A University Multimedia Facility: Perspectives of an Institutional Innovation

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(Abstract)

This study examines an innovative multimedia facility created in partnership with the NewMedia Center's consortium which is a partnership between technology corporations and institutes of higher education. Findings include the discovery that the facility was itself an innovation created in response to the innovation of multimedia technology. It was also an institutional innovation that tried to assist the diffusion of multimedia technology in certain directions. The main thing it offered was access to its users the tools of multimedia but perhaps more importantly was the facility's founders ability to create the perception of momentum in the direction of a new innovation multimedia.

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I dedicate this work to my teachers who taught me; to the writers I read; to my committee who counseled me, to my friends who consoled me; to my parents who cared; to my wife who supported, encouraged, and shared.

TABLE OF CONTENTS

TITLE i
ABSTRACT ii
ACKNOWLEDGEMENTS iii
TABLE OF CONTENTS iv
INTRODUCTION 1
Need to Respond to Technology 1
The Study 3
Value of study 4
Research questions 5
THE LITERATURE 6
Multimedia 6
Innovation 9
What Drives Innovation 10
Innovations Have Social Impacts 11
Innovations Influence Organizations 12
What Is Diffusion 13
Change Agents 13
What is a change agent? 13
Strategies of change agents 15
Diffusion effect 16
Resistance to change 16
Industry / Education Partnerships 17
Need for Access to Multimedia Production Tools 19
Social Construction of Meaning 21
METHODOLOGY 22
Why An Ethnographic Case Study? 22
Limitations of Ethnography 24
Limitations of the Data Collected 24
Data Sources 27
Data collection 28
Fieldnotes 29
Data analysis 30
Validity and Reliability 30
Researcher's Stance 31
Reflexivity 31
My Access to the Research Environment and Participants 34
THE SOUTH UNIVERSITY MULTIMEDIA FACILITY 35
How Was the *SUMF* Created? 36
Relationship with National Consortium 39
The Corporations' Agendas 42
What Kind of Change Did the SUMF's Corporate Affiliates Want to Bring About? 42
Marketing 42
Barriers to the Corporation's Agendas 43
How Was the SUMF Used as a Change Agent by the Corporate Affiliates? 44
South U. Administration 45
What Kind of Change Did South U.'s Administration Want to Bring About? 46
Restructuring higher education 46
Faculty development initiative 47
Faculty development initiative intended to save money 47
Needed uniform computing platform 48
Needed to provide place for training 49

Barriers to South U.'s Agendas 50
Many faculty were comfortable with traditional teaching practices. 50
Many on campus did not want to change platforms. 51
Lack of infrastructure. 51
Lack of skills. 52
Funding from state could erode. 52
How Was the SUMF Used as a Change Agent by South U.? 53
Political. 53
Discounts and inside knowledge 56
Provides resources. 59
SUMF was used as a site for training 62
SUMF provided an incentive to switch platforms. 62
Library administration 62
What Kind of Change Did South U.'s Library Want to Bring About? 63
Barriers to the Library's Change Agenda 66
Changing too quickly might be too much of a shock. 66
Library staff not prepared for change. 67
How Was the SUMF Used as a Change Agent by the South U. library? 67
SUMF's Form? 68
Architecture 68
Equipment 69
Rules 72
Form Influenced How SUMF Was Used 75
Alliances Important to Change Effort 75
Alliances can generate momentum 76
Alliances 77
Alliance Was Means in Itself 85
How Was the Facility Used by the Patrons? 85
Classroom 85
Influence of the World Wide Web 91
Desktop publishing 94
High-end Multimedia 97
Expertise 101
How much is enough? 102
Who were the users? 103
Community. 104
Faculty. 106
Students. 107
ANALYSIS AND INTERPRETATION 108
Institutional Innovation 109
Users 109
Faculty, students, community. 109
Classroom 111
FDI Will Increasingly Use the SUMF 112
Multimedia 112
What Was Demanded? 115
DISCUSSION 116
Alliances Were Created to Leverage Change 116
What Type of Access Is Needed 116
What Type of Access Does the SUMF Provide 117
Access Was a By-product Not the Focus 118

Access to Classroom Is Demanded Now 118
Future Challenges of the SUMF and Technology Access in General 119
Continued Funding 119
Usage Patterns 119
Redefining the Library 120
Corporations Solidifying Position in Higher Education 121
REFERENCES 123
APPENDIX A: GLOSSARY 127
APPENDIX B: DATA COLLECTED 131
APPENDIX C: CONSENT FORM 133
APPENDIX D: HYPERCARD APPLICATION 137
APPENDIX E: SAMPLE OF FIELDNOTES 139
APPENDIX F: SOFTWARE AND HARDWARE CONFIGURATION 141
CURRICULUM VITA 149

INTRODUCTION

This study is an examination of an innovative institutional innovation created in partnership with a university I've named *South U.* and the *NewMedia Center's* consortium which consists of large multimedia corporations and hundreds of institutions of higher education. The institutional innovation I've named the *South U.* Multimedia Facility (*SUMF*) consisting of a multimedia production studio and a multimedia classroom that attempts to provide reasonable access to multimedia production technology to the faculty and students of *South U.* as well as members of the local community.

Need to Respond to Technology

The *SUMF* is an attempt to create an institutional response to changing technology. Technology is increasingly seen as outpacing the capacity of social institutions to adjust (Toffler, 1980). Educational institutions in particular need to respond with institutional innovations to accommodate new technologies (Razik & Nalbone, 1989). Each institution of higher education will respond to these pressures according to its own situation. Razik and Nalbone (1989) make these suggestions: "Increase participation in mission-oriented technological innovation in partnership with industry and government; restructure organizationally to optimally integrate and use new technologies in its own operations; and concurrently address social issues" (p.66).

Margaret Mead pointed out the importance of innovative institutional responses to technology when stating,

> There are too many complaints about society having to move too fast to keep up with the machine. There is great advantage in moving fast if you move completely, if social, educational, and recreational changes keep pace. You must change the whole pattern at once and the whole group

together - and the people themselves must decide to change (McLuhan, 1964, p.28).

To generate such large scale change the resources of an institution must be commanded. As Dewey (1935) noted, "The educational task cannot be accomplished merely by working on men's minds without action that effects actual changes in institutions" (p.4). Addressing change is not an easy process. Razik and Nalbone (1989) suggest these questions which an institution of higher education must pose to itself.

- What is technological progress and what is not?
- For what purpose is a given technology being considered? Who will benefit? What will be the costs in terms of social, environmental or other impact? Who will bear the weight of those costs?
- Can the university maintain such values as freedom of inquiry and a commitment to the wider public good and still be viable in a socioeconomic and political system where competition and pressures to serve special interests may diminish its access to resources?
- What are the limits of the university as an institutional agent of progressive change?
- What are the consequences of not meeting the challenge of technology's unregulated thrust (p.74)?

These questions are important ones and should be kept in mind when studying universities and innovative change.

The *SUMF* was formed by an alliance that wanted to promote the diffusion and adoption of multimedia. As Razik and Nalbone (1989) state, "The university must attend to real-world issues by involving 'stakeholders' in the processes of research and problem

solving. This implies that universities must engage in 'outreach' activities into its constituent communities and social environs" (p.74). The university may need a tool or structure that allows it to engage these communities and thus promote change. It is appropriate to classify the *SUMF* as a tool for promoting change.

Promoting any innovation has ethical implications(Roger, 1983). However, those implications shouldn't automatically be interpreted as being negative. As Eveland (1979) states,

> There is nothing inherently wrong with ... a pro-innovation value system. Many innovations currently on the market are good ideas in terms of the almost any value system, and encouraging their spread can be viewed as virtually a public duty (p.99).

Eveland (1979) describes how such an innovation might be researched when stating,

> But even in the case of an overwhelmingly advantageous innovation, a researcher should not forget that the various individuals in the potential audience for an innovation may perceive it in light of many possible sets of values. If the researcher is to understand their behavior in adopting or rejecting the innovation, the researcher must be capable of taking their various points of view (p.99).

That is what I have attempted to do as I addressed the following questions.

The study

The purpose of this research study was to examine an innovative, technology-oriented facility within a large university and then develop an understanding of what role the facility was playing, how the facility was used and the meanings the facility induced.

As such, this study sought to answer the question, "What meaning did the facility have among those associated with it?" To address this question I decided to focus on how

the facility was used. By studying the way an object or facility is used to define its meaning is not only practical but the foundation of pragmatism. As John Dewey (1916) states, "It is the characteristic use to which a thing is put, because of its specific qualities, which supplies the meaning with which it is identified" (p.34).

Value of study

This study frames an institutional innovation from multiple perspectives. Dewey (1916) suggests:

> Where only a single outcome has been thought of; the mind has nothing else to think of; the meaning attaching to the act is limited. One only steams ahead toward the mark. Sometimes such a narrow course may be effective. But if unexpected difficulties offer themselves, one has not as many resources at command as if he had chosen the same line of action after a broader survey of the possibilities of the field. He cannot make needed readjustments readily (p.109).

By examining how the *SUMF* was used from both its creators and patrons point of view we can see the issues, problems, and potentials of such usage. We may then evaluate the outcome according to a diverse range of expectancies and be better prepared with options resulting from our broad survey.

This type of examination of an institutional innovation is one form of technology assessment. Brooks (1973) describes the purpose of such assessment as, "The objectives of technology assessment are seen as: trying to anticipate the consequences of increasing scale of application, stimulate continuing research and monitoring related to it, and serve as a goal towards continuing adaptive innovation" (p.247). This pursuit is important because, "By sharing these perspectives, people can define various objects as common, predict others' behavior, and orient their own behavior" (Katagari, 1992, p.67).

Research questions

I began with an open agenda because of the importance of allowing data to emerge from the environment (Tesch, 1989). One of my primary tasks was to narrow this open agenda to focus on issues that were most illustrative of this particular innovative environment. Specific research questions derived from the general framework of usage emerged and are the focus of this document. These include:

- How was the *SUMF* created?•How was the *SUMF* used by its creators?
- What were the agendas of the *SUMF* 's creators?
- What kind of change did the *SUMF* 's creators want to bring about
- •What were the barriers to change?
- How was the *SUMF* used by patrons?

THE LITERATURE

This study is an examination of a new innovative facility. To understand this facility it is necessary to become familiar with the literature on innovation. I will demonstrate in this study that this facility was partially used as a tool for encouraging change. Some of these changes include promoting the use of a particular type of multimedia technology. Multimedia is central to this study and is reviewed in detail to understand what it is and why access to the tools to produce and use it may be important.

Social structures that promote change are referred to as change agencies. To understand how this facility was used in this capacity I have discussed change agencies and the nature of resistance these agencies encounter. The SUMF was used as a change agency through a partnership with business and education institutions. Business / Education relationships are reviewed to add background to the SUMF innovation.

Multimedia

Multimedia is a global innovation in technology. It is the development of computer systems that integrate two or more different types of media (Burger, 1993). Understanding multimedia is central in studying the meaning of the *SUMF* . In order to understand the substance of the *SUMF* itself and the innovation that it was used to promote, we must have some background on multimedia

Multimedia is an attempt to communicate through more than one of our senses. This description requires an additional concept: automated mediation. Automated mediation is achieved by placing a variety of media under the direct or indirect control of a computer (Burger, 1993). We can program these systems to present information contained in various mediums in a set pattern, or more randomly, or even under the control of the receiver. Feedback can be given as well as received from both the user and the media system through automation.

A formal definition has been given by Dahmer (1993) that describes multimedia as:

> Multimedia - a computer system capable of seamlessly manipulating data in several formats (such as text, graphics, sound, and still or motion video) and of allowing nonlinear navigation (branching) and presentation of the data formats based on real-time user input,

or more informally,

> Multimedia is just a fancy name for something that combines the capabilities of technologies that used to be separate. Your computer used to be a separate thing from your TV, stereo, camera, and CD player- and your camcorder or whatever. Multimedia just mixes together the functions of these and a bunch of other kinds of gadgets (p. 46).

Multimedia has had various types of incarnations and continues to evolve as our technological capabilities change. Slide-show presentations once were the vanguard. Computer-based systems began to appear and were followed by systems that allowed computers to control analog devices such as VCRs and video disc players. With advances in digitalization we will soon have all of the capabilities of various forms of media in one system. Advances in technology have combined these media in a single integrated device (Kozma, 1991).

Multimedia is an innovation that is being diffused throughout every sector of our society (Dahmer, 1993). One of the main barriers to diffusing multimedia is the expense of the equipment and knowledge needed to create applications. Few people not affiliated with the defense or entertainment industries have access to the resources needed to explore this medium. The cost of computer technology, both hardware and software, has declined in recent years, but the sophistication level of potential audiences for multimedia has generally increased proportionally (Dahmer, 1993). To generate professional

applications, an individual must have access to equipment ranging in price from $20,000 to $150,000 (Laird, 1985). It is difficult to imagine anyone but professional multimedia experts, those associated with industry, and extremely wealthy and ardent hobbyists being able to afford the tools necessary to produce multimedia products. Many people might be able to find new and creative uses of multimedia, if only they had an opportunity to explore it.

