typical responses of staff whose familiarity with an innovation ranged form no knowledge at all to many years experience with it. therefore, many of the items may appear to be of little or no relevance to you. For the completely irrelevant items, please circle "0" on the scale. Other items will represent concerns that you do have in varying degrees of intensity, and they should be marked higher on the scale.

For example:

For a statement that is very true of you at this time:	0	1	2	3	4	5	6	7
For a statement that is somewhat true of you now:	0	1	2	3	4	5	6	7
For a statement that is not at all true of you at this time:	0	1	2	3	4	5	6	7
For a statement that seems irrelevant to you:	0	1	2	3	4	5	6	7

Please respond to the items in terms of how you feel about the MICROCOMPUTERS for FULL-TIME FACULTY as the INNOVATION when you answer the questions. We do not hold to any one definition of this, so please think of it in terms of you own perceptions of what it involves.

Thank-you for taking time to complete this task.

Adapted by The Regional Laboratory for Educational Improvement of the Northeast and Islands, 1989, from an instrument developed by the Procedures for Adopting Educational Innovations/CBAM Project, R&D Center for Teacher Education, The University of Texas at Austin, 1974 (Gene Hall, Archie A. George and William L. Rutherford). Measuring Stages of Concern about the Innovation: A Manual for Use of the SoC Questionnaire. Austin, TX: Research and Development Center for Teacher Education, The University of Texas at Austin, 1977).

0	1	2	3	4	5	6	7
Irrelevant	Not true of me now		Somewhat true of me now			Very true of me now	

1.	I am concerned about student's attitudes toward this innovation.	0	1	2	3	4	5	6	7
2.	I know of some other approaches that might work better.	0	1	2	3	4	5	6	7
3.	I don't even know what the innovation is.	0	1	2	3	4	5	6	7
4.	I am concerned about not having enough time to organize myself each day.	0	1	2	3	4	5	6	7
5.	I would like to help other faculty in their use of the innovation.	0	1	2	3	4	5	6	7
6.	I have a very limited knowledge about the innovation.	0	1	2	3	4	5	6	7
7.	I would like to know the effect of reorganization on my professional stats.	0	1	2	3	4	5	6	7
8.	I am concerned about conflict between my interests and my responsibilities.	0	1	2	3	4	5	6	7
9.	I am concerned about revising my use of the innovation.	0	1	2	3	4	5	6	7
10.	I would like to develop working relationships with both our faculty and outside faculty using this innovation.	0	1	2	3	4	5	6	7
11.	I am concerned about how the innovation affects students.	0	1	2	3	4	5	6	7
12.	I am not concerned about this innovation.	0	1	2	3	4	5	6	7
13.	I would like know who will make the decisions in the new system.	0	1	2	3	4	5	6	7
14.	I would like to discuss the possibility of using the innovation.	0	1	2	3	4	5	6	7
15.	I would like to know what resources are available if we decide to adopt this innovation.	0	1	2	3	4	5	6	7
16.	I am concerned about my inability to manage all the innovation requires.	0	1	2	3	4	5	6	7
17.	I would like to know how my teaching or administration is supposed to change.	0	1	2	3	4	5	6	7
18.	I would like to familiarize other departments or persons with the progress of this new approach.	0	1	2	3	4	5	6	7

0	1	2	3	4	5	6	7
Irrelevant	Not true of me now		Somewhat true of me now			Very true of me now	

19.	I am concerned about evaluating my impact on students.	0	1	2	3	4	5	6	7
20.	I would like to revise the innovation's instructional approach.	0	1	2	3	4	5	6	7
21.	I am completely occupied with other things.	0	1	2	3	4	5	6	7
22.	I would like to modify our use of the innovation based on the experiences of our students.	0	1	2	3	4	5	6	7
23.	Although I don't know about this innovation, I am concerned about things in the area.	0	1	2	3	4	5	6	7
24.	I would like to excite my students about their part in this approach.	0	1	2	3	4	5	6	7
25.	I am concerned about time spent working with nonacademic problems related to this innovation.	0	1	2	3	4	5	6	7
26.	I would like to know what the use of the innovation will require in the immediate future.	0	1	2	3	4	5	6	7
27.	I would like to coordinate my effort with others to maximize the innovation's effects.	0	1	2	3	4	5	6	7
28.	I would like to have more information on time and energy commitments required by this innovation.	0	1	2	3	4	5	6	7
29.	I would like to know what other faculty are doing in this area.	0	1	2	3	4	5	6	7
30.	At this time, I am not interested in learning about this innovation.	0	1	2	3	4	5	6	7
31.	I would like to determine how to supplement, enhance, or replace the innovation.	0	1	2	3	4	5	6	7
32.	I would like to use feedback from students to change the program.	0	1	2	3	4	5	6	7
33.	I would like to know how my role will change when I am using the innovation.	0	1	2	3	4	5	6	7
34.	Coordination of tasks and people is taking too much of my time.	0	1	2	3	4	5	6	7
35.	I would like to know how this innovation is better than what we have now.	0	1	2	3	4	5	6	7

APPENDIX D

OPEN-ENDED QUESTION

OPEN-ENDED QUESTION

When you think about the microcomputers for full-time faculty what are you concerned about? (Please be frank and use complete sentences.)

APPENDIX E

POSTCARD

POSTCARD

Name _____

_____

Would you be willing to be interviewed for this research project?

_____ Yes

_____ No

APPENDIX F

TYPICAL DISSEMINATION INTERVENTIONS

TYPICAL DISSEMINATION INTERVENTIONS

Stages of Concern	Form	Content	Example Interventions
0 Awareness	Brief (1-2 pages). Media (5-10 minutes). Widespread. Large group. Low cost.	Overview of innovation name, developer, likely users, benefits.	Brochures, Newsletters, announcements in meetings, spot ads.
1 Informational	More lengthy (3-5 pgs). 1-2 hours, phased, repetition with increasing depth. Targeted toward individuals and groups who have indicated interest. Group interest.	More extended description of the innovation philosophy, contents, components, benefits and costs. The roles people play should also be highlighted.	Awareness workshops, trips to demonstration sites, description of use by experienced users
2 Personal	Individual or small target, face-to-face, empathic, supporting.	Clarifying roles, responsibility, supports, rewards, encouragement. Identification of priorities and backing by decision makers. Enthusiasm building.	Individual conference between administrator and staff member, small group meeting to clarify roles and responsibilities. Announcement of special resources to support implementation. Statement of rewards for use.
3 Management	Timely, quick response. short in length, individualized, task specific, face-to-face.	How to do it; nitty gritty of logistics and mechanics of use.	Tips sheet. "Comfort and caring sessions." Experienced users serving as consultants. Manuals that address techniques and how to do.
4 Consequence	Print or face-to-face. Notes, articles, workshops. Quick turn-around not as important.	Suggestions for expanded use. New ideas for refining use. Sharing evaluation data.	Sharing an article about a novel application of the innovation. Field trip to another site whete the innovation is used differently. A workshop to add another major feature to the innovation use.

TYPICAL DISSEMINATION INTERVENTIONS (CONTINUED)

Stages of Concern	Form	Content	Example Interventions
5 Collaboration	Meetings, policy decisions, resource commitments, linking facilitation, personal conversations.	Supporting users communicating and working with each other.	Arranging concurrent planning periods. Knocking out walls. Organizational development workshops.
6 Reinforcing	Print, trip, face-to-face.	Brain storming, stimulation, set breaking workshops, suggestions of alternatives.	Good time workshops. Consultants with fresh ideas. Providing information and training about other innovations.

APPENDIX G

LETTER FROM PRESIDENT

Office of the President

Keene State College
229 Main Street
Keene, New Hampshire 03431-4184
603 358-2000 FAX 603 357-5833

January 1992

To the Campus Community

From President Judith A. Sturnick

We will soon be welcoming in the Spring 1992 semester. We'll be starting off with a diversity program exploring the importance of differences on a campus. New personal computers will arrive for all of our full-time faculty members, and the campus will literally bloom this spring as new plantings complete the Fiske Quad.

On Monday, January 20, Civil Rights Day in New Hampshire, the Diversity Committee will be hosting Dr. Geneva Gay, a specialist on multicultural education from the University of Washington in Seattle. Her free, public presentation, "Strength Through Diversity: Difference DOES Make a Difference," begins at 7 p.m. in Waltz Lecture Hall and wraps up two days of meetings with students, faculty, and staff on campus.

By January 21, the first day of classes, all full-time faculty members will have personal computers on their desks. Each personal computer will be connected to the campus network, able to send and receive information from every other personal computer and the mainframe computer on campus, as well as throughout the University System of New Hampshire.

Improvement to information technology on campus has been a goal in Keene State's planning process for several years and is a significant step in our pursuit of academic excellence. A major portion of the equipment budget for the next few years has been set aside for this acquisition, which has been purchased form the New Hampshire-based Digital Equipment Company at a cost of $838,000.

APPENDIX H

STATEMENTS ON STAGES OF CONCERN QUESTIONNAIRE

Item Number	Statement
	STAGE 0
3	I don't even know what the innovation is.
12	I am not concerned about this innovation.
21	I am completely occupied with other things.
23	Although I don't know about this innovation, I am concerned about things in the area.
30	At this time, I am not interested in learning about this innovation.
	STAGE 1
6	I have a very limited knowledge about the innovation.
14	I would like to discuss the possibility of using the innovation.
15	I would like to know what resources are available if we decide to adopt this innovation.
26	I would like to know what the use of the innovation will require in the immediate future.
35	I would like to know how this innovation is better than what we have now.
	STAGE 2
7	I would like to know the effect of reorganization on my professional status.
13	I would like to know who will make the decisions in the new system.
17	I would like to know how my teaching or administration is supposed to change.
28	I would like to have more information on time and energy commitments required by this innovation.
33	I would like to know how my role will change when I am using the innovation.
	STAGE 3
4	I am concerned about not having enough time to organize myself each day.
8	I am concerned about conflict between my interests and my responsibilities.
16	I am concerned about my inability to manage all the innovation requires.
25	I am concerned about time spent working with non-academic problems related to this innovation.
34	Coordination of tasks and people is taking too much of my time.

Item Number	Statement
	STAGE 4
1	I am concerned about students' attitudes toward this innovation.
11	I am concerned about how the innovation affects students.
19	I am concerned about evaluating my impact on students.
24	I would like to excite my students about their part in this approach.
32	I would like to use feedback from students to change the program.
	STAGE 5
5	I would like to help other faculty in their use of the innovation.
10	I would like to develop working relationships with both our faculty and outside faculty using this innovation.
18	I would like to familiarize other departments or persons with the progress of this new approach.
27	I would like to coordinate my effort with others to maximize the innovation's effects.
29	I would like to know what other faculty are doing in this area.
	STAGE 6
2	I now know of some other approaches that might work better.
9	I am concerned about revising my use of the innovation.
20	I would like to revise the innovation's instructional approach.
22	I would like to modify our use of the innovation based on the experiences of our students.
31	I would like to determine how to supplement, enhance, or replace the innovation.

APPENDIX I

INTERPRETATIONS

INTERPRETATIONS

1. Establish a Holistic Perspective.

The goal of interpreting the SoC Questionnaire data is the development of an overall perspective and a description of the relative intensity of the different States of Concern about a particular innovation for the respondent(s). The interpreter needs to strive to develop a gestalt based on all the Stages of Concern scores. In developing an interpretation, the interpreter needs to explore alternative interpretations, and check them out against other parts of the SoCQ data. The focus for interpretation should be on what stages are high and low, and what the person seems to be indicating about her/his concerns. Developing this holistic description requires practice and thought. It cannot be done mechanistically.

2. Look at the High and Low Stage Scores.

Look at the relative highs and lows for that individual, not how high or low the individual is in relation to some other SoCQ data.

Stage 0: High 0 -- Indicates either an experienced user who is more concerned about things not related to the innovation, or a nonuser who is just becoming aware of the innovation.

Low 0/high other stages -- Indicates an experienced user who is still actively concerned about the innovation.

Low 0, 1, 2, and 3 -- Indicates an experienced user who is still actively concerned about the innovation.

Caution -- If the Stage 0 percentile is particularly high relative to the other scores, the other stage scores may have little significance. If there is an overall high response tendency, the high State 0 score may not reflect unconcern about the innovation.

Stage 1: High 1 -- Want more information about the innovation.

Low 2 -- Feel that they already know enough about the innovation.

Stage 2: High 2 -- Have intense personal concerns about the innovation and its consequences for them. While these concerns do not necessarily indicate resistance.

Low 2 -- Feel no personal threat in relation to the innovation.

Stages 1 and 2 generally go together, but when they fall apart, check them closely.

High 1/low 2 -- Need more information about the innovation. These respondents are generally open to and interested in the innovation.

Low 1/high 2 -- Have self concerns, tend to be more negative toward the innovation and generally not open to information about the innovation per se.

Stage 3: High 3-- Have logistics, time, and management concerns.

Low 3 -- Have minimal to no concerns about managing use of the innovation.

Stage 4: High 4 -- Have concerns about the consequences of use for students.

Low 4 -- Have minimal to no concerns about the relationship of students to use of the innovation.

Stage 5: A high 5 score is complex:

High 5 -- Have concerns about working with others in relation to the innovation. A high 5 will all other stages being low is likely to be an administrator, coordinator, or team leader -- one who perceives herself/himself to be in a leadership role; coordinating others is the priority.

High 5 with some combination of 3, 4, and 6 also being high--Have concern about a collaborative effort in relation to the other high stage concerns.

High 5 with 1 being high -- Have concerns about looking for ideas from others, reflecting more a desire to learn from what others know and are doing, rather than concern for collaboration.