To create sophisticated multimedia applications the user must have a variety of ways of capturing sound, pictures, motion, and be able to combine them into an interactive program. To do this the creator needs to have equipment such as scanners, sound boards, and video capture cards. Capturing these types of data is an activity requiring hardware with large storage and memory capabilities. This storage capability is found in computers with compact disc player connections. To create multimedia you must be able to play and produce CD-ROM's (see Appendix A for glossary). Further, you must have all of the software that permits you to seamlessly integrate various types of media and give navigation control to the user of your application. This synthesis requires knowledge and experience as well as technical tools. Obviously these requirements remove the possibility for the average person to engage in high-end multimedia production.

Multimedia production at this sophisticated level has only recently become possible outside of a professional studio associated with Hollywood or perhaps the Department of Defense . Further the necessary software previously required great skill and expertise in computer programming. This type of expertise is still a great asset but the lack of it is no longer a barrier to entry in this field.

There seems to be a growing enthusiasm for the potential of multimedia to assist and transform learning experiences (Perelman, 1992). A prerequisite to transforming education through technology is access to the equipment. The production equipment and

expertise offered in this facility is only a means to an end. Equipment isn't the issue; it's the talent and creativity of the developer that makes the application (Burger, 1993).

It is unclear who will have the time and motivation to pursue the creation of such multimedia products. Time must be spent becoming familiar with the technology, learning software, finding resources, and in creating applications. Traditionally the development time for computer-based multimedia applications runs between 75 and 300 hours for every finished hour of computer based instruction (Laird, 1985). Often computer instruction requires a team effort. As Cheryl Samuels Campbell comments, "It requires the collaboration of at least a project manager, instructional designer, programmer, and subject matter expert" (as cited in Piskurich, 1992, p.375). Computer skills, creativity, motivation, and organizational abilities need to be harnessed. These are all potential barriers to change which were explored in context in this study.

Innovation

I have classified the *SUMF* as an institutional innovation that not only has its own unique characteristics but is used to promote the diffusion of multimedia. The diffusion of innovation has long been studied at great depth and provides background for determining the *SUMF* 's meaning as an innovation.

Innovation research encompasses a wide variety of fields and disciplines. These include; rural sociology, communication, education, marketing, general sociology, medical sociology, anthropology, and geography (Rogers, 1983). These new ideas and the practices and products that result from them are central to social change in every field of endeavor (Laltman, Duncan, & Holbek, 1973).

We often think of innovations as hard-technologies such as automobiles and airplanes, but as Rogers (1983) points out, the concept is much broader, he states, "In other cases, a technology may be almost entirely compromised of information; examples

are a conservative political philosophy, a religious idea like Transcendental Meditation, a news event, a rumor, assembly-line production, and management by objective" (p.13). This broad definition creates a problem of determining where the innovation begins and where it ends. Rogers (1983) states, "One of the conceptual and methodological issues facing diffusion researchers and practitioners is the determination of the boundaries around a technological innovation" (p.14). I have referred to the *SUMF* as an institutional innovation. One of the questions that this study seeks to answer is what aspects of the *SUMF* made it an innovation. Was it the computer hardware and software or was it the social organization, the connection to the national consortium, the opportunity for broad access or a combination of these?

What Drives Innovation

Innovation has been described by the economist, Arthur Shumpeter, as being the primary source of profits and thus the engine for capitalism (Heilbroner, 1986). But innovation is about more than maximizing profit. Public institutions of higher education, while not profit-seeking, compete for students, grants, and public funds. To "win" these resources they must keep down costs and perform their missions with ever increasing efficiency and effectiveness and to do this they must innovate or at least portray themselves to the public as being innovative. Thus it is necessary to scrutinize not only the substance of the innovation, but the public presentation of it as well.

There is a paradox created when society is dependent upon innovation and yet these same innovations can have serious adverse consequences. Lyons (1979) in describing the modern Luddite movement (a general dislike for technical innovation) gives support for studying in detail an innovation, especially when associated with technology. "Dramatic innovations can have drastic and unforeseen consequences. Luddite policy would insist on research for monitoring change, and for gaining and disseminating knowledge" (p.382). Waiting for these consequences to play themselves

out may be too late. This paradox creates a logical resistance to change among many people. Heisenberg (1958) quotes a traditional farmer, who is resisting new irrigation methods, who states,

> I have heard my teacher say that whoever uses machines does all his work like a machine. He who does his work like a machine grows a heart like a machine, and he who carries the heart of a machine in his breast losses his simplicity. He who has lost his simplicity becomes unsure in the strivings of his soul. Uncertainty in the strivings of the soul is something which does not agree with honest sense. It is not that I do not know of such things; I am ashamed to use them (p.63).

People may gain one thing and lose another by adopting an innovation. The creator's agendas of the *SUMF* needs to be examined. We need to generate an understanding of how an institutional innovation is being used to prepare people to decide whether the benefits outweigh the costs.

Innovations Have Social Impacts

Innovations and technologies have social impacts that go far beyond the clearly apparent. John Dewey (1958) recognized this when stating, "Even technological arts, in their sum total, do something more than provide a number of separate conveniences and facilities. They shape collective occupations and thus determine direction of interest and attention, and hence affect desire and purpose" (p.345). Thus by changing the tools that are used in a social system we may be transforming that social system. This study of the *SUMF* should allow us to determine how interest and attention might be changed as a result of how the facility is used.

The classical study in the innovation genre is the Ryan and Gross (1943) study of the introduction of hybrid seed corn to Iowa farmers and its diffusion throughout the state. This study describes the changes in behavior among farmers that the innovation

promoted. Rogers (1983) states, "Previously farmers had saved their own seed, selected from their best-looking corn-plants. The adoption of hybrid corn meant that a farmer had to make important changes in his behavior" (p.33). Whether that change represents progress depends on who you are in the social system and how you create meaning from your position. Marshall McLuhan (1964) adds,

> The new media and technologies by which we amplify and extend ourselves constitute huge collective surgery carried out on the social body with complete disregard for antiseptics. If the operations are needed, the inevitability of infecting whole system during the operation has to be considered. For in operating on society with a new technology, it is not the incised area that is most affected. The area of impact and incision is numb. It is the entire system that is changed (p.64).

Thus only by studying how the *SUMF* is used by both creators and patrons can we gain an understanding of the potential impact of an innovation.

Innovations Influence Organizations

An organization has been described as: "a negotiated social reality with the intention of arriving at a satisfactory level of shared meaning, so that some common actions can be achieved" (Gray, Bougon, & Donnellon, 1985, p.35).

Once an innovation is introduced that social reality may change. An innovation may change an organization or could even be a new organization itself. The innovation may create a shared organizational reality that could never have been foreseen (Hosking & Anderson, 1992).

Organizations often find themselves in a fight for survival; a fight for relevance as the world around them changes. Innovations can assist them in this effort. Schumann (1991) suggests, "Organizations which initiate systematic innovation are those most effective at exploiting change" (p.20). While others claim, "A self-renewing, creative

organization makes innovative change its ally, courageously willing to abandon what has been successful in order to replace it with something potentially much more successful" (Smith & Slesinski, 1991, p.13). Yet, because the impact of an innovation may be difficult to predict those efforts might be counter productive. One of the issues this study confronts is the environmental pressures that *South U.* finds itself dealing with and how those pressures encourage an innovative organizational response.

What Is Diffusion

Diffusion is the process where an innovation is adopted or accepted throughout a particular population. The majority of research on innovation has focused on how to encourage the adoption of particular innovations (Rogers, 1983). One of the uses of the *SUMF* by its creators was to encourage the diffusion and use of multimedia technology. Rogers (1983) describes the main elements in the diffusion of new ideas as being an innovation, which is communicated through certain channels, over time, among the members of a social system.

Change Agents

What is a change agent.

One of the agenda's of the *SUMF* 's creators was to promoted the use of multimedia. It was used as an tool or agent to promote change. Rogers (1983) states, "A common problem for many individuals and organizations is how to speed up the rate of diffusion of an innovation" (p.1). Thus a change agent or agency is needed. A change agent is one who actively encourages the diffusion of an innovation and who does so depending upon the type of diffusion system. Rogers (1983) describes different diffusion systems,

> In a centralized diffusion system, decisions about such matters as when to begin diffusing an innovation, who should evaluate it, and through what

channels it will be diffused, are made by a small number of officials and or technical experts at the head of a change agency. In a decentralized diffusion system, such decisions are more widely shared by the clients and potential adopters; here, horizontal networks among the clients are the main mechanism through which innovations spread. In fact, in extremely decentralized diffusion systems there may not be a change agency; potential adopters are solely responsible for the self-management of the diffusion of innovation (p.7).

A change agency may be so complex that it can be identified as an innovation itself. As Braun and MacDonald (1978) suggest, "A technological innovation is like a river- its growth and development depending on its tributaries and on the conditions it encounters on its way" (p.1) and Rogers (1983) states, "We should remember, therefore, that an innovation is not necessarily invariant during the process of its diffusion. And adopting an innovation is not necessarily a passive role of just implementing a standard template of the new idea" (p.17). Thus one strategy of an innovative change agency would be to provide a forum for exploration and access. This study, in part, examines how the *SUMF* was used in that capacity.

People need to gain experience and have access to an innovation. Rogers states,

Knowing about an innovation is often quite different from using the idea. Most individuals know about many innovations that they have not adopted. Why? One reason is because an individual may know about a new idea but not regard it as relevant to his situation, as potentially useful. Attitudes toward an innovation, therefore, frequently intervene between the knowledge and decision functions. In other words, the individual's attitudes or beliefs about the innovation have much to say about his passage through the innovation decision process. Consideration of a new

> idea does not pass beyond the knowledge function if an individual does not define the information as relevant to his or her situation or if sufficient knowledge is not obtained to become adequately informed so that persuasion can take place (p.169).

This implies that a change agency can be a source of information and a place where the change agency and the potential adopter can meet. Rogers and Kincaid (1981) state,

> Most past diffusion studies have been based upon a linear model of communication defined as the process by which messages are transferred from a source to a receiver. Such a one-way view of human communication describes certain types of communication; many kinds of diffusion do indeed consist of one individual, such as a change agent, informing a potential adopter about a new idea. But other types of diffusion are more accurately described by a convergence model, in which communication is defined as a process in which the participants create and share information with one another to reach a mutual understanding (p.63).

Strategies of change agents.

A change agent is actively involved in promoting planned change. Change agents and agencies must be familiar with strategies that can promote change. As Chin and Benne (1976) state,

> Whether the focus of planned change is in the introduction of more effective thing technologies or people technologies into institutionalized practice, processes of introducing such change must be based on behavioral knowledge of change and must utilize people technologies based on such knowledge (p.23).

Armed with this knowledge change agents can address the myriad of problems associated with change. Chin and Benne (1976) state,

> As attempts are made to introduce these new thing technologies into school situations the change problem shifts to the human problems of dealing with the resistance's, anxieties, threats to morale, conflicts, disrupted interpersonal communications, and so on, which prospective changes in patterns of practice evoke in the people affected by change (p.22).

Diffusion effect

This peer pressure to adopt an innovation is called the diffusion effect. "The diffusion effect is the cumulatively increasing degree of influence upon an individual to adopt or reject an innovation, resulting from the activation of peer networks about an innovation in a social setting" (Rogers, 1983, p.234). Social groups influence how individuals find meaning in the objects they use. It is important to explore the meaning individuals have as well as their social associations, because it further informs us to the nature of the meaning. The *SUMF* created many opportunities which in themselves may put pressure on the university community to adopt multimedia.

Resistance to change

Studies of change have primarily focused on the perspective of those encouraging change rather than those being subjected to change (Klien, 1976). This bias may lead us to think of those who resist change as obstacles to overcome. However, those who resist change may have rational, valid reasons for doing so. Klien (1976) describes three desirable facets of resisting change; opposition to real threat, resistors know that the change is not in their best interest; maintenance of integrity, resistors see the change as a threat to their self-esteem and identity; resistance to change agents, resistors may feel change agents are not working in their best interest.

In higher education it is the faculty, or some faction of the faculty, who often assume the roles as resistors. As Razik and Nalbone (1989) suggest,

> One of the more critical organizational changes needed is the reorganization of the professional academic work force into more differentiated and specialized roles. Universities have been slow to adopt new technologies for many reasons, but one major reason is that faculty themselves are not adequately trained to design, produce, or apply the new technologies (p.71).

Not only may faculty not be trained in these skills but they may have no interest in developing these skills and may perceive change as a threat and may become actively involved in rejecting the change. How the faculty at *South U.* use or resist using the *SUMF* is particularly important to understanding the meaning of the facility.

Industry / Education Partnerships

The *SUMF* relationship with the national *NewMedia Center's* consortium creates an alliance between higher education and technology corporations. This type of relationship has many advocates. It is clear that partnerships with industry are increasingly being discussed as avenues for improving education. For example the director of the Virginia Business Education Partnership Program states,

> Partnerships are powerful tools for addressing our highest educational priorities. Continuing dialogue between business and education is a must for progress in educational reform. Success in restructuring education truly requires a collaborative approach, with business leaders, educators, parents, and diverse community members all involved to develop a new generation of partnerships dedicated to improving student achievement (Taylor, 1994, p.3)

There are also many who are concerned with these alliances because of the corporations' interest in profit (Bates, 1989, De Vaney, 1994, Rudinow, 1989).