Stage 6: High 6 with low 1 -- Not interested in learning more about the innovation. The person is likely to feel that she/he already knows all about it and has plenty of ideas.

High 6, high 3, low 0, 1, and 2 -- Is a user who tends to be positive in attitudes toward the innovation, but has many logistics issues to take care of. The high 6 indicates that the person has ideas about how to improve use of the innovation.

Tailing-up 6 for nonusers -- Has ideas about how to do things differently and is likely to be negative toward the innovation.

3. Look at the Individual Item Responses.

Look at the individual item raw score distributions. Check for patterns, trends, and irregularities. Watch the flow of item scores from left to right. Do they increase or decrease by stages?

A. If it appears by the raw scores that the respondent Q-sorted according to stages, more credence can be given to the profile.

B. Lack of sorting suggests general confusion about the innovation or lack of a clear focus (perhaps the respondent did not read the items closely).

C. Nonusers do not always peak clearly on one or two stages. However, if the items for Stages 0, 1, and 2 are relatively high and Q-sorted then the respondent is likely to be a nonuser.

D. If there are no clear peak stages, then the person has multiple stages of concern or no clearly focused concerns.

Note: Our experience has suggested that some individuals whose item responses are constantly in the upper extremes (on the SoCQ, this would be the use of 5's, 6's and 7's) tend to be outspoken with definite opinions. In some cases,

consistent use of the lower extreme item responses suggests that the person will be unlikely to share her/his opinions with others. Many of those who consistently use middle range item responses tend not to be forthright in their opinions. Although these patterns have not been specifically investigated with regard to the SoCQ, there are some indications that they do apply.

4. Look at the Total Score.

The total score, to some degree, reflects the amount of involvement the person has with the innovation. However, the total score should not be given very large significance in the overall interpretation.

A. A low total suggests low intensity of concerns and a comfortableness with the innovation.

B. A high total percentile suggests definite feelings and involvement with the innovation. These may be either negative or positive.

APPENDIX J

INITIAL INTERVIEW PROTOCOL

INITIAL INTERVIEW PROTOCOL

I. INTRODUCTION

A. Describe Purpose of the Study

I am studying how and why faculty response to technological change for my doctoral research. I haven't been on campus much this semester so I really don't know much about how the process has been handled or is proceeding.

B. Consent Form

Review consent form with interviewee.

C. Warm-up Questions

How do you like your new computer? (INNOVATION RESPONSE DECISION)

What do you see as its advantages and disadvantages? (NEED, COMPLEXITY, EXTERNAL CHARACTERISTICS)

II. IMPLEMENTATION CHARACTERISTICS OF INNOVATION

1. CHANGE CHARACTERISTICS

A. NEED

1. How strong of a need do you feel there was for this new computer? Very strong, average, or no need?

2. Can you elaborate on why you felt _____?

B. CLARITY

1. Were there any expectations communicated to you about how you should do your work in a different way as a result of having this machine?

2. What expectations are you aware of?

3. How were they communicated to you? (formally, informally)

C. TRANSFERABILITY

1. How ready did you feel to use this computer?

2. Was anything done to help you prepare for the arrival of this computer?

3. Was this helpful?

4. What was missing?

D. COMPLEXITY

1. What is your sense of how easy or difficult it is going to be to use the system? (Or it was to use the system or you anticipate it to be to use the system?)

2. Please elaborate.

E. DIVISIBILITY

1. Think back for a moment when you had to choose your microcomputer. How comfortable were you with the selection process?

2. What could have been done to make that easier for you?

3. (AIDED) What if they set up demos in the lab for you to try before you made your choice?

4. To what extent were you familiar with computers and how did you become familiar with them?

F. QUALITY AND PRACTICALITY

1. What aspects of the process to bring a networked system of microcomputers on campus do you think was handled extremely well and what aspects could have been handled better?

2. LOCAL CHARACTERISTICS

A. ORGANIZATIONAL STRUCTURE

1. How do you think that this decision was made?

2. Do you think this was a sound decision-making process?

3. If you could wave a magic wand over the process, how would you have liked to have seen the process work?

B. ORGANIZATIONAL CLIMATE

1. How would you characterize the current relationship between faculty and administration?

2. Has this project improved or hurt it? Why? (What is your sense of how people feel about this project? Are they pleased and excited to have the computers or are they skeptical and dismissive? Why?)

3. EXTERNAL CHARACTERISTICS

See Question #2 under Change Characteristics/Need. Also see warm-up questions #1)

or

Can you think of any outside forces (outside campus life) that motivates you to use your computer and or the network?

III. IMPLEMENTATION STRATEGIES

1. From what you know or have heard, what kind of support systems are available to help faculty use the new computers?

2. Is there any informal support available to you? (e.g., a colleague down the hall, a manual you purchased, etc.)

3. How helpful have these support systems been for you?

4. Do you feel there is a need for any additional support and if so what would you like to see?

IV. INNOVATION RESPONSE DECISION

See warm-up question #1.

V. WRAP-UP

1. Can you anticipate feeling differently about this computer system in the future, say in the next few years?

2. What do you see as influencing your views about the future?

3. Is there anything I should be asking you in my efforts to understand this change better?

OUTLINE GATHERING DATA REGARDING:

1. NEED

2. CLARITY

3. TRANSFERABILITY

4. COMPLEXITY

5. DIVISIBILITY (TRIABABILITY)

6. QUALITY AND PRACTICALITY

---

7. ORGANIZATIONAL STRUCTURE

8. ORGANIZATIONAL CLIMATE

---

9. MOTIVATION FROM EXTERNAL INFLUENCES

---

10. IMPLEMENTATION STRATEGIES

---

11. RESPONSE TO INNOVATION

---

12. ANYTHING ELSE I SHOULD ASK

APPENDIX K

HUMAN SUBJECTS RELEASE FORM

HUMAN SUBJECTS RELEASE FORM:

To participants in this study,

I am an Assistant Professor in the Management Department at Keene State College, on leave of absence this year to work on my doctorate. The subject of my research is technological change. Specifically, I am interested in how and why the full-time faculty at Keene State are responding to the project to implement a networked microcomputer system on campus. During this interview I will be asking you for your views about this project. My main role will be to listen as you talk about your experience with this project.

I will audio-tape this interview so that I can refer to your commenta as I analyze and write up the results of my study. I will own and store the audiotapes in a place where theie access will be limited only to me. In any written mateials and oral presentations in which I might make use of your materials from these interviews, I will not use your name, or the names of people you mention. Any transcription will be typed with pseudonyms.

As part of my work, I may use occasional quotes from your interview as a way of capturing the essence of your opinions. I may also use some of the interview material for future publications or for instructional purposes in my teaching. Your name will not be associated with you views.

You may at any time withdraw from the interview process. You may withdraw your consent to have specific excerpts used, if you notify me by the end of the interview. If I should want to use any materials in a way not consistent with what is stated above, I will ask for your additional written consent.

In signing this form, I am assuring you of your confidentiality. In signing this form, you are also assuring me that you will make no financial claims for the use of the material in your interview, nor will you hold Keene State College or the University of Massachusetts responsible.

I, _____ have read the above statement and agree to participate as an interviewee under the conditions stated above.

Signature of Participant _____

Signature of Interviewer _____

Date _____

APPENDIX L

DISCIPLINES AT KEENE STATE COLLEGE BY CATEGORY

DISCIPLINES AT KEENE STATE COLLEGE BY CATEGORY

A. Arts and English

1. Art
2. English
3. History
4. Modern Languages
5. Music
6. Theatre Arts and Speech (TASF)

B. Behavioral Sciences

1. Economics
2. Journalism
3. Philosophy
4. Political Science
5. Psychology
6. Sociology

C. Education

1. Education
2. Physical Education
3. Special Education

D. Science

1. Biology
2. Chemistry
3. Computer Science
4. Geography
5. Geology
6. Math
7. Physics

E. Management

1. Human Services
2. Industrial Technology and Safety
3. Management

APPENDIX M

AVERAGE SELF-REPORTED COMPUTER EXPERTISE

ON 14 SOFTWARE PACKAGES

Average Self-Reported Computer Expertise on 14 Software Packages

Value	Frequency	Group Cumulative Percent	Group Frequency Percent	Total	Percent Total
1.00	7	7.4	7.4		
1.08	8	8.4	15.8		
1.15	6	6.3	22.1		
1.20	1	1.1	23.2	22	23.0
1.23	6	6.3	29.5		
1.31	5	5.3	34.7		
1.33	1	1.1	35.8		
1.36	1	1.1	36.8		
1.38	4	4.2	41.1		
1.40	1	1.1	42.1		
1.43	1	1.1	43.2		
1.46	3	3.2	46.3		
1.50	4	4.2	50.5	26	27.0
1.54	2	2.1	52.6		
1.58	1	1.1	53.7		
1.62	4	4.2	57.9		
1.67	1	1.1	58.9		
1.69	2	2.1	61.1		
1.71	1	1.1	62.1		
1.77	6	6.3	68.4		
1.86	1	1.1	69.5		
1.92	5	5.3	74.7		
1.93	2	2.1	76.8		
2.00	3	3.2	80.0	28	30.0
2.15	1	1.1	81.1		
2.21	2	2.1	83.2		
2.23	1	1.1	84.2		
2.29	1	1.1	85.3		
2.33	1	1.1	86.3		
2.38	2	2.1	88.4		
2.50	1	1.1	89.5		
2.54	1	1.1	90.5		
2.62	1	1.1	91.6		
2.77	1	1.1	92.6		
2.86	1	1.1	93.7		
3.08	1	1.1	94.7		
3.14	1	1.1	95.8		
3.36	1	1.1	96.8		
3.38	1	1.1	97.9		
3.64	1	1.1	98.9		
3.77	1	1.1	100.0	19	20.0
Total	95	100.0		95	100.0

APPENDIX N

STAGES OF CONCERN RAW SCORE-PERCENTILE CONVERSION CHART FOR STAGES OF CONCERN QUESTIONNAIRE

Stages of Concern Raw Score-Percentile Conversion Chart for Stages of Concern Questionnaire

Five Item Raw Scale Score Total	Percentiles for Stage 0	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Total Raw Score	Percentile
0	10	5	5	2	1	1	1		
1	23	12	12	5	1	2	2	1- 42	3
2	29	16	14	7	1	3	3	43- 55	6
3	37	19	17	9	2	3	5	56- 60	9
4	46	23	21	11	2	4	6	61- 66	12
5	53	27	25	15	3	5	9	68- 72	15
6	60	30	28	18	3	7	11	73- 74	18
7	66	34	31	23	4	9	14	75- 78	21
8	72	37	35	27	5	10	17	79- 80	24
9	77	40	39	30	5	12	20	81- 83	27
10	81	43	41	34	7	14	22	84- 86	30
11	84	45	45	39	8	16	26	87- 89	33
12	86	48	48	43	9	19	30	90- 92	36
13	89	51	52	47	11	22	34	93- 95	39
14	91	54	55	52	13	25	38	96- 98	42
15	93	57	57	56	16	28	42	99-101	45
16	94	60	59	60	19	31	47	102-104	48
17	95	63	63	65	21	36	52	105-107	51
18	96	66	67	69	24	40	57	108-110	54
19	97	69	70	73	27	44	60	111-112	57
20	98	72	72	77	30	48	65	113-114	60
21	98	75	76	80	33	52	69	115-118	63
22	99	80	78	83	38	55	73	119-122	66
23	99	84	80	85	43	59	77	123-125	69
24	99	88	83	88	48	64	81	126-127	71
25	99	90	85	90	54	68	84	128-132	74
26	99	91	87	92	59	72	87	133-136	77
27	99	93	89	94	63	76	90	137-141	80
28	99	95	91	95	66	80	92	142-144	83
29	99	96	92	97	71	84	94	145-150	86
30	99	97	94	97	76	88	96	151-156	89
31	99	98	95	98	82	91	97	157-161	92
32	99	99	96	98	86	93	98	162-173	95
33	99	99	98	99	90	95	99	174-189	98
34	99	99	97	99	92	97	99	191-245	99
35	99	99	99	99	96	98	99		

APPENDIX O

OPEN-ENDED STATEMENTS

CASE NUMBER	STATEMENTS BY CONTENT UNIT	STAGE OF CONCERN/ CODE TAG
1.	I am very frustrated to have asked for a laptop and been given a big Digital. I would have preferred either the laptop or the Mac. or..a Mac laptop which I now learn would have been possible but about which I was not told. Oh well.	3 E
	No manual with Microsoft Windows. Now what?	3 T
	How will I get hooked up to E-Mail? When? How will I learn to use it?	3 T
	How do I access library resources and CD discs from my office?	3 T
	Tom Desmarais installed the systems as a favor. I feel uncomfortable about explotive student labor and am reluctant to ask him for help.	3 H
	Who is available for help over here?	3 H
	Where do we get supplies? Floppies?	3 P
	How can I translate my First Choice files into Windows files?	3 H
	I want the computer to be a tool, not a door stop. The hardware is costly, but without the initial support I am unlikely to find time to learn to use it. Help!	3 H
2.	Not enough resources for training and maintenance were allocated.	3 T + C
3.	They will be an excuse for inadequate clerical staffing.	3 A
	The administration will consider computer and adequate means of dealing with increasing enrollments.	3 A
	We need to recognize and augment human resources, not just provide technology as a substitute.	3 R
4.	I am very pleased to have access to a computer with such graphic capacity.	0 Y
	My only concern would be in communication. I would be afraid that it would minimize interpersonal contact in our daily way of communicating.	3 R