Most of the interest in business / education alliances has centered around advertising to public schools (De Vaney, 1994, Pomice, 1989). While the *SUMF* does not advertise products in a sense it does market them. Some have objected to corporate involvement in education with our without direct advertising, as Olson (1990) states, "If corporations want to invest in materials directed at schools, that is their choice - they have a right to produce those materials. We have a responsibility to see them for what they are" (p.80). Not only are promotional materials often thought of in this light, but even donations have been characterized as a type of marketing strategy.

In 1953 the A.P. Smith Manufacturing Company of New Jersey donated some money to Princeton University. Officials at Princeton were happy to accept the funds. Unfortunately, some shareholders of A.P. Smith were less than pleased with this arrangement. So displeased in fact that they filed suit against the board of directors asking, "What does Princeton University have to do with the fortunes of A.P. Smith Co.?" After all A.P. Smith was a business. The judge decided in favor of the board of directors stating, "The Smith Company turned to philanthropy not for the sake of philanthropy but for the sake of selling more valves and hydrants." In the courts view, a corporate gift to an institute of higher education was not an act of altruism, but a strategy to sell more products. After this judgment was rendered, Princeton did seem to object to this characterization of the arrangement between A.P. Smith and themselves.

Dewey has stated, "That which prevents the schools from doing their educational work freely is precisely the pressure - for the most part indirect, to be sure - of domination by the money-motif of our economic regime (p.102)." Computers have become vital in today's higher education (Razik & Nalbone, 1989). What remains unanswered is whether access to those tools and the way it is supplied (through state

funds or through an alliance such as the *SUMF*) impinges on faculty's ability to "work freely."

Need for Access to Multimedia Production Tools

The *SUMF* is, in part, an attempt to provide access to multimedia production technology. The study addresses the question of what type of access is demanded and the what are the constraints of providing such access through an alliance with each member having their own agendas.

Each medium, including multimedia, distort its messages with a particular bias (Lias, 1982). Each medium, directs us to organize our minds and integrate our experiences, shaping our thoughts in powerful ways (Kay, 1991; Postman, 1986). Expression, via multimedia or any other medium, could be not only the best way of expressing something -- it could be the only way.

If this is so, then providing access to the tools of multimedia production becomes an important issue for a democratic society. Currently the price tag on hardware and software to create professional level multimedia applications is quite high. It would be unlikely for an individual not attached to a institution to be able to make the necessary investment. Even those who are able to afford such an investment are in somewhat of a catch-22: You may not know what you are capable of producing as far a multimedia is concerned until you have gained considerable experience exploring the medium. But you don't want to make the investment until you know what you can do with the medium. Van Dam (1992) has suggested,

> If we get the right tools it will mean that we can produce far more universal and democratic access to information than we do now. Maybe we can start removing some of the boundaries between the information 'haves' and 'have-nots.' Even in the highly developed countries you can see

> huge gaps between those who have immediate access to information and those who do not (p.17).

Van Dam (1992) further clarifies the need for access to production facilities in stating,

> Especially in education, the distinction between authoring and delivery systems should not be too finely drawn. Readers and students should be authors too; a sense of participatory democracy should determine who has the right to put materials into the database. Authoring will, I believe, remain the most difficult problem we will face, and we must do everything in our power to make it as easy as possible for all classes of users (p.17).

Mann (1849), while certainly not referring to multimedia technology, recognized the importance of empowering people with the ability to produce when he stated, "The greatest of all the arts in political economy is to change a consumer into a producer; and the next greatest is, to increase the producer's producing power; an end to be directly attained by increasing his intelligence (p.67)."

Some have suggested that access to computers is so important that laptop computers should be issued to citizens by the government (Simon, 1995). Yet, even a program as outrageously expensive as that would still not provide everyone with the necessary tools to fully exploit the digital age. We are still left with large inequities. A.J. Liebling once stated that, "Freedom of the press belongs to the person who owns one." Multimedia has gone a long way in making it easier for anyone to be a publisher of traditional media. However, to fully exploit multimedia an individual requires expensive equipment. Being a publisher of new media may be out of the range of possibilities for most people just as owning a Gutenburg press was out of the reach of most common people centuries ago.

As Winders (1988) suggests, "Therefore although totally unconstrained access is feasible in practice it would probably be necessary to allow access to resources based on peoples individual need or the individual's ability to pay for the resources that they use (p.22)." Our society has developed many types of institutions to respond to such inequities. However, new technology challenges these institutions to create new opportunities. Deciding whether or not a type of access should be continued, modified, or expanded requires an in-depth evaluation which is broadly construed to gather data from a variety of sources and analyzed in terms of the emerging issues. This study contributes to the foundation needed for this type of evaluation.

Social Construction of Meaning

In the study of the *SUMF*, I have examined how the facility was used from multiple perspectives. Schutz's (1962) theory states that reality is multiple as opposed to single and that the world of everyday life is pragmatically defined by each person. Each person associated with the *SUMF* constructed different meanings and when expressed may provide insight to the whole. This approach is a social constructivist approach (Douglas, 1990). Douglas places groups in this framework when stating,

> A social group is defined as a collection of individuals who share the same set of meanings attached to a specific artifact. Each group might have different technical goals or identify different technical problems,...they all help construct machines and technical systems (Douglas, 1990, p. 81).

This study examines groups of creators and patrons and how they use the *SUMF* to pragmatically construct the meaning of the institutional innovation.

METHODOLOGY

Why An Ethnographic Case Study?

I determined that the best approach to answer the questions raised earlier was through an ethnographic approach. Hammersley and Atkinson (1983) offer a clear statement of this method when writing, "The ethnographer participates, overtly or covertly, in people's daily lives for an extended period of time, watching what happens, listening to what is said, asking questions; in fact collecting whatever data are available to throw light on the issues with which he or she is concerned" (p.2). This definition refers to the use of ethnography while conducting an inquiry in a particular context or case, such as my case study would be.

The following quote helped reassure me that my decision to study this particular institutional innovation through a single ethnographic case was the correct one. "Case study methodology is appropriate, using observational and ethnographic techniques to follow innovations as they develop over time, and to reveal the dynamics of intra-group processes as they mediate and realign the negotiated social order which accommodates task performance" (Bouwen, DeVisch, & Steyaert, 1992, p.129). I wanted to understand how an innovation was used by different individuals and social groups. One way to do that and also get detailed contextual specific data was through an ethnographic inquiry.

Case studies have been used in research that attempted to develop an understanding of computers and the context that they are found. One such study indicated. "In order to understand the microcomputer innovation at so many structural levels, a case study methodology was selected. Case studies are intensive, independent analyses of particular situations that make use of a variety of sources to provide a comprehensive description of present conditions and their history. This approach was

ideally suited to the multidisciplinary, exploratory nature of this research" (Sheingold, Kane, & Edreweit, 1983, p.414).

Ethnographic methods are appropriate when attempting to develop an understanding of a phenomena in context. Studying innovation is particularly amenable to these methods. Coleman (1958) suggests that the predominant focus on the individual in diffusion research instead of the network that the individual finds themselves in is often "due to the assumption that if the individual is the unit of response, he must consequently be the unit of analysis" (Rogers, 1983, p.109). Sampling procedures fail to provide an adequate examination of context as Barton (1968) states, "Using random sampling of individuals, the survey is a sociological meat-grinder, tearing the individual from his social context and guaranteeing that nobody in the study interacts with anyone else in it. It is a little like a biologist putting his experimental animals through a hamburger machine and looking at every hundredth cell through a microscope; anatomy and physiology get lost; structure and function disappear and one is left with cell biology" (p.3).

Rogers (1983) comments on the strengths of the ethnographic methodology, "The other traditions (besides anthropology) have seldom used participant observation as their data gathering methodology, but they have carried forward into quantitative research certain of the theoretical leads pioneered by anthropology diffusion scholars" (p.50).

This examination relied on my personal participant observations, documents, as well as, formal and informal interviews, over an entire academic year, by collecting data from a variety of sources on a daily basis. Over time, I was able to build my study in a holistic manner. I used one source to confirm and clarify my interpretations garnered from other sources.

Limitations of Ethnography

Ethnographic methods have limitations that need to be addressed to help us fully understand how to use such research. These limitations included the ability to generalize. A case study examines a particular environment through the lens of a particular researcher. Consequently the data collected will be context specific and difficult, if not impossible, to replicate. Conclusions are based upon the logical arguments created by the researcher and not upon statistical inference.

To a certain extent the methodology of ethnographic evaluation guides makes "determining standards" problematic. As Yin (1992) states,

> Ethnographic evaluations are primarily guided by the assumption of multiple realities that are socially constructed - rather than the belief that there is a single, 'objective' reality. For this reason, ethnographic research does not emulate the traditional paradigm of empirical science, which assumes a single objective reality that also can be repeatedly replicated (p.125).

Other researchers using more positivistic paradigms have made the claim of being able to generalize results. My study however, makes no such claims and should not be read with that intent. With this inquiry I hope to provide the reader with a plausible construction of the *South U.* Multimedia Facility innovation that will provoke questions and issues that the reader may find helpful when examining innovations involving institutions and technology.

Limitations of the Data Collected

When examining any phenomena in context the researcher must be content with the data that materializes. The researcher cannot control the research environment and may influence it only inadvertently. The data used in this study establishes the parameters

for possible inquiry, thus there are many potentially interesting questions that are not addressed in this study.

For instance, the administration of the national consortium and the corporate board members were largely represented indirectly through e-mail memos and public publications. I have made some conclusions based upon these documents, however, in-depth interviews with those representatives was impractical. As a consequence I focused my attention on those people and groups who were locally accessible.

This study, along with every ethnographic study, had to deal with time constraints. My task was to choose a point of closure that satisfied practical, as well as logical, constraints. I chose a single academic year as the duration of this study because I was particularly interested in the creation period of this innovation. The period was short enough to focus on only the introductory period but long enough to allow me to study the research environment in considerable depth. Since the majority of students leave campus and many faculty begin to prepare for summer vacations it seemed logical to conclude the study when campus activity was beginning to decline.

The introductory time period had many characteristics that were unique to it. If I had studied the *SUMF* a year after I did it is likely that I would find the facility being used for purposes that were not apparent during the start-up period. It is also likely that the *SUMF* would no longer be used as it was when I made my observations. Studying any phenomena in context requires that its unique characteristics be made explicit.

Awareness of the facility was limited and spread primarily through word of mouth. Other than two, unsolicited articles, early in the semester, in the campus newspaper, there was no effort to publicize the facility. The two co-directors had initially decided to create a publicity plan that included activities such as; announcements on the university and community access television channel, flyers attached to local utility bills, and announcements in local newspapers. This promotional effort was never carried out.

The co-directors made the decision to hold off on these activities in order to give themselves and their staff time to gain experience and expertise in the hardware and software. They also were waiting on another staffing position to be assigned to the facility. Not only was the decision made to limit publicity but also, it was decided to restrict the hours of operation as well. During the time of the study, the facility operated only during the week days and not on the weekends or at night.

The facility was to be used a training site for the faculty, however, during the time of the study only two, full, four-day training sessions were held. These sessions were held all day for four consecutive days in the classroom portion of the facility. At the end of the spring semester it was expected that these workshops would be held every day throughout the summer and would have significant impacts upon the way the facility was used by other patrons. During the time of the study the classroom was used only occasionally for educational technology workshops. I expected that that type of usage would increase dramatically as more faculty became familiar with multimedia and might ask for further training.

Further, because of the Faculty Development Initiative (examined in more detail in a following section) the faculty at *South U.* had just begun a computer platform change. Most faculty who had a computer had a PC that was compatible with the IBM architecture. The Faculty Development Initiative was a university attempt to switch the faculty to the Macintosh platform. All of the computers in the *SUMF* were Macintosh's. Many faculty and students had little experience with this platform at the time of the study. Throughout the study only approximately 300 of the 1500 faculty had been given Macintosh computers on their desktops. I suspected that usage patterns and volume for the *SUMF* would increase once more of the campus faculty had become comfortable with the Macintosh platform because they would have at least some exposure to the potential of multimedia.

Data Sources

People are the essence of any research in social science. The *SUMF* offered an opportunity to examine issues related to technology but where the technology was not studied in isolation. It was how people used technology and innovation which was of interest. Below, I have included a list of all of those who became a part of the study. The ones I chose to study seemed to be most appropriate given the research data collected and my goals for the study.

- Creators
  - South U. Administration
  - New Media Center Administration
  - Library Administration
  - Student workers
- Patrons
  - Higher Education
    - Faculty
    - Staff
    - Students
  - Public school educators
  - Community at large
    - Artists
    - Hobbyist
    - Local business

These groups could be broken down into two categories; patrons who came into the facility, and the administration who created and managed the facility. I began my examination of the administration by observing and interviewing the staff members who worked in the facility itself. I continued to interview members of the of administration (in

order of their place in the institution's hierarchy) and stopped interviewing when it became apparent that the interviewee's knowledge of the facility was second hand at best.

The patrons were observed in depth as to the nature of their activities within the facility. I was able to confirm many of my observations through informal discussions with many of these patrons. In addition I held formal interviews with several patrons and used an e-mail survey to the others to gain a wide perspective on usage patterns. These data were examined in light of participant observations that continued until the end of the spring semester which marked the conclusion of the study.

Data collection.

Throughout the duration of the study the primary source of data came from my participant observations and interviews with respondents. (Appendix B: Data collected)The participant observations were collected on a daily basis and recorded in detail in fieldnotes. In addition to these observations, I interviewed many of the stakeholders both formally and informally (i.e. casual conversations). Formal interviews were taped. Interviewees were asked to sign a consent form. (Appendix C: Consent Form) The interviews were open ended to allow the interviewees to express what was most important to them. I immediately transcribed these interviews and provided copies to the interviewees, which gave them the opportunity to confirm the accuracy of the transcription as well as the opportunity to add additional comments.

The primary source of data was gathered by focusing on the environment of the facility. This approach is referred to as a point-of-adoption study. As Rogers (1983) states, "Respondents are asked to provide details about their adoption of an innovation at the time that they adopt, such as when they come to a clinic, a dealer or a warehouse, or to a store. This data-gathering strategy solves the recall problem, obviously, because data are gathered at the time of adoption..., Very few point-of-adoption studies have been

conducted to date, but they might be feasible in certain situations" (p. 117). Because so few studies had been done in this manner, and because it was well suited to my situation, I felt it was important to pursue this method to demonstrate the benefits of a point-of-adoption strategy.

The point-of-adoption strategy is similar to what Cowan (1987) describes as the "consumption junction" (p.263). Cowan (1987) further suggest why this junction is so important in that, "This, after all, is the interface where technological diffusion occurs, and it is also the place where technologies begin to reorganize social structures" (p.263). As such it was important that observations of the *SUMF* constitute the core of this study.

As the study progressed I was increasingly able to focus my attention on critical issues. The volume of fieldnotes was considerably larger early in the study and continued to be reduced as I allowed the study to emerge.

Fieldnotes

I kept detailed fieldnotes daily that contained my observations, accounts of interviews, thoughts, and summaries of readings (Appendix D: Sample of fieldnotes). Maintaining the fieldnotes was mostly done while in the field. I would usually sit at one of the computer terminals next to the facility's entrance and write any relevant observations. When the action was slow or non-existent, I would review the notes, try to make connections, and begin to write drafts. These fieldnotes contain much of the data I've used to build this study. Periodically, I would analyze the data and attempt to generate connections and build arguments. This was done in an attempt to prevent the accumulation of unanalyzed data. At the conclusion of the study, synthesis and construction of the final document was greatly assisted by this incremental process.

While transcribing my fieldnotes, I assigned pseudonyms immediately to insure that confidentiality of patrons was maintained to the best of my ability. Any request for

exclusion or further confidentiality by participants was respected. A confidentiality agreement was signed by those patrons singled out for additional data.

Data analysis This study created an enormous amount of data. To organize these data and analyze it required a systematic approach. The word processor was essential to keep this volume of data manageable. The patron surveys provided an ideal way to track individuals. As groups of individuals emerged, individual files were placed in "folders" for the group. Obviously an individual could have belonged to a number of groups and was cross-referenced appropriately. Folders on groupings of meanings were also established. The fieldnotes were transcribed daily and cross-referenced into the appropriate folders.

The power of the word processor allowed multiple copies of data to be placed under a variety of classifications with only modest additional effort. Data in various headings were examined and interpreted daily using questions such as; Does this represent a usage? Does this indicate meaning? How does this compare and contrast with the other data? Is there a pattern here? Does this need to be investigated further?

By carefully analyzing the data that I had obtained I could see that there was a pattern. The theories that explained the *SUMF* environment persistently expressed themselves, or I expressed them, to the point where I could say what this study was about. Many potentially explanative theories manifested themselves in my observations but were left out of this text. I made no claim that this document in any way "fully" deciphers the *SUMF* environment.

In a sense, this is the Glaser (1967) saturation approach. I saturated myself with the data until I could construct categories and relationships that were meaningful to me. In other words I was, "deriving concepts and interpretations, in which data from the different sources are collected and new concepts are derived until some convergence in meaning can be observed" (Bouwen, DeVisch, & Steyaert, 1992, p.129).

Validity and reliability.

The nature of this type of study provided ample opportunity to use the techniques of triangulation. The methodology of triangulation requires that the researcher use at least three sources to confirm their data. I compared my observations to the interviewees' statements and compared their statements to each others. I constantly shared my data and any work in progress with others working in the facility. Each piece of data was examined in detail and had the opportunity of influencing the study. Even the data that were not cited explicitly helped me gain an understanding of the ways the facility was used. Under this paradigm, all data, even seemingly isolated facts, may have been illustrative.

Researcher's Stance

Reflexivity

As the researcher in an ethnographic study, I was the only tool that gathered and interpreted the data. That situation required me, as the researcher to reveal as much as possible about my own bias and stance. Generating a non-biased study was not the goal and probably would not have been possible. However, by providing the reader with an honest appraisal of one's stance, the reader is better prepared to interpret the study. This attempt at self-revelation is called reflexivity.

Delamont (1992) describes reflexivity as, "Reflexivity is a social scientific variety of self-consciousness. It means that the research recognizes and glories in the endless cycle of interactions and perceptions which characterize relationships with other human beings. Research is a series of interactions, and good research is highly tuned to the inter-relationship of the investigator with the respondents" (p. 8). Reflexivity recognizes that the researcher is a part of the environment of study and that that environment cannot be

studied without investigating the relationship that exists between the researcher the surroundings.

The importance of incorporating reflexivity into the ethnographic methodology is stressed as being essential to the validity of the study by Delamont (1992),

> The permeation of all aspects of the research process with reflexivity is essential. Each researcher is her own best data collection instrument, as long as she is constantly self-conscious about her role, her interactions, and her theoretical and empirical material as it accumulates. As long as qualitative researchers are reflexive, making all their processes explicit, then issues of reliability and validity are served (p.9).

A concise way of saying this is; we are part of the world we study (Gouldner, 1970). The researcher's influence is not necessarily something that should always be considered a hindrance in the search for knowledge. "How people respond to the presence of the researcher may be as informative as how they react to other situations" (Hammersley & Atkinson, 1983, p.15). The researcher's presence can be a rich source of data. It all depends on the soundness of the logic used in analysis.

In time it became clear that research concerning the *SUMF* was not strictly about the facility itself but also about my analysis of my relationship with the facility and the patrons. Or more succinctly put, "The fact that behavior and attitudes are often not stable across contexts and that the researcher may play an important part in shaping the context becomes central to the analysis" (Hammersley & Atkinson, 1983, p.188). Another researcher who studied the same scenario would have studied a different situation in the same environment because of the different roles each of us would have played. Both studies would be equally valid even though the studies would have been quite different.

The role of the researcher in an ethnographic study can be placed on a continuum from complete participant to complete observer (Junker, 1960). I envisioned my role in

this study as being somewhat in the middle of this continuum. As a researcher I attempted to approach the project with the principle of reflexivity and acknowledge myself as an intricate part of the research and not merely an objective observer. Of course, the close relationship that I had as a participant observer has positives as well as negatives. On the positive side I had the opportunity for greater access. On the negative side there was a possibility that I would have difficulty making the familiar problematic, which was essential in analyzing my data. To insure that I maintained perspective, I strove to be constantly vigilant and self-conscious of my purpose and my position.

This institutional innovation had certain meanings for me. It was both the source of my assistantship and the environment of my study. I had a close, personal, relationship with many of the users I observed. I enjoyed working with them and hope to continue the relationships I developed. As for my stance towards the technology itself I remain somewhat skeptical. I was fascinated by the potential of multimedia as a communicative medium but the cynic in me questioned its value, as well as the motives of those promoting its capabilities.

To some extent I have influenced the action that occurred within the facility. I made no effort to avoid doing so. In my role as a graduate assistant I sought, to the best of my ability, to help every patron, to reach their goals, regardless of the way they used the facility. I attempted to provide counsel to those who asked and to stay out of the way of those that did not. Although my assistantship was officially only fifteen hours a week I logged much more time than that in an effort to make participant observations. I always tried to remain helpful and available to patrons regardless of whether or not I was "on the clock."

Not only was I assisting patrons in making use of the technology, I was also probing and observing. It is likely that my questions and comments to both patrons and coworkers will have to some extent changed their behavior. The way that patrons

responded to situations will reflect their knowledge of me as a expert, tutor, and researcher. I was a participant when I was assisting patrons, yet I was an observer and recorder concurrently. Both of these roles overlapped.

My Access to the Research Environment and Participants

Fortunately, access to this environment was easily obtained. I was awarded a graduate assistantship to work in the facility. My role as a graduate assistant gave me a "reason to know" much of the information the administration and staff had about the facility. The assistantship also gave me an opportunity to interact with patrons of the facility in ways that would have been impossible to a pure observer. The assistantship also made it more practical for me to spend a large portion of my time in the facility.

I intended to be as comprehensive as possible. Although, It was logistically impossible for me to be at the facility all of the time. To insure comprehensiveness, I used a computerized general survey that all patrons were required to fill out (Appendix E: patron survey). Again, my assistantship assisted in the use of this instrument because the co-directors wanted it as well to identify who was using the facility. This instrument (actually created largely by one of the site directors) gathered basic demographic information from patrons. I used the information from this database as a device to identify potential patrons to be interviewed and to conduct a survey through the campus e-mail system.

THE SOUTH UNIVERSITY MULTIMEDIA FACILITY

When I began collecting data for this study, I realized that many of the issues I would uncover would center around the technology of multimedia. I felt comfortable stating, given the trends of the recent past, that all of the hardware and software located in this facility would be outdated in a few years; perhaps within a few months. Computer magazines often have "remember when" articles that reminisce about computing technology. I was always shocked when I pondered these articles because they were only referring to the simplicity of computers less than a decade ago.

Therefore, I suspected that the technology discussed in this dissertation would be considered equally quaint and simple. I acknowledged that the technology considered here would be obsolete and antiquated in a very short period of time. As a result I have attempted to focus on issues that may have a longer tenure. These include; partnerships between public and private entities, the role of facilities in the change process, and access to technology.

While institutions have been created to serve all kinds of purposes this facility was unique. There was no other facility on campus, in fact I was unable to find another example of a facility anywhere that attempted to provide access to multimedia production technology to such a broad audience. As such the issues that have arisen may very well be specific to the present social and technological climate.

I would ask the readers to remember that at the time I studied the South University Multimedia Facility (*SUMF*), the equipment it contained was considered high-end. These tools were not commonly available to the average person, in that they were expensive. With that in mind allow me to share the year I spent working and learning in an innovative institution that was created as a result of a number of organizations trying to shape their futures.

How Was the *SUMF* Created?

A bewildered student walked through the entrance door of the *South U.* Multimedia Facility or *SUMF* . *Smith*, the site director for the facility, looked at him and asked, "Can I help you?" The tone of the statement was more, "why are you here," than an offer for help. I heard and spoke these words throughout the academic year. During that time I worked as a graduate assistant as well as a researcher in the newly created *SUMF* . The statement, "Can I help you?," was the method that was used to begin the screening process. It was an informal interview that was intended to answer the question, "Is this person going to appropriately use the facility?"

Common replies to this question included, "I need to use the word processor for my term paper," or "I'd like to check my e-mail." We considered these wrong answers. Other replies such as "use the computers," and "surf the internet," were vague enough to prompt further inquiry. Most often patrons would provide just enough information to hang themselves and were subsequently denied access to the facility. To be allowed to use the *SUMF* the patrons had to say a magic word: multimedia.

Multimedia is one of those things that makes people say, "I can't define it but I know it when I see it." The *SUMF* had a number of sponsors, each with their own agendas, and it had a number of users, each with their own agendas. Everyone had their own definition of what multimedia was. Determining what was an appropriate usage of the facility was often decided by the directors that managed the day to day operations of the facility.

The ambiguity of the definition allowed the *SUMF* to appease a number of diverse constituencies but at the same time it generated confusion and misunderstandings. The directors of the *SUMF* promoted it as a high-end multimedia production facility but it was more often used as a classroom. There was an understanding among the *SUMF* 's

staff as to what high-end production meant, but we had considerable difficulty explaining it to our patrons.

Officially the *SUMF* was open for use by any faculty, staff, student, and even anyone from the local community; as long as they wanted to create multimedia and as long as the facility had no other scheduled activities. It was these two requirements that restricted what otherwise would have been open access. The staff's job, myself included, was to keep the machines running, to provide support to those who needed help, and to act as gatekeepers, making sure that the facility was used as its creators had intended.

I first heard about the *SUMF* many months before it was created. Officials at *South U.*, a large southeastern university, submitted a proposal to join a national consortium of corporations and universities called the *NewMedia Center's consortium.* I was told that if they were accepted to the consortium they would build a multimedia production facility and that my graduate assistantship would be assigned to that project to help it get started.

The *NewMedia Center's* consortium was created by a variety of large, well known, corporate sponsors who produce hardware and software technology for a number of computer applications particularly multimedia. Over the summer, I found out that *South U.* had been approved as a charter member of the *NewMedia Center's* consortium along with twenty-one other institutes of higher education. These institutions were of all types including; universities and community colleges, public and private, rural and urban, large and small. Many of these institutions had national name recognition and many others were attempting innovative and well publicized activities that focused on some type of multimedia. It was planned for the consortium to expand to hundreds of schools and many additional companies once the program gained momentum.

I understood that *South U.* had been accepted into this group because it was willing to contribute significant resources to their campus facility and that they had

expressed their intention of making significant investments in computing technology university wide. Most influential, however, was that *South U.* was a copartner in an effort with the local community and a local telephone service to create an "electronic village" that sought to provide access to computerized networks for the entire community. This "electronic village" had been promoted nationwide through network newscasts and public interest pieces.