5. I don't think about the topic, so I have no concerns. 0 N

6. Basically good idea, but I've had a computer in the office, as well as at home for several years, and I've taken a number of courses since I'm intrigued with the theory. 0 Y

   However, to see people presented with computers without printers, or even such things as a couple of discs and a mouse pad, much less any sustained instruction, seems silly. 3 P + T

7. My basic concern is finding the time to become proficient in their use. 3 M

8. That computers will be used as an excuse not to address the issue of inadequate secretarial help. 3 A

   That equipment be properly maintained. 3 E

   That the computers risk being stolen. 3 U

   As I am already a Mac user in my home office, I look forward to learning new functions. 0 Y

9. We seemingly have moneys for studies, for microcomputers and much technology, but what is happening to the moneys for full-time faculty positions. More and more adjuncts may not enhance Vision 2000. I question the basic higher education philosophy and related values. Guess I still believe in a person-oriented teaching learning situation. 3 R

10. I don't recall that faculty voted to purchase PC's, but I think it's a good idea. 0 Y

    Some will be intimidated and make no effort to use the technology, but will discover the potential and incorporate it into their teaching and other professional efforts. 0 N

    I wish the college would find a way to help interested faculty and staff to purchase computers for use at home. For example, they could loan us money from the salary budget and recover it through payroll deduction. The college put a MAC-LC in my office last Fall and I've been making the transition from Apple IIe technology since that time. Things would have gone more easily if I had a machine at home. (By the way, I just ordered one.) I think others will feel the same sense of wild frustration. 3 E

The MAC-LC is wonderful, powerful technology. The decision to get one for every interested faculty person was an excellent and courageous one. 0 Y

11. I am not concerned about these computers. I am interested in finding ways to use them to help me be more effective. 0 Y

12. Someone from each section ought to be given advanced training, and then one-half released time (at first) to serve as a "resident expert" for colleagues. 3 T

    Money should be budgeted for software purchases each year - not on an "as requested" basis, but as a regular expenditure just like other supplies. These should be coordinated for best prices of multi-packs, site licenses, etc. 3 P

    Every effort should be made to get students "on-line" with the use of micro-computers. Instructional clusters of microcomputers should be created within each discipline for instructional purposes in an attempt to provide other ways of "delivering" courses or parts of courses. 4 S

13. Optimum use. We need time to discuss uses and non-uses of the resource. 3 M

14. I am concerned that digital computers were chosen for IBM oriented faculty instead of IBM machines. I am concerned with compatibility with my other IBM's. I am concerned about having to learn a new (Digital) computer and having to manipulate the compatibility with a number of other machines. The little I have tried to use these digital machines, I have run into problems with compatibility and memory space. 3 E

15. I don't like the fact that all printing must be done on networked printers. Faculty should have individual printers of reasonable quality. For example, suppose as chair of DPEC or a DPEC member, or as a member of a search committee I want to print personnel evaluations or correspondence concerning a job search. When I send this to a networked printer, whoever is standing by the printer may have access to my correspondence. The same situation would hold for SBDC consulting reports which must be confidential. 3 V

    Laser printers accessible via the network are a good idea and with easy access should suffice for most printing tasks requiring higher quality print etc. 0 Y

Another concern - is there a mechanism in place to protect against the introduction of a virus into the system which could then find its way into faculty computers? 3 U

Who will have access to data on my hard disk? Can my machine be accessed while I'm working on it? 3 V

16. The potential for the computers can only be fulfilled with a labor intensive program to help people learn how to use the new tools to fulfill their instructional and professional goals. This demands resources which are thought to be in short supply. 3 T + C

17. This is an excellent idea, and the equipment is pretty good; not state of the art, but much better than the junk I was given at my previous institution. 0 Y

I am concerned about adequate documentation and software. 3 H + P

I am also concerned about the up-front investment of time and energy needed to develop the expertise to save me time and energy. 3 M

Finally, I am concerned about the availability of support staff and when I get stuck. 3 H

18. I am concerned that we cannot keep the computer system in good repair. The case of printer refill cartridges is very high. Our budget is always a problem. 3 E

Computers are a big help to me. I could not keep up without them. I could not publish without them. 0 Y

We may need more software. I am concerned that the software may consume our whole budget. 3 C + P

19. I am concerned that a few faculty may use their microcomputers so little that the money would have been spent on other things. 3 C

20. I think providing microcomputers for full-time faculty is terrific and I'm very excited about new opportunities for telecommunications opened up by this innovation. 0 Y

My concern relates to training for faculty especially those who are phobic or who have never turned one on before. 3 T

I see this innovation as an enhancement of my work and hence my teaching; not as one which I will use directly with students. 0 Y

21. I know only about the fact that we all have microcomputers on our disks. I am excited about that and use mine a great deal. 0 Y

However, I know nothing about how these are to be used in any master plan manner for academic or non-academic activities. It is obvious to me that the computer network is exciting for us as educators. Is there some plan for using these beyond the obvious? If so I want to know what it is. 3 A

I am frustrated that we have not been provided with a manual for WORD. Fortunately, I have WORD at home. I'm also frustrated that we've received no information on how to network with other campus members or beyond this campus. 3 T

Rumor has it that we may be expected to register students for classes via our computers. If that type of activity is expected of us, we need opportunities to discuss that at length. I question the feasibility of such a time consuming use of my time. 3 A + M

22. When I think about microcomputers for full-time faculty, I am concerned that it should have happened earlier. 3 A

In a 1991 survey of Safety Studies Graduates, respondents were asked to address areas in their education at Keene State that did not meet their needs in the workplace. One of the most common responses alluded to a lack of computer skills. Some responses indicated that the graduate's new employers were disappointed that their new employees were not computer literate. Like it or not computers are a reality that everyone has to deal with. The concept of computers on campus should be expanded to include students as well. 4 S

23. How will privacy be affected? 3 V

Is the anti-theft device ever going to be installed? 3 U

Who makes decisions about new software acquisitions and who will pay for them? 3 A + C

Could the money have been better spent on new faculty positions? 3 C

How accurate are database searches as the fact (literature searches)? 3 H

Who will pay for such on-line searches? 3 C

How can I protect myself when all printers go down (campus wide)? 3 E

Why were workshops offered when faculty were off campus (January and March 9-14)? 3 T

24. I really don't have major concerns. I am so pleased that we have the Macs, the network to the library, the laser printer network. It took a lot of vision and effort to pull it off. Maybe you should ask, what do you like about the computers rather than just seeking concerns. 0 Y

We need also to have the budget to purchase software for classroom demonstration of technology in the classroom. We need technology rich classrooms - hooked up VCR, overhead, projection screens for computers. 3 P + 4 S

25. I believe telecommunications/computer use is a very futuristic truth. One must become good users of this means. 0 N

I do not wish to see us become so electronically directed that we lose the art of conversation (live) though! 3 R