This "electronic village" provided inexpensive access, for the community, to the internet. *South U.* was located in a college town with most of the local community consisting of students, faculty, and residence with some sort of connection to the university. Many of the *South U.* departments either required or at least encouraged their students to purchase a personal computer. As a result of these factors the community was, per capita, relatively computing affluent and thus made an ideal environment to test out a new multimedia facility.

The stated goal of the *South U. Multimedia Facility* was: "to provide a rich set of resources for the community to work with multimedia tools," and the facility would, "provide showcases of high-quality multimedia resources with reasonable access to all segments of the community," as *Veblin*, one of the facility*'s* co-directors, described it to the local college newspaper.

Previously, access to these types of resources has been limited to professionals in the multimedia industry. The *SUMF* intended to provide people who had not previously had a chance to use such equipment the opportunity to do so. Faculty would now have access to equipment that would allow them to create interactive computer programs full of sounds and graphic illustrations for use in their classrooms. Students would be able to create their own multimedia presentations.

Both co-directors were initially excited about being able to have community members, particularly artists and musicians, begin to explore the possibilities of

multimedia. One of the directors told me at this time that he had already talked to several local artists who had expressed interest in using the facility. When the *SUMF* first opened, enthusiasm was running high. The directors didn't know what to expect but were excited to begin providing a service that had not been provided before.

Relationship with National Consortium

The *NewMedia Center's* national office stated their own conception of what a facility resulting from the partnership with the consortium would be. As, Eric Wilson, the director of that office has stated:

> The NewMedia Centers program, first announced in October 1993, is a new model for integrating interactive media in higher education. Centers formed under the program utilize state-of -the-art hardware, software, and peripheral products to incorporate interactive media into a multitude of campus activities. These include developing media-based curriculum materials for a range of academic disciplines; training students and faculty; and conducting workshops and seminars for community members. Technology partners provide the centers with extended, preferential pricing below typical educational prices. They also offer access to industry contacts and involve them in advance testing and use of new technologies. Academic partners provide a dedicated NewMedia Centers facility, along with a campus "champion;" a budget for equipment, staffing, and support; and plans for curriculum development and community access (Wilson, 1994, p. 2).

The faculty, students, and community members were expected to benefit from the opportunity to access these production technologies which under normal circumstances would be beyond the means of most potential casual users. The cost of such a relationship

may include; loss of autonomy and being used as a marketing tool for technology products.

Representatives from *South U.* encountered the request for proposals to join the *NewMedia Center's* consortium at the 1993 EDUCOM conference in Cincinnati. The consortium was looking for academic members who could provide:

- A champion on campus who will promote the use of the NewMedia Center to key targeted constituencies - faculty, students, staff, and the regional community beyond campus.
- An institutional budget commitment for hardware, software, facility, staffing, and support of the center.
- A facility dedicated to the NewMedia Center for at least two years (equipment must stay in one location on campus)
- A staffing plan.
- A commitment to develop curricula.
- A plan for community access (such as programs for K-12 teachers, business executives, artists, or any other groups or individuals that the institution intends to include).
- A commitment to participate in the annual conference for NewMedia Centers
- A commitment to work with the NewMedia Centers consortium to promote the program (presentations at EDUCOM and other academic conferences, papers, etc.). (RFP, 1993)

South U. submitted a proposal that convinced the *NewMedia Center's* consortium that *South U.* would be a valuable member of the program. Upon notification that *South U.* would be accepted into the consortium university officials began negotiations to determine the location for the *SUMF* and determined that the university library held the

appropriate space. Under the guidance of the two appointed co-directors, one chosen from University Libraries the other from Educational Technologies, the design of the facility and the selection of equipment began. The re-modeling of the chosen space in the campus library, began in early summer and continued until the beginning of the fall semester.

As the remodeling progressed hardware and software began to be purchased. The final equipment list included such hardware as, twenty-five, audio and visually enhanced Apple Power Macintosh computers. Twenty of these were model 6100 computers in traditional a classroom set up with one instructor's machine in the front hooked up to an LCD panel. The other computers were model 8100 computers located in a small closet sized room in the back of the facility. Each of these computers where hooked into the campus ethernet which provided a gateway to the internet. Four computers were hooked up to scanners. All of them had a number of software for graphic, sound, and video manipulation, along with programs for making interactive applications. (Appendix F: Software and Hardware Configuration)

Both the machines in the development room and the classroom had the same software applications on their hard drives. This configuration was suppose to allow classes to be held, while at the same time, allowing patrons to use the development room with out one interfering with the other. When a class was not in session patrons would be able to use either room for their activities. Those needing the power of the computers in the development room would be offered the opportunity to reserve time on a particular machine.

The initial equipment endowment did not include many items such as; a CD-ROM presser to allow users to make their own CD's and a MIDI keyboard input which allows users to create and manipulate digital audio. Yet, the co-directors felt that this type of equipment was important if they were going to target the *SUMF* towards the needs of

high-end users. It seems that budget shortfalls accounted for the delays in acquiring this equipment.

The *SUMF* opened a week after the fall semester began. The site administrator was transferred from another department in the library and was the only full-time employee. Three student workers were hired; each working approximately twelve hours a week. I was hired as a graduate assistant to augment the staff.

The Corporations' Agendas

What Kind of Change Did the SUMF's Corporate Affiliates Want to Bring About?

Marketing. The corporations who started the *NewMedia Center's* program had created tools, in the form of computer hardware and software, that would allow a user to create multimedia. These innovations were being used by only a few media professionals and pioneers. The general public had little familiarity with these products and as a consequence they had no idea of what they could use them for. They had no idea of how to use them. Therefore, I was not surprised when I was told that these products were not in heavy demand by the average user. To promote these innovations, these corporations needed a method to diffuse them to the widest audience possible.

A corporation's function is to make profits for their shareholders. To make these profits, the corporation needs a customer base who are willing to purchase their product or service. The potential customers need to have perceived a need for those products or services if they are going to purchase them. Modern corporations have created marketing strategies to influence the population to think that their product can satisfy their needs.

These corporations needed a marketing strategy that effectively encouraged people who had never produced multimedia to do so. They needed people to begin exploring the medium and producing demos of what could be done. They needed publicity to encourage interest in the medium. Corporations also needed a way for

potential customers to become comfortable and knowledgeable with their products instead of their competitor's products. They needed a sophisticated marketing outlet that specifically targeted potential customers.

It is not my intention to disregard any benevolent motives on the part of the corporations, however, I had no access the corporate decision maker's values and reasoning. Because of the limited resources with which I conducted this study I was unable to gather data beyond these corporations public relations apparatus.

I do not believe my characterization of the corporate affiliates of the *NewMedia Center's* consortium as profit seeking was misguided because corporations are legally defined in that manner. There was also a consensus among those I observed and interviewed at the local level that the corporation's involvement was primarily a conduit for marketing their products. For instance a senior university official suggested, "It's a not so cleverly disguised marketing strategy" and "These companies are in this to make money." A corporation's function in society was to generate profits. It is not my intent to analyze this function, only to describe my understanding of their role in the *SUMF* .

Barriers to the Corporation's Agendas.

Digital multimedia products have only recently become commercially available. As such, there are a number of barriers that keep people from adopting these innovations. First, because the technology is in its infancy, people do not know what the hardware and software is capable of. They do not know because there have not been sufficient opportunities to view and interact with completed projects. People do not understand that multimedia can communicate in new and unique ways. To overcome this barrier, innovators must be encouraged to explore the medium and make multimedia projects.

To explore multimedia, people must have access to the necessary equipment. During the time of this study, the equipment necessary to explore high-end multimedia was well beyond the financial means of the average person. The corporate affiliates had

to overcome this exposure barrier. They had to convince potential customers that their products were worth the expense.

How Was the SUMF Used as a Change Agent by the Corporate Affiliates?

The *SUMF* allowed patrons the opportunity to become familiar with the corporate affiliate's products in a setting that had been legitimized by South University. *South U.* had required and encouraged many of its students to purchase computing equipment in the past. With well over twenty thousand students who would graduate and could eventually be in positions to make purchasing decisions concerning computing equipment for personal and business use; *South U.* was a potentially important market.

In addition, the partnership *South U.* had formed in creating the "electronic village" gave the corporations an opportunity to get exposure. That effort was making the local community a very computing intensive environment that had the potential to encourage a high demand for computing products. Perhaps, more importantly, was the publicity that this community networking effort was receiving from a variety of national and international publications, news broadcast, and public interest stories.

The *NewMedia Center's* consortium corporate affiliates could leverage these activities, already in place, with minimal effort and expenditure of resources. They primarily used the prestige of their corporate names to entice academic partners to participate and only offered a modest discount on their products. Thus the universities technological initiatives had their own momentum. The corporations wanted to use that momentum for their own purposes, which was to expose more consumers to their products.

These products were too expensive for an individual to invest in on their own without any prior knowledge of the equipment's capabilities. Contributing some resources for a lab where people could gain access to these products was an easy way for the corporations to gain exposure. The resources the corporations provided the *SUMF* were

modest. Because of the nature of a public resource like the *SUMF* , there were often several different people wanting to use the same equipment at the same time. This situation may have encouraged some patrons to invest in their own equipment which was the corporation's intent.

South U., as well as hundreds of other universities, was eager to participate in the consortium. In fact, by the end of my data collection the *NewMedia Center's* consortium expanded by a hundred additional schools and announced plans that it would expand again the following year. A relationship with industry was popular and demonstrates how influential industry has become within higher education.

Yet, it would be a mistake to view the *SUMF* as an institutional innovation; as being solely created to sell products. Marketing products is simply the function of corporations, who were only one member of a complex alliance. It was the *South U.* administration who was primarily responsible for creating the *SUMF* . The *NewMedia Center's* corporate affiliates were just savvy enough to realize that facilities like as the *SUMF* were prime opportunities for them to promote their products with a small investment of their resources.

South U. Administration

In contrast to the corporation's desire to encourage people to adopt a technological innovation for the sake of selling products, the *South U.* administration wanted people, the faculty in particular, to adopt multimedia production tools to encourage their use in the instructional process.

The *South U.* administration had no particular interest in promoting the fortunes of the corporations who participated in the *NewMedia Center's* consortium. That was incidental to their purpose in creating the *SUMF* . Their agenda was no less than to

change *South U.*'s entire academic culture by encouraging the use of multimedia to make instruction clearer, more personalized, and available to a larger audience of students.

Economic and political pressures from outside the campus were demanding that the university accomplish more with fewer resources. The *South U.* administration believed that the only way to even attempt doing more with less was by exploiting the potential of computers, particularly, multimedia.

What Kind of Change Did South U.'s Administration Want to Bring About?

Restructuring higher education.

The most significant outside pressure came from the state's restructuring of higher education. *South U.*, as well as many other higher education institutions witnessed much of their funding erode. The State's 1994 Appropriation Act stated the following goals for higher education,

> to effect long-term changes in the deployment of faculty, to ensure the effectiveness of academic offerings, to minimize administrative and instructional costs, to prepare for the demands of enrollment increases, and to address funding priorities as approved by the General Assembly.

or in other words: to do more with less.

This introduction to state wide restructuring went on to describe the specific criteria for developing revised resource allocation plans. Among these criteria include this statement about technology:

> Institutions should include plans to incorporate telecommunications and computer technology into teaching and learning in ways that improve programs of study while contributing to cost containment. (Restructuring, 1994, p.23).

It was clear that, from the highest levels, the state government was looking to technology to help hold down costs. In a *South U.* publication produced by the university's president discussing the restructuring plan, it was stated,

> They (instructional technologies) have the potential to break the dependence upon a particular place and/or time for access to the faculty. They have the potential to increase the productivity of student learning by increasing the intensity of the student's interaction with the faculty member and with the course material. They offer great potential to expand enrollment capacity, to enhance quality, and to control costs (Restructuring, 1994, p. 8).

Faculty development initiative.

In response to the restructuring process and a desire to maximize the potential of technology, university officials created the Faculty Development Initiative (FDI). The FDI intended to supply each faculty member with a powerful, audio/visual, capable computer as well as the training and resources to fully exploit the potential of their new machines. This initiative proposed to train each faculty member for an entire week in various types of multimedia software, as well as, curriculum specific software. Since *South U.* officials had been using a location on campus that was ill suited for this purpose, the *SUMF* was an ideal site to train and support these faculty for this effort.

Faculty development initiative intended to save money.

The Faculty Development Initiative represented a large financial investment. Such an investment may have seemed odd when overall university funds were being cut. However, *South U.* officials felt, over the long term, that this effort would allow them to stretch their faculty resources to teach more students more effectively. They also predicted that the investment in distributed desktop technology would allow them to

eliminate the campus' computer mainframe which would result in a considerable overall savings.

To institute such large scale change the university needed continued support from the state. They also needed an instrument to overcome resistance and needed a way to encourage students to expect computer augmented learning experiences. And finally they needed to do this with a relatively small investment.

The university recognized that if the it was going to transform itself it would need to build an infrastructure of technology. Each faculty and student would have to have access to computing technology. Purchasing computers for the faculty and creating a few general computing labs was not enough to change the entire university's approach to instruction. They needed to change the attitudes of the faculty and students towards using computers as platforms for learning. They needed to provide the faculty with skills and they needed to create the expectation among the faculty that multimedia was a crucial tool in the teaching process.

Needed uniform computing platform.

To build a unified campus technology infrastructure the *South U.* administration wanted the entire university to adopt the same computing platform. They had chosen the Apple Power Macintosh because it had a reputation as being user friendly and its programs had a standardized interface which made it easier to learn new applications. The computer chips in these machines had been designed through a joint venture between Apple and IBM and it was hoped that these chips would be a significant step in making all personal computers compatible.

As *Veblin*, a co-director of the *SUMF* , stated,

> Well, part of that was sort of predicated on the fact that the Power Macintosh was in development at that time, so the understanding was that somewhere down the road in the not too distant future, and in fact it has

been less than two years now, we have a machine that will work in both environments. Understanding also that some things will never transfer across. But for the majority of the computing needs, they can be met in a Power Macintosh / PowerPC environment with in a few years. So understand there are people who we know were left out and were going to be left out of the mainstream of what we're doing. But again it is a matter of looking at the economy in terms of dollars and scale of this whole thing versus just the needs of just a few people. And you do have to look at the greater good of the entire university and that's because money is the issue. We don't have the dollars we had. We've got more people and we've got more things to do with fewer dollars and we have to look at that and that is the critical issue.

The *South U.* administration wanted everyone on campus to use the same computer platform to increase cross-department compatibility and to minimize the support services necessary. The Macintosh was chosen because it was considered to be more user friendly and would take care of a number of system functions itself and not require the operator to be an expert on computers.

Needed to provide place for training.

South U.'s administration needed to provide the faculty with access to multimedia computers along with training for developing multimedia skills. Toward this end, they began an enormous investment in their faculty through the Faculty Development Initiative.

To truly reap the benefits of technology, it not only has to be made available but it has to be explored and adopted as well. Promoting this change was not an easy task. The entire organization must shift paradigms. Individual faculty and students must gain experience and expertise in the technology. The administration recognized this and

apparently decided to make the investment in technology, primarily in the form of the Faculty Development Initiative. This initiative supplies each faculty member with their own powerful, at the time of this writing, audiovisual capable machine. But, as I mentioned earlier, not only does a technology need to be available, people must be encouraged to use it.

As with any change, *South U.* was well aware of the fact that it would encounter resistance from many sources; each source having its own agenda and interests. The *South U.* administration needed someone or something that would provide the change process with some momentum by breaking down barriers to change.

Barriers to South U.'s Agendas

There were pockets of resistance, throughout the university, to changing from the status quo. Many departments, particularly engineering and business, had already made commitments to a different computing platform than that being promoted by the FDI, while many other faculty members had little experience with computing at all. These attitudes created a barrier and unless they could be overcome a great deal of money would have been wasted.

Many faculty were comfortable with traditional teaching practices.

The faculty I spoke with related experiences that I suspect are fairly common. Most instructors teach the way that they were taught by their own instructors. Because multimedia technology did not exist until recently, I was not surprised that most of the faculty used traditional teaching methods.

Many faculty had no experience in designing instruction. They also had no incentive to learn about these practices because the university makes no requirement that faculty have any teaching expertise only experience. The instructors I interviewed were experts in their subject matter I perceived but more often than not they were not expert in teaching techniques.

The faculty were rarely rewarded for teaching excellence and there were no incentives in place to devote extensive time to that process. Incorporating multimedia into the classroom effectively requires large amounts of both planning and production time. A faculty member who chose to spend time on multimedia may be taking away time that could be devoted to research which was rewarded and required for tenure and promotion. Few were willing to make that sacrifice.

Many on campus did not want to change platforms.

There was a great deal of resistance to adopting the Macintosh platform. The PC compatibles were popular and many faculty had devoted a great deal of time and effort to learning how to use that platform efficiently. When university officials made the decision to only support the Power Macintosh, they knew that they were going against the common opinion in some quarters of the university. Yet, armed with a facility such as the *SUMF* that provided opportunities that weren't previously available for IBM-PC compatibles and that such opportunities were part of a national consortium it could at least be argued that adopting the Macintosh platform had its advantages.

Lack of infrastructure.

The plan for the FDI was to provide both equipment and training to each faculty member on campus. To do this, there needed to be a classroom environment with a computer for each class member that would allow the class to get hands-on experience under the guidance of an instructor.

The FDI plan intended to train each of the approximately 1500 faculty members and then retrain and re-equip them every four years. To handle this volume of training there had to be a facility that was available anytime it was necessary for instruction. They needed a laboratory that was dedicated to the purpose of training.

Lack of skills.

The *South U.* administration also realized that supplying the faculty with rudimentary computing equipment would not be enough. The faculty would have to have access to more high-end production equipment than was available on their desktop machines. They needed a central location were faculty could get use this high-end equipment and get the technical and design advice that they may need.

The majority of faculty had no experience with multimedia technology. Much of the software and hardware required special knowledge and skills. While many faculty would be willing to upgrade their skills, many would resist. Many faculty simply didn't have the time and interest to pursue any change in their instructional skills, others were scared and intimidated by the technology.

Another barrier to change was that the technology was changing so quickly. Many faculty were apprehensive about exploring the medium because they suspected that their newly learned skills would be obsolete within a semester or less. The *South U.* administration needed to have better information as to what products the companies were planning to offer. They wanted the companies to know what their needs and concerns were. *South U.* officials wanted some way of getting "inside information" to help with their planning process.

Funding from state could erode.

During the year of observation, the state government had continually cut overall investments into the state's higher education system. *South U.* had been hit particularly hard. There was little reason to believe that the process of reducing funding would not continue. However, the state had allocated a large amount of money to the FDI in hopes that by investing in technology the university would be able to instruct more students with less faculty resources.

This investment could be re-examined at any time, especially if the *South U.* administration couldn't produce evidence that the technology effort was yielding successful results. *South U.* needed some method of demonstrating that what they were doing was going to pay off. They need to show that funding for the effort should continue at least until the faculty had a reasonable amount of time to experiment with the medium.

How Was the SUMF Used as a Change Agent by South U.?

Political.

Abel , a senior university official who helped make the decision to submit a proposal to the *NewMedia Center's* consortium stated,

> Initially we were not interested because we saw virtually no advantages to it other than prestige. After talking about it we decided that we probably couldn't afford not to submit, simply because, with the rest of our initiative and activities, with those initiatives going on, politically in the state it would be a problem if another institution was a charter member even though we were leading the state in this area.

It becomes clear that one of the primary reasons that the university wanted to appropriate the *NewMedia Center's* consortium was political. It would be used, in part, as a tool to demonstrate the university's commitment and progress in the area of integrating technology into education. It helped make it clear to state officials that *South U.* was going forward and making progress with their technology effort.

University officials could make this demonstration with little additional expense beyond what they had already planned for. By having a partnership with other institutions and multimedia oriented corporations, *South U.* could make a number of rhetorical arguments including; defining themselves as leaders in educational technology, comparing themselves to an elite group of institutions, using the authority of the experts belonging to the consortium, and creating a precedent for other institutions to follow.

The relationship with the consortium allowed these arguments to be made. These arguments were potentially powerful tools to convince state officials to continue their funding and to convince the *South U.* faculty that they should use multimedia. This rhetorical benefit, gained from being a member of the consortium, was relatively inexpensive compared to the investment being made through the FDI. But the credibility they gained from the relationship could be a significant contributor to the overall success of the effort.

The expense of the *SUMF* was described as a, "drop in the bucket relative to the overall effort and the leverage we get from it." by *Briggs*, a senior university official with Information Systems. He goes on to describe the benefits of being associated with a national entity,

> Evaluations of the benefits and cost of this technology effort could only be accurately completed three to four years into the process. In the mean time, to insure funding for the effort, it would be a good idea to provide state officials with some assurance that the effort was important and successful.

One way to argue that you are on the right track, as far as technology is concerned, is to align yourself with prestigious technology companies as well as prestigious educational institutions. In this situation prestige is derived both from the names and reputations of the other educational institutions involved as well as the corporation's high profile names and reputations. As *Abel* , a senior university official, put it:

> Immediately after finding who was in the charter group we were able to just, drop names of other institutions. You want to be associated with a highly respected, highly visible group of institutions. You want to be a member of that group. It's helpful, it's helpful in grant proposals, it's

> helpful with communications with (state capital). To say our activities are recognized by industry and other groups as belonging to a certain class, if you will, of others players in the field. The hidden message is that support should be continuing.

It is clear that membership in the consortium had political benefits. However, it would be a mistake to assume that these political benefits were the only reason the University became a part of the *NewMedia Center's* consortium. Prestige was a benefit of membership but it should be clear that the administration was not prepared to relinquish any resources solely for the attainment of prestige. It was a combination of perceived benefits that interested these officials.

After a semester of operation, the *NewMedia Center's* consortium issued a requirement for the academic associates to pay several thousand dollars to offset program costs. When asked about how they would react to this fee, before it was implemented, *Abel* replied;

> I'd react to that the same way I reacted to the initial survey a year or so ago asking us how we would feel about that. I guess it was after we were selected in the spring. And I said at that time I wanted to know what I was getting for my money. If all it is is a plaque hanging on the wall, we really have to look at what benefit the prestige issue has, we're going to have to see more than that. Let me put it this way, before the *SUMF* came around we had relationships with a number of software vendors and Apple. And we were already beta testing software for companies like Macromedia, we were an Authorware site and (had relationships with) other products as well. So it's hard to know if dropping out would mean we would not be able to do that.

Administration officials seemed united in their opinions that something similar to the facility would have been created regardless of affiliation with the consortium. Regardless of being affiliated with the national program, they needed space to conduct intensive training for the Faculty Development Initiative.

The production portion of the facility would not have been as elaborate without a national connection. However, in the process of creating the *SUMF* administration officials realized that a production facility allowed more students to become interested in multimedia. If a few students began to make presentations for their classes enhanced with multimedia it might have the net effect of changing the standard of what is expected for other students as well as the faculty.

Discounts and inside knowledge.

Along with discounts, *South U.* officials wanted intimate knowledge of what technology companies were doing and the products that they were developing. Since technology, particularly multimedia technology was changing so quickly, *South U.* officials hoped to get inside knowledge to assist them in long term planning. *Abel* explains;

> What we saw as being the primary benefit was not a few percent savings on buying equipment and software. Rather, it was to influence the direction of software and products, peripheral devices, and software, teacher sets, interface designs; to have the opportunity to know ahead of time what was in the pipeline and to influence that. That's the primary benefit because it influences our planning for the instructional development activities, it influences what we know we will be teaching, and the teachers that will be available. It clearly effects course development planning if we can say by the time your software, your courseware, is ready, (saying this to a faculty member in a planning

> session), by the time we have the product ready there will be a piece of software available that will enable these things to actually be done. It gives us an early look, it's the primary reason you always want to be involved with beta testing or alpha testing, because you know what's in the pipeline and you can have an impact on it.

By knowing what the corporations were planning *South U.* felt that it could better plan and allocate their own resources which would keep them from investing in technology that would quickly become obsolete.

South U. officials were going to have to build a classroom for the FDI regardless of the relationship with the consortium. And although they knew that the classroom would be heavily used, they also realized that it would remain idle for large periods of time because faculty could only be trained intensively during slow times of the year and generally during business hours during a week. Students and community members are not necessarily restricted to those hours and could thus take advantage of the resources without interfering with the FDI project.

South U. had already begun its Faculty Development Initiative when the opportunity to join the *NewMedia Center's* consortium arose. The relationship with the national consortium allowed *South U.* to get more mileage out of their existing effort. The most obvious benefits were the discounts offered by the Consortium's corporate members. As *Abel* stated: "We do get some cash...some reductions of cost for equipment and software, it's a small reduction, perhaps less than ten percent, although it varies with each vendor."

This comment and similar ones were stated with little enthusiasm. It wasn't just the discounts that interested *South U.*. In fact, taking advantage of the discounts was problematic. All of the software on the computers in the *SUMF* had to match the software on the machines that the faculty were given through the Faculty Development

Institute. Upgrading had to be done campus wide which often involved purchasing several thousand copies of software. Yet, the discounts offered by the consortium's corporate affiliates could only be applied to the relatively small portions of equipment that was used in the facility itself. Nevertheless, the relationship did provide some cost savings.

As *Veblin*, a director of the *SUMF* , stated,

> We would have done something like this in any case. What the *NewMedia Center's* program did when it came out a year ago at EDUCOM was give us some leverage to say "OK, look, here is the trend across the country, we are following the trend here that is being supported by a consortium of the top companies in this field and some of the top schools in this field. You know this is sort of an elite thing at this point. We were buying into a program that we knew would have at least a certain life span of interest, excitement, and visibility, and what we're doing is we're leveraging the membership to this *NewMedia Center's* program to try to gain some more prominence and some more credibility on campus, to say "we're not doing this just as some capricious thing, just because we wanted to go out and buy Macintoshes." To be able to say look what's going on around the country. And in fact we belong to this club. And look at the interest that was generated by the *NewMedia Center's* program, it certainly is a significant movement.

This sentiment was echoed by *Abel* , a senior university official, when stating,

> By bringing it in under the wrap of this whole thing, fundamentally we could get access to resources, that if it stood alone, nobody owned it or it wasn't seen as central to the effort then it would be much harder to get resources.