26. Licensing/sharing of software. 3 P

Dollars for software purchases. 3 C

Mix of computers - I use IBM and want students to have access to my tutorials on the network. If they only have know-how to use a MAC, it's discriminating. 3 E + 4 S

27. I like the idea but cannot evaluate the cost and benefit factors. 3 C

28. Why was funding spent on computers rather than on other drastic college needs, such as more full time staffing? 3 C

In my department, I don't think anyone really evaluated our need for or potential use of computers. 3 A

Nor were printers or tables included in the order. 3 E

For ten years, we have been requesting computers for student use in the language lab. We need software to drill and practice vocabulary and grammar. Good software is readily available, but to date we have no computers in the lab - no apparent administration interest in that student use of computers. 4 S

I think that the college should place student needs and the quality of teaching and learning in the foreground of every spending decision. I'm not sure that was done here. 4 S + 3 C

How about personal needs? Computers are cheaper than secretaries, right? So receiving computers means we now do all our own word-processing? 3 A

29. We need extensive training in the network applications and thus far aren't getting this. 3 T

I'm concerned that the hard drives are overloaded with network applications I'll never use. 3 E

And I'd really like to see a computer classroom, accessible via network. 4 S

30. I think it is fabulous and a major positive step. 0 Y

I am concerned about how we go about learning to maximize the technology's capabilities (or even begin to learn about some of the capabilities). I know only a fraction of what a MAC can do - want/need an easy way to familiarize self. I am from a Wang IBM world, so not totally unfamiliar with computer concepts, but don't know MAC world at all - would like to. 3 T

31. Current - Printing problems - I have had a new computer for four weeks and productivity has decreased because it takes up space, I want to learn to use it - but can't print with it - no network hookup. 3 E

Future - Anyone can get access to my material (tests etc.) before I pick it up at the printer. Printer codes could get confused and material routed to another building. Confidentiality (see above) tests, DPEC, reports, etc. 3 V

Software limitations - no spreadsheets, not sure of what software I can use or what is on the VAX. No surge protector, no mouse pad. 3 P

Training - Why during Spring break? 3 T

Costs to department for laser printers, ink, paper, etc. 3 C

32. My major concern is that I do not have enough time to do everything I would like to do with my computer. 3 M

I've been using a MAC since they were first available (1984?) and have had one (an SE/30) on my desk at KSC since 1989 (I believe). I am extremely happy with this computer and could not function without it. 0 Y

I would like to have a computer as a physical presence in my classes and use it more for instruction. 4 S

It is very difficult for me to find the time to be innovative in this respect, however. 3 M

33. I am concerned that they will be used. Faculty need training and time to use them. Most of use are so overloaded that we have no real time to work on them or get to use them as we could (should). I do use mine for grades, letters, etc. 3 T + M

34. I am concerned about the questions of privacy regarding the information on each faculty member's computer, particularly in regard to grades and personal correspondence. 3 P

35. I am not really concerned about anything. I'm glad to have the computer to use. 0 Y

36. My greatest concern is that knowledge of the technology will assume greater importance than knowledge of the substantive material that I consider necessary inn college education. Already I have encountered computer literate students who are, at best, only semi-literate in the English language and uniformed or very poorly informed in many other areas. 4 S

I also worry about the monetary cost of remaining technologically up-to-date. It may be that the effort to upgrade the computing system will draw off funds that I think may be better spent on other things (e.g. library holdings, needed staff, etc.) 3 C

37. I am quite concerned that we are now being asked/required to do our own test banks and compile our own exams. Secretaries can no longer do all the necessary input. This is absurd given our teaching and administrative requirements. I believe our new Dean is being quite unreasonable on this issue. 3 A

Concerned about lack of funds being made available to purchase software. Our department budgets shrink yet new technology requires new purchases. We have no money for this. 3 C

As time has moved on the computer center seems less and less willing to assist in the transition from old Decmate database to new MAC base. to expect us to just re-do, retype, or dump old data is shortsighted on the administration's part. They need to get back in the trenches with us for awhile and see life from the real, active side of the desk. 3 H

38. Many faculty members use these mainly as simple word processors, for which simpler and less expensive alternatives are already available. 3 E

The money spend on them would have been better allocated to more advanced features for the rest of us who want the full - page graphs or possibilities available on sophisticated Macintosh computers. My own needs for full - page musical scores could not be considered, for example. Likewise, flatbed scanners may be of use to people needing graphics; also color printers, and perhaps optical character recognition capabilities. This interest, in my own case, centers on research output, as well as the effective advertising of music events. 3 C

So far as students are concerned, music theory can successfully be drilled in by relatively simple Macs. Perhaps they can also be helped by spelling and grammar checkers, though there is a danger of no learning (besides the learning of dependence) taking place. I foresee computers at KSC as having much use to people who have a real purpose for them in research, primarily by faculty and graduate level students. (Other students can write term papers on them, or on cheaper word processor. For them, old - fashioned library research still appeals to me.) 4 S + 3 E

Some faculty members may also have no interest whatever in computers. Their preferences should be respected - and financial allocations therefore should correspond to these preferences. 3 A

Computer literacy is by no means the most important literacy on campus. I'm glad to have it, to facilitate my own traditional research. But traditional literacy in relation to language and cultural heritage is far more important, and in increasingly short supply. Maybe some of the unused funds for computers can be recycled for books for Mason Library? 3 R

There will never be an acceptable substitute for holding a book in hand and turning its pages. Students need to know this. 4 S

(One more quibble. We have as yet no assurances of adequate furniture to house our new toys!!!) 3 E

More important than the technology is who is using it, and to what purpose. 3 R

39. Adequate instruction is a concern. 3 T

Adequate printing facilities is another. 3 E

40. I know some faculty who will not use them. It seems like a waste of money to put them on their desks. Others, like me, are happy to have one, but it was never a high priority. The money spent on people like me could probably also have been put to better use. 3 C

I never heard any campus discussion about whether or not this was a desirable way to spend such a large amount of money. This is of some concern. 3 A

There doesn't seem to be enough real expertise on campus on how to use the computers and the software. I can get answers to the basic questions, but not the more sophisticated ones. 3 T

41. I believe the most significant impact of the readily available and effective micro computers for full-time faculty will be in time savings in completing our tasks. 0 Y

Computer aided instruction and student use of the computer will only be enhanced when we provide them with better access to the PC's. 4 S

42. I have several concerns:

Availability of, and access to, software programs on the network. 3 P

Training in the use of software. 3 T

Security (particularly word processing, letters, tests, etc.) 3 V

Timing of running off output and location of output device; delivery time for finished product to user. 3 E

Ability to ask for/receive new programs as needed, either to be placed on the network, or on departmental computers not connected to the network. 3 P

Lack of communication on the whole project. 3 A

Inadequate staffing/under-staffing of technology people to implement the project. 3 A

Ability to select draft printer vs. laser printer as needed. 3 E

43. I am not concerned. 0 N

44. During add/drop time, we were asked what we wanted. We told "them". They ignored us. 3 A

Result is system useless and inappropriate and useless for teaching (not enough power, graphics, or disks). Also wrong floppy. 3 E

System seems to be to unload administration or faculty. The system is inappropriate for teaching. No real academic software. 3 A

Do not agree with or like Windows base. Removal of VMS terminal support for mail/Internet via dial up is a great step backward. 3 P

Don't see resources to support use, growth and repair of system/ innovation. 3 C

It is essentially obsolete technology. A 486, XVGA, 64K, 100 meg disk CD-ROM is essentially the standard now, not this junky thing. Cost difference is negligible as well. I can't load or run most of software on the small disk or under Windows. 3 E

No money to upgrade software to Windows where such upgrade is available (usually it is not). 3 C

System seems like a ___ to non users, not what the experienced users want! There are many such users at KSC now. 3 E

45. My principal concern is that computers will not be used. A great deal of money will then have been wasted. 3 A + E

46. The idea is a good one. 0 Y

However, I strongly believe that a major mistake was made in trying to implement the "one size fits all" concept. 3 E

Although I'm grateful to have a networked station, it does not begin to fill the memory and computing requirements needed to run software that would bring me and my students into even 20th century applications in Geology. 3 E + 4 S

It becomes even more frustrating when I realize that my computer cannot be "retrofitted" with the hardware to "bring it up to snuff". This means that when funds become available, the whole system, in my office will need to be replaced. It would have been better to spend a bit more now, to be fully operational rather than wait for an indefinite time to become fully operational. 3 E

On the bright side, I'm very pleased to be in the network and to have access to the library computer, campus info, and E-Mail via UNH. 0 Y

Hope we get stand alone service in the near future. 3 W

47. Computer conferencing software is one thing. I'd like for all of us to be able to interact on line in areas of mutual interest and concern. 3 W + 5 F

There is great potential that may remain unfulfilled due to lack of vision, training, and support. 3 A, T, H

Many people are unfamiliar with the possibilities of electronic communication and "groupware". 3 T

It is great to put everyone on line but poor to withhold the necessary support. 3 H

48. Will faculty members be spending time doing secretarial work? Will there be a reduction in secretarial staff? 3 A

Where will the budget reductions occur to finance this purchase? 3 C

Will adequate training and service be available? 3 T

Will departmental budgets suffer to provide accessories, repair, etc.? 3 C

What happens when these computers are obsolete in 3-5 years? 3 E

Will faculty have access to all data - student records, admissions, data budget, library, etc.? 3 A

49. My main concern is to learn to exploit its possibilities to the fullest for my teaching and scholarly work. 3 T

I'm sure there are uses other colleagues are making of the LC that I've not thought of. So I'd like to see a way of sharing our experiences and of getting concrete illustrations of what can be done. 5 F

For me tutorials tailored to expense accounts, daily calendars, billing customers, and addressing form letters just don't answer my questions - worse they don't let me formulate good questions, because I haven't seen concrete illustrations concerned with academia. 3 T

A second concern is the difficult of getting technical help when it is needed. I have not yet been able to access the network - so laser printing and library research are not even within my experience yet. 3 H

Related is the fact that so far my LC, despite my having received the lock down hardware more than a month ago, is still not secured. Indeed, even the Laser printer in Parker Hall Lounge is in a room with ground level windows that I've found several times unlocked at night and weekends. I can just see getting entirely geared to use this technology only to find one day that theft or vandalism has eliminated my ability to carry out teaching plans. 3 U

50. I think they are a useful tool - I use it to do research and write but not to teach. 0 Y

51. I think it is fantastic! I've had a MAC at home since 1984. It's wonderful to be able to work in my office as well. I've never used a network before and I'm very excited about learning how to use it. I've applied for a VAX account and would like to learn more about it and other networks like Bitnet. 0 Y

52. I think it is a wonderful idea. 0 Y

We should have the opportunity for more complete training. 3 M

53. This acquisition was long overdue. 0 N

I hope that faculty - wide electronic mail and file/document sharing will be implemented quickly. 5 F

I hope that KSC develops its own Internet node. 3 W

Will additional resources be available to upgrade the new micro-computers as faulty uses become more diverse and sophisticated and as the equipment ages? 3 E + P

The campus network must permit faculty access to student records for advising purposes. The computer and telephone mail systems should be interfaced to allow development of voice mail lists. 3 W

The college must commit real resources to assure the physical and electronic security of the system and to replace stolen equipment. 3 C + U

More campus-wide software licensing should be encouraged to permit broader distribution of applications.

54. Very positive first step: This is a big move with a lot of potential benefits. I am generally pleased with the hardware and software provided - it is first class. I am also in the special circumstance of having requested, and having received more powerful hardware than is generally available. The network facilities and the printers are well thought out. 0 Y

I am concerned about the level of training for other users on two counts. (I am not concerned for myself, as I have been using and programming the MAC since 1984.) First, there will be some time required for conversion from old to new. I hope the staff gets on this and helps. Second, my interactions with some of the staff doing training led me to conclude that I know a lot more than they do - which is really scary. Who can train the trainers? 3 T

55. I think that computers for all faculty is a positive move. 0 Y

I wish that there were more hours (in a block) to work on projects without the interruptions of teaching classes. 3 M

The administration must (and soon) provide funding for software appropriate for each faculty member's use (a minimum of $25,000) per division to start). Providing only Microsoft Word will enhance little but secretarial efficiency. 3 C

Faculty within disciplines who are unaware of a computer's potential in that discipline must be given relevant instruction in software and hardware use. The use of present faculty, with or without additional training, to then teach other faculty is a recommendation (released time to learn and to teach other faculty). This idea would provide a technology expert in each discipline. 3 T

56. Faculty needed to be consulted to see if they would even use computers. Many faculty have no interest in them. 3 A

I'm not yet connected to the network, but would hope that would happen soon. 3 H

Given the amount of memos that are circulated on this campus - and the awful networks of communication (due to too many people working on small projects with little coordination), this campus desperately needs an E-Mail service. But we have a history of getting systems that don't work well or have "bugs" (i.e. the phone) so we all need training and more information. The lack of training that come with the computers was appalling. There needs to be more support or even a clear message of who to call when there is a problem. The administration seems to give us the machines but not the knowledge to use them. 3 T

57. Takes too much valuable time to learn how to operate the thing. 3 M

58. As indicated I'm interested in the use of the computer for instructional purposes and as a research tool. 4 S

For example, access to the library holdings are tremendously helpful - access to data bases like CD ROM would be very useful as would information pertaining to articles in periodicals. 3 W

I've only the slightest glimmering of the use of the computer in the class-room, for example, its interface with other equipment. The ability to use it to provide instant information, film, etc. is exciting. 4 S

Personal communication between people, using the computer, has promise but also some pitfalls. I'm fearful we might tend to meet less and sit in our offices more. 3 R