He continues,

> From our, from the rest of the organization's point of view I guess it's helpful to say that you have a (relationship with the *NewMedia Center's* consortium) in that it puts the university in a class of institutions.

and

> I don't know what level of prestige the whole enterprise has externally. I think it probably, the level of prestige it has, the level of importance it seems to have, seems to vary. Those who are not in it, who are aggressive, want in it, because I think there are clear values in, as a promotional tool and as a capital raising and a fund raising tool, to say that you're in it. That your activities, your program, meet some sort of quality standard.

Provides resources.

South U. was attempting to create a technology infrastructure but recognized that the effort would be useless if the faculty didn't adopt the technology. As *Briggs*, a senior university official, states,

> Well the *SUMF* from my perspective is one element of a really broad effort, commitment, on the part of the university. To basically learn how to apply technology to improve the learning and teaching process. And there are several components of that. One of them is literacy in the technology and the *SUMF* certainly plays an role in that. Another aspect of it is, infrastructure, basically having the tools for people to be able to utilize. One of the things we've said is we need to think of this technology as something that has really become a commodity, a commodity that that's going to be turned over continuously. So that literacy in the technology is something that has to be turned over at a fairly frequent rate too. We've set as a goal that 100% of our faculty over a period of four years, if they

> choose to utilize what is provided, will have the opportunity to become literate in using NewMedia technologies and other teaching technologies. The whole idea, though, is that faculty, the people involved in this process, know and understand the technology, they are the ones that inevitably have to come up with the ways of modifying the teaching and learning process so that the utility of both the teachers and the students time and of the technology is increased.

The officials I interviewed suggested that when in the company of other well known corporations and institutes of higher education it is easier present such large scale change. Your plans don't seem quite as radical or risky or even dangerous. Faculty would feel supported thereby minimizing anxiety and resistance to change.

As stated previously, the administration's agenda was primarily one of organizational change. They intended to make the university more technologically oriented. Not only were they attempting to provide the necessary tools for the campus community, but also they had an interest in promoting the use of such tools. As with any large scale change there were those who resisted change. The *SUMF* was used as another tool for addressing the concerns of those who were comfortable with the status quo.

As *Veblin* thoroughly explains,

> There has to be a way to leverage the kinds of things we want, getting our agenda across to those faculty members who don't understand the implications of sticking with a main frame and sticking with IBM for the entire campus,

in reference to the relatively expensive existing technology. He continues,

> We have to look at a broader perspective, we have to look at new approaches, innovative approaches. The engineers, they have to have IBM PC's. Why? Because they are used to them. The other thing which is

probably the most valid reason for having the IBM's is because that is where their software is. And it's not to say that there isn't equal or better software on the Mac side, they don't want to hear that.

Part of the change brought on by the Faculty Development Initiative was a university wide computer platform switch. Information Systems wanted the entire campus to begin using the Power Macintosh platform. The prestige of the *NewMedia Center's* consortium helped to legitimize this effort. The resources available in the *SUMF* gave the faculty the opportunity to get involved with multimedia without having to worry about not having the necessary equipment. Many projects could be completed by a faculty member, in their own office, on their own computers. However, if a faculty member needed resources beyond what they had on their own desktop, they would have those resources at the *SUMF* .

Veblin describes this effort and the *SUMF 's* role in assisting the infusion of technology on campus:

> The reason this exist is because there needs to be sort of a front line defense for those people who say I don't have this piece of hardware or this piece of software and that means I can't do my job, that means I don't want to buy into this program. And what we're saying is here is a location on campus that anyone can come to and meet any of your needs at any given point in time. So if they don't have *Photoshop* for instance, (and say) "oh I need to do this picture," then the *SUMF* will deal with that. So for all of those multimedia needs, which we are pushing. We are really telling these people, "this is what the world is coming to here, you need to learn multimedia, and this is where they can come." Even if they don't have their machine yet (if they haven't been through the FDI) they can come here and do multimedia.

Having the resources available removed the opportunity for a faculty member to claim they didn't have the hardware and software resources they required as an excuse for not using multimedia.

SUMF was used as a site for training.

To handle the volume of faculty that *South U.* wanted to through the FDI they needed a space that was dedicated to training. When the opportunity arose to join the *NewMedia Center's* consortium *South U.* officials were eager because they felt they could still use their resources to fulfill their faculty training needs and with little additional investment they could offer a service to the students and community thus increasing the return on their investment.

SUMF provided an incentive to switch platforms.

The *SUMF* only contained Macintosh computers. There wasn't a similar facility on campus that catered to the IBM compatible platform. As a result an incentive was created to explore the Macintoshes. Macintosh aficionados were encouraged that the computer they were familiar with was being promoted, while PC "people" often were disappointed. Either way, if they wanted to create high-end multimedia they had no choice but use Macintoshes. *South U.* officials hoped that by supporting the Macintosh and not the PC compatible would encourage more people to switch to the Macintosh. By having the entire campus on one platform the university could consolidate their support services. Faculty would be more likely to share common experiences with the platform and thus promote the use of multimedia throughout the campus.

Library administration

The *South U.* library provided the space for the *SUMF* to be housed and contributed all the funding for the construction of the physical room, which involved

extensive remodeling. In addition, the library funded one of the directors' positions, as well as the on site technical manager and student assistant positions.

The library funded a large portion of the *SUMF* and thus had a large stake in the facility. The innovation that they wanted the *SUMF* to promote was the library itself. They wanted the *SUMF* to provide them with a foot into the door of technology. Library officials predicted that the traditional role of the library as a place where one could access information would eventually be eclipsed by that same information being made available through networks to geographically dispersed locations.

What Kind of Change Did South U.'s Library Want to Bring About?

The time may be fast approaching when the information in books will be available through networks, as some pundits predict (Heterick & Gehl, 1995; Toffler, 1980). However, that was certainly not so at the time of this writing. The library was beginning a time of transition but didn't have a clear concept of its destination. The library was obligated to continue providing their traditional service and at the same time begin exploring options to define its future role.

Library officials wanted the library to become a learning resource center; a place where people could come and gain access to computer networks of information and media if they didn't have access elsewhere. They hoped that patrons might also come to the library to gain access to the tools that would allow them to create as well as receive information.

Providing access to information is the library's mission. To move from that base to providing other services would require many people, particularly those in charge of funding, to change and adopt a new definition of what a library is and which services it should provide. The *SUMF* was used as a change agent that attempted to assist in the adoption of the new library definition. Library officials wanted to prepare the institution for the possibility that the library's role was to expand access to not only information, but

to the technologies needed to communicate information. Also they wanted the *SUMF* to help them recreate themselves.

The *SUMF* provided some access to these production tools but this was only a small experimental step in redefining the library's mission. The real strength of having the *SUMF* was that it opened up the opportunity for the library to become a provider of those types of services. Not only did the *SUMF* put them in that kind of business it did so in a way that was legitimized by prestigious universities and corporations. By positioning themselves in this way the library could petition the state for funds more effectively when the time to do so arrived.

The library had begun to recognize that they had to change. They had already begun a process of shifting a percentage of their materials to a storage site to free up space for computing terminals which could access databases containing journal articles and monographs. The question was what types of services should they begin to offer and how could they position themselves to offer a service that was not redundant to what most people had access to through their desktop computers.

Officials from educational technologies and media services convinced library officials that the *SUMF* would be an appropriate facility to help them with the change process. The library was under pressure to change, although from different environmental factors than the department of Educational Technologies. *Briggs*, a senior university official suggested,

> For two of three years we've thought that the library needs to become a place where people go to where they have easy access. I believe the library of the future is one that needs to be available 24 hours a day, seven days a week, and it becomes again really a learning resource center. So it means, it's a place where you can go to get help in using the tools of research and the tools of learning, it's a place where you can go where there is an

economy of scale and access to materials and technology. The library, in fact we would like to see, we've talked about the day when there might be hundreds of workstations and study areas where people interact, and provide people with easier and greater access. Over the long term we really believe most individuals are going to have highly personalized computers, they are going to be used for personal communication, for access to these kinds of materials. Then the library becomes the safety net for people that just can't afford to get access to these things. But it also becomes a place that maybe what you do is what we call beta testing of new course materials and learning materials. It's sort of a fail safe environment, one that new software, courseware could be checked out and then put into an environment where it's delivered over the network.

Laird, a senior library official, explains why she wanted this facility,

I mean this is an opportunity that I didn't want to lose. I have in mind that the library will be different and that it will, it should be the center of intellectual activity of all kinds. And that with changes in technology and emphasis on instructional technology, network information, that the library needs to offer more of those kinds of facilities.

Briggs, a senior university official, agreed,

The library has to change anyway and I think the library community knows that. You know this is a catalyst for change. I think it is still a controversial idea, my view of it is that most workspace in the library will some day, we're going to have off site storage for most of the materials in the stacks, it'll be readily available but it's going to be on a call basis, and that space that valuable in the center of campus is going to be allocated to the technology, the workspaces that allow a lot of people easy access to

those materials. But that's not a view that is shared by a lot of the library faculty. One of the things we are certainly seeing that they put the *SUMF* in and it's a busy place. It stays in demand. So I think it's great. *Laird* has been very supportive and it was a nice merger with some of our instructional technology people.

The library's administration wanted the library to change in order to remain important and relevant to the campus and community but they realized that many, inside and outside, of the library would want to go in another direction and thus offer resistance to changing.

Barriers to the Library's Change Agenda

Changing too quickly might be too much of a shock.

Library officials expressed some desire for the *SUMF* to be more accessible and reduce some of the time when the facility was under used. At the same time they wanted to gradually increase the technological services they were providing. By gradually offering more and more technological services the library might be able to overcome resistance by increasing the campus' comfort level with technology. The library wanted at this point in time a "foot in the door" of technology and were content with that. By going slow, the library could test the waters to see if they were where they needed to be before increasing the investment in this type of technology.

There were plenty of uncertainties concerning the library's role in the future. The *SUMF* was a first step into a new direction. Supporting the *SUMF* was not a bold action and required only a modest investment. A bold initiative could have had negative side-effects if it was decided down the road that the library shouldn't provide that type of access. The *SUMF* provided the foundation to go in that direction should they choose to in the future.

Library staff not prepared for change.

Many of the library faculty expressed dissatisfaction with library space being appropriated by educational technologies. The decision to allocate the space was primarily generated at the top level with little consultation from staff members. Library faculty I spoke with expressed interest in the facility but I sensed that they felt that they were losing control over their space.

Many library faculty participated in the Faculty Development Initiative and attended a week long training session at the *SUMF* . Unfortunately when they received their desktop machines they were forced to relinquish the computer they had previously used. In many circumstances this was a different platform which they had invested a great deal of training time. To a certain degree, many of these people associated the *SUMF* with the removal of their machines which added to the resentment. I don't believe the *SUMF* being a member of the national consortium garnered much enthusiasm from the staff. *Laird*, a senior library official, recognized this when mentioning: "Anytime you have change, and perhaps take some resources away from programs that are in existence you have those difficulties. "Those library faculty who had their resources removed were understandably concerned about the direction of change.

How Was the SUMF Used as a Change Agent by the South U. library?

Just as the Faculty Development Initiative was assisted by an alliance with the consortium to overcome objections to change, the consortium was also used to address objections to change within the library. As *Briggs* suggests, "It helped it go down a lot easier for the people who were concerned about using library space for it."

Senior library officials seemed to view the *SUMF* as a necessary step in the transformation of the entire library, Yet, they seemed more interested in providing patrons with access to information resources than providing access to production

equipment. When I asked about opening up the facility for uses other than multimedia *Laird*, a senior library official, suggested:

> I would like to, now one time or twice I've suggested to *Thatcher* (*SUMF* director) that you open up the classroom. She said no it has to be for multimedia. I've talked a little bit about you don't want to have this facility unused. Better that it be busy all the time. But she feels very strongly that it only be used for multimedia, and I just haven't pressed her. I can see *Thatcher*'s idea that if we don't allow it to be used for multimedia and multimedia programs then it can be just taken over by these extraneous uses and then how will you get rid of them when you develop enough programs for it to be used all the time for its purpose of its design.

Because the *SUMF* was central to the FDI, library officials hoped that the campus faculty would begin to view the entire library as being central to their professional development as well as an information resource for their academic needs.

SUMF's Form?

The agendas of all of the groups that had a role in the creation of the *SUMF* influenced the form of the facility. The form of the facility consisted of the architecture, the equipment, the arrangement, the staff, the rules, the procedures, the attitudes of the staff, and the hours of operation. All of these constructs were mediated to one degree or another. The resulting composite, the form, of the facility, in effect influences how the facility can be used by patrons.

Architecture

The architectural structure of the *SUMF* was primarily a result of the agendas of Educational Technologies and University Libraries. Educational Technologies needed to have a classroom in which to hold their workshops. This was their primary objective. The

facility had to be set up so that at least twenty individuals could be in a class at any one time. Since the faculty had to be able to see a projection screen while that sat at their terminals. A traditional classroom setup was needed.

The alliance with the *NewMedia Center's* consortium required that they have a production room. The library donated the space for the project but available space was limited. They agreed upon constructing a new room. This room was divided into two sections; the production room and the classroom. I had a chance to discuss the many possible sizes and configurations of the room with *Veblin* and *Thatcher* before construction began. We attempted to make the production room large enough to comfortably fit six computer stations. In retrospect, the space we allocated for this was far too small. As it turned out only three people could work at any one time in the production room. Yet, had we made the production room larger, we would have made the classroom smaller. The production room sacrificed space so the classroom could be used for educational technologies faculty development initiative.

Equipment

The decision of what hardware and software was purchased was primarily determined by the needs of the Faculty Development Initiative. This initiative was trying to move the campus to the Macintosh platform. As part of that effort South U's campus computer support department had decided that they would no longer provide services to other platforms. Because of these circumstances the lab only contained Macintoshes.

Each machine in the *SUMF* had to be set up identically to all the other machines. Obviously this was important so patrons could easily navigate the system and didn't have to find the location of the applications they needed. More importantly, for the *SUMF* administration, was to keep the computer's desktop uniform with the machines they were giving to the faculty. The logic was that it would be easier for a faculty member to use the machines after the initial training and easier for them to learn new applications at

continuing workshops if they were familiar with the interface. Keeping the computers uniform in a public facility was a complicated and time consuming task. A large part of the staff's time was spent doing this.

There was some type of software for every major area of multimedia including software for photo manipulation, graphic creation, digital video, sound manipulation, animation, page layout, and authoring programs capable of bringing all the previous elements together and providing for various user interactions. The hardware consisted mainly of the computers themselves. The computers were audio/visual ready which means that a patron could capture audio and video directly into the computer and audio and visuals could be displayed. These machines each had a CD-ROM drive as well. Some of the machines were attached to scanners, VCRs, audio tape decks, and high-8 video cameras. Most of this equipment was purchased through the *NewMedia Center's* consortium or was appropriated from educational technologies and university libraries.

This equipment could meet most patrons multimedia production needs, however, it was not set up to meet all of them. For instance several programs, such as higher-end languages like C++ and Script-X, were not made available. I asked the site director about the absence of these tools and he told me that although he had a great desire for these programs, they wanted to keep the facility simple and easy to use and that they couldn't be all things to all people.

While I observed the *SUMF* there was a continual debate going on about what equipment to buy. It seemed that all parties involved recognized that the hardware and software had to be continually updated. Again the Faculty Development Initiative largely drove this process. Software upgrades had to be matched with purchases for the entire faculty. Software purchases were focused on those tools that could be used interdepartmentally.

An item that was the focus of considerable debate was a CD-ROM burner. This tool would allow patrons to create their own CD-ROMs. Many argued that a CD-ROM burner was essential to producing multimedia because of the ability of CD's to store comparatively large amounts of data which was required by multimedia. The administration recognized that this was an important tool but also recognized that it was a very expensive tool.

Throughout the study I was continually told that the *SUMF* would be purchasing a CD-ROM burner. I passed this information on to the patrons who were always inquiring about the availability of such device. In fact it was the most requested device that we didn't have. During the time of this study the CD-ROM burner's large expense outweighed the perceived benefits and was subsequently never purchased.

Some of the higher end uses could be done, at least by those associated with *South U.*, in another lab across campus. This lab was exclusively for multimedia development and was only available for specific uses. My impression of this lab was that it was difficult to gain access and was definitely not for novices. *Veblin* contrasted the *SUMF* with the other multimedia lab on campus which was located in the engineering department.

> We get people who come in here and have really specific needs either were not quite at the point to support the things that they are doing to the degree that they want to be supported or they need resources we don't have or they need more time then we can give them, then we give them to *Berger*(director of the other multimedia lab). Then *Berger* gets someone who already knows pretty much what they're doing. Someone who is going to really use his resources effectively. I think that is sort of what we are looking at, what are the best ways to use the resources we have. And this offers us a way to do sort of a triage. Some one comes in and says, " I

need to do multimedia" Are you going to put em down on a fifteen, twenty thousand dollar system right off the bat. Or do you put em on something a little bit smaller. And as they outgrow our resources put em into the resources they need. So it keeps people off *Berger*'s back, it has the people who are working in his facility, those people that are really using the resources. And we can have somebody come in here for years and putz around with this stuff, and if they never get to the point where they use it effectively so what.

The *SUMF* didn't necessarily want to be in competition with the other multimedia facility although both labs offered much of the same equipment. The main differences between the *SUMF* and the other lab were; the *SUMF* 's classroom setup, the tie in with the national alliance, and who was allowed access. The *SUMF* offered access to everyone regardless of their affiliation with the university.

Rules

The hours that the *SUMF* was open limited many people from using the facility. There were no weekend hours and it closed during the week at 9:00 PM. The limited hours, combined with all the time the facility was used as a classroom, provided users with an unpredictable schedule of when they could use the production tools.

Patrons further had to contend with a variety of rules and procedures that were created to ensure that the facility was always prepared for a class, that the equipment was secure, and that non-multimedia uses were kept to a minimum to provide some assurance that resources would be available for multimedia producers.

One of the *SUMF* 's co-directors argued that patrons needed to be able to explore the machines if they ever were going to become interested enough to create their own multimedia applications. It was fine with him if people came in to use the machines for

whatever they wanted. The site director argued that although that would be ideal in practice, this made administering the facility difficult.

Practical concerns won out and the facility was only open to those who were producing multimedia. Multimedia was defined sometimes broadly and sometimes narrowly. There was not a written definition. Interactive programs of any nature were acceptable. Any type of digital media manipulation was acceptable. The line of what was acceptable and what wasn't started to become fuzzy when the ultimate goal of the patron included transferring data to paper. Some activities such as page layout, particularly if it included images, was acceptable as long as patrons used the layout software. However, making a page layout with a word processor was prohibited.

Consuming multimedia was also discouraged in the *SUMF* . Patrons were not permitted to bring in their own personal software. They could only use the various internet software for pulling down images and sounds, and not for general browsing. Games were prohibited. E-mail was prohibited. These rules were often difficult to enforce because the software to do those things was on the machines.

The software was on the computers because it was used in some of the classes. For example, sending e-mail and exploring the internet was perfectly acceptable as long as it was done as part of a class. This strange circumstance was a result of the conflicting agendas of the facility's creators. Just about anyone could schedule time in the classroom and conduct any sort of class they wanted to as long as it had something to do with computing. Faculty Development Workshops had the highest precedence.

In fact, after the first semester was over, officials from the Faculty Development Initiative complained to *Smith*, the site director, that the computers were not being kept in uniform condition. Often various machines would not have the appropriate files or files were repositioned differently from the instructor's computer. This was surprising to me

because about half of the staff's time had been spent in attempting to keep the machines uniform.

Smith, the *SUMF* 's technical manager, suggested that this uniformity couldn't be maintained, especially when patrons would use the facility for non-multimedia applications. His solution was to enforce the limitation to only multimedia production applications. He did this by deciding to order a program that would allow him to lock all the files on each machine.

With this program the files could only be accessed if one of the staff unlocked the specific program for the patron. In this way the staff would know which programs were used and could concentrate their time on ensuring that the computers were reset when the patron left. This would also free time that was spent defining what could and could not be done in the *SUMF* . Once *Smith* had made this request, it was sent to the *SUMF* directors and senior university officials. The purchase had not been made by the time I finished collecting data because various levels in the university hierarchy were discussing if it limited access too much. They were trying to define what type of access was required for classes and what type of access was necessary for multimedia production.

The *SUMF* , at the time when I collected data, was the only classroom on campus and in the community that had computers on each of the desks that was not dedicated to an indexed for credit class. This made the classroom a very popular facility to use and it was scheduled for use often. Consequently, the more the classroom was used, the less the *SUMF* could be used as a production facility.

Patrons wanting to develop multimedia were encouraged to schedule a particular machine in the production room to guarantee that it would be available. The downside to this procedure was that the machine could only be reserved for a maximum of two hours each day. While providing more equitable access this procedure limited what many could accomplish.

For example, during the spring one of the co-directors granted a special request from one of the departments on campus. They needed to use two of the three machines in the production room all day for three weeks. The patrons were making a digital video about eleven minutes long. They had considerable experience in the software and hardware. Contrast this to the time allotted to a novice: two hours a day. Their chances for successfully completing a project decreased dramatically.

Several other rules and procedures also shaped how this facility was used. Patrons using the facility to create multimedia had to fill out an involved electronic questionnaire. They could only use the equipment inside the facility. The *SUMF* had a digital camera and a high 8 video camera, both potentially useful to a patron but they could not be taken out of the room which limited their usefulness.

There was also the problem of storage space. Multimedia requires a great deal of data. In most instances the data exceeded the capacity of storage disks and had to be left on the *SUMF* 's hard drives. Patrons had to request that their data not be erased, but we would only store it for a maximum of a week . The *SUMF* would have quickly run out of storage space had this not been done. Yet, this procedure was a clear barrier to the creation of certain types of multimedia products.

Form Influenced How SUMF Was Used

The staff continually held discussions on what type of access to offer. It was recognized that most of the users were interested in low-end uses. It was also recognized that patrons had to have some degree of exposure to the resources before they would be able to find projects that could exploit them. Some suggested that we allow anyone regardless of whether or not they were working on multimedia to use the *SUMF* . In that case, patrons could do whatever they wanted and would always have the opportunity and exposure to high-end multimedia. However, from a practical standpoint it was decided

that the *SUMF* didn't have sufficient resources to do that. As a result often the *SUMF* was under used.

Alliances Important to Change Effort

The *SUMF* was built by creating alliances both inside and outside the university. All of the groups associated with creating the facility had a vision of their own needs. Each was looking for avenues where they could promote their own interests. By forming alliances they could leverage their own position and use the resources of others to further their own goals. To bring all of those resources together required a large investment. Without pooling resources through alliances it was unlikely that the *SUMF* would have ever come to be and the creators would have to have found other methods to promote innovations.

The creators of the facility were using it for purposes other than to produce multimedia. They were using the *SUMF* as a tool. A tool that acted as a change agent that would encourage the adoption of other innovations. Corporations used it as a marketing tool. They wanted to encourage a broad audience to find uses for their products which would in turn promote the purchase of their hardware and software. *South U.* administration was using it as a tool for organizational change. They wanted their faculty to adopt multimedia technology with the end goal of teaching more students with fewer faculty resources. Library officials wanted to change the library's structure and provide innovative services to the faculty, students, and community.

Alliances can generate momentum

The relationship between *South U.* and the *NewMedia Center's* consortium was largely used to generate momentum for change. It was the leverage they received by appropriating the names and prestige of other universities and corporations. In essence,

the administration could say that, "it's not just us who realize that multimedia is an important technology. All these other institutions are doing the same thing."

Alliances

The University was experiencing mandates for technology implementation. Change was coming regardless of affiliation with the *NewMedia Center's* consortium. However, the Consortium provided an alliance. By forming alliances *South U.*'s administration was able garner the support of those who otherwise may have been opposed to expenditures on the *SUMF*.

There is something about alliances that make things happen. By appropriating someone else's name, and someone else's prestige you can make things happen for yourself. Alliances were used as a means to generate support to create the *SUMF*. The relationships where developed as a means in themselves as well. Alliances are a close associations for achieving common objectives. They deserve close attention when examining the form of the *SUMF* because each member of an alliance may seemingly want to achieve a common objective. Each member of an alliance uses the alliance and its objective for their own purposes. Under those circumstances the end product is a result of negotiation and compromise that no one had envisioned.

In the first year of operation of the *SUMF* there were no direct costs of membership to the consortium. As mentioned earlier *South U.* officials were skeptical of any such requirement. However that is not to say that *South U.* did not have to provide something to the consortium. It provided an arena to display and promote their products. "We will all compete better if we all cooperate better. Such exchange will help to create a critical mass of players in the NewMedia industry." The Beginnings of a NewMedia Industry, a report from the Hakone forum

The consortium recognized the interest in developing partnerships when they first announced the request for proposals that was distributed at the 1993 EDUCOM

conference. This request identified several benefits of becoming a partnership in this consortium including:

- The ability to provide access for students, faculty, and staff to the latest NewMedia technologies, thus enabling research, curriculum development, and training opportunities to meet future educational and economic challenges
- An on-campus resource for faculty training and curriculum development
- An opportunity to work in partnership with other leading-edge educational institutions and with leading technology companies and publishers (with the possibility for programs like beta testing, seeding of new products, joint research programs, and so on)
- Opportunity to explore and integrate interactive media as a powerful tool for teaching and learning
- Outstanding pricing on a complete range of complementary hardware and software solutions (below the already discounted pricing each consortium member already provides to the education users)
- Revenue generating opportunities (seminars, courses, publication of projects developed in center) (NewMedia Center's consortium, Request for Proposals, 1993)

This statement focused on the benefits of being a consortium member but ignored the benefits to the corporations which would benefit equally, perhaps more, from the consortium with higher education. It clearly provides the corporate affiliates a forum to expose their products to a larger audience. This circumstance wasn't lost on *South U.*

officials. As *Veblin* stated, "Realizing that the program is designed to sell machines that it was designed to sell software, it gave everybody a little more credibility, even Apple who is trying to sell machines."

The *NewMedia Center's* consortium not only brought together colleges and universities but corporations as well. These companies obviously had a great deal of experience creating and marketing technology products. The power and name recognition of corporations was certainly valued in this process of organizational change.

It is clear that *South U.* officials had no apparent misgivings about their relationship with industry, as long as their needs were being met. Clearly, the Consortium was appropriated because it coincided with an already ongoing initiative. When asked about the continued affiliation *Abel* was