I've noticed an increase in writing (volume) but have seen no improvement in the quality of writing - I think it will ultimately have a big impact on what we write - on style of writing. 3 R

59. Does this entail more secretarial work for us? Will this system enslave us like voice mail? 3 A

Will there be money to upgrade the system as time goes on? 3 C

Is this system to enhance administration and communication or instruction? 3 A

60. The need for extensive faculty training as soon as possible, primarily in the area of word processing. 3 T

61. It is many years overdue. 0 N

I am very concerned that the faculty are being turned into a cadre of typists (who can't type). This is partly good and necessary because the extremely poor quality of typing services available to some of us -- work not done for weeks or months, full of mistakes, misspellings, etc. Already, I see "my" secretary spending maybe 40% of the day in her office - with very little to do in my opinion. This is because few dare to give her work anymore. 3 A

Faculty and secretaries are in desperate need for more instruction. I have wasted more frustrated, stressful hours fighting with the horrible manuals for Excel and Word than I care to think about, and I see secretaries et al., suffering the same way. We have invested hundreds of thousands in hardware and software, but only hundreds in how to use it. That is not smart. 3 T

Networking is positively exciting, but we need time and budget money to get on it. 3 M + C

We are in desperate need of better access to better printers. I can not access e.g. the biology printer from my MAC, and no one can/will tell me why or fix it. 3 E

Please don't get me wrong. Overall it is absolutely fantastic. 0 Y

I am just frustrated because there are so many good things I want to do, but I don't know how to do them and I don't have the huge amounts of time it takes to learn how by "playing" or by learning from the book. I have too many people knocking on my door and too much junk mail and other paper. 3 M + T

62. Time: While administrators find little time to work at their computers, they have secretaries and staff to fill the gap. Not so with faculty. 3 M

Using a computer (word processor) takes a great deal of time - but it does afford an expanded level of control over sensitive and/or private material. 0 Y

Obviously there are positive and negative facets to the program. Back to basics - I'm grateful to have learned keyboarding skills in secondary school - even more time is wasted by those without this skill. 3 R

63. Although I will probably use my computer/printer from time to time, it is not a significant improvement over what USNH subsidized me to buy a few years back. (I have this computer and printer at home.) These computers and printers were purchased primarily as part of the administration's vision of academic quality. There was little input from faculty and when asked for it was generally ignored. For example, I share an office and I decided we needed one "notebook" and one computer and that the latter would sit next to our shared (with 5 other faculty) printer in a nearby room. This is what we needed. What we got were two regular Macs both installed in our office. My office mate, who wanted the flexibility of the "notebook" has no interest in the micro. 3 E

64. The scheduling for instruction of faculty was during Spring break - faculty need this break as much, if not more, than the students. If we're expected to learn about innovation, we should be given time to learn it, not expected to add it to our already taxed schedules. 3 T

My computer has not been locked down and is not yet connected to the Library. I called about a month ago about it, but no luck. Since I have a computer at home I'm not concerned about accomplishing regular WP tasks. 3 U

But I'd like to cooperate and use the innovation - it's just a matter of time. No systems gets up and running overnight, I guess. Maybe during the summer I can sit down and figure this all out. Till then, it looks good in my office, anyway.... 3 M

65. It is full of potential. 0 Y

My major concern is that the MAC LC that most of us got will have enough memory (RAM) to use the programs we need. As the software becomes more complex and bigger, the hardware has to keep pace. I've been using a MAC for a couple of years at home for this purpose and have had problems keeping up to date. The MAC LC we have now has a difficult time running word processing, page layout, and drawing programs all at once. 3 E

66. The microcomputers for full-time faculty are valuable additions to our offices. They save us time and have forced me to learn to use a computer. I have need to do this and am now doing it. These computers save secretaries' time, paper, and storage space. 0 Y

My concern is that the one printer for the Arts Center is a long way from my office and it is very inconvenient to run back and forth and not know who is going to read my printouts since it is impossible for me to get there in time to catch them as they are being printed. 3 V

67. Micro computers are sociologicals. A personal computer i.e. is designed to fit the personal style and to be identified as personal property. However, the history of computers has created an institution for the management and standardization of this technology. Based on the model of corporate production assets i.e. standardization, efficiency, sponsorship, etc. These two models will inevitably conflict. 3 R

So long as there exist corporate standards for PC systems, I will not use the equipment effectively. Every time a policy changes I must obsolete all of my materials and approaches. For example, it took me a month to convert my disks from 5.25 to 3.5. I was lucky, at least I have the facilities, the department does not. And I lost the data which I did not have on backup because my old machine was moved somewhere. If the efforts to standardize WP are implemented, I will need to stop publishing papers from campus as I will not take a month to learn an inferior WP system. My grading/tracking programs represent a considerable investment in programming time. I will not reprogram to a corporate standard data base system. 3 E

If the printer is removed, as I am told it will be, then they might as well take the equipment out of the office as I will not revise my programs to a new printer, walk one floor for papers, print confidential work on a network etc. 3 V

The point is not that the policies are good or bad. It is that any policies are bad if the unit is a personal extension of my capabilities. MIS is a transient profession. It served a purpose for a short period of time. It could continue to serve a purpose only if it adapts to the major difference between personal and corporate resources. (Read Mahon "Joseph in Egypt" for a similar conflict in the role of scribes when paper was an expensive corporate resource.) 3 R

68. Will the college support requests for software? Upgrades? 3 C

69. Nothing in particular. I can't imagine working without one. I have been a Macintosh literate for about 9 years. 0 N

70. I am basically concerned about the waste. The whole business should have been prefaced with "Do you need this equipment?" There are some advantages to having a word processor but its a little like using a sledge hammer to swat an ant. Most people do not need a microprocessor. 3 A

71. Being one handed - I feel a substantial personal defeat regarding typing (or using the keyboard) i.e. I will need substantial time for skill development - or my hunt and peck style will minimize utility to innovation. 2 E + 3 M

I also doubt the long run intentions of management i.e. these computers will replace our secretarial assistance - to save money. This is a poor use of time and insensitive to both staff and faculty. 3 A

72. I think of it in more in terms of how students may be using microcomputers, how I might understand and work with their using them, and how other faculty are using them. 4 S + 5 F

I would like to learn about microcomputers use but it is not a current matter for me. A gradual introduction would be helpful for me. I have an open mind about future uses of microcomputers. 0 N

73. I've always had high hopes for "the human use of human beings" (Weiner's phrase) that computers might make for. Except in the obvious cases of word processing and spreadsheet accounting (I've yet to see the light about database programs). These hopes have yet to be realized. All too many times computers have turned out to be life - observers rather than life providers. I think of acquaintances who have given up much of their lives to the pursuit of perfecting "the system", spending days and nights to save the machine a few microseconds of time. Still I have great hopes for the possibilities inherent in networking, so I wait. 3 R

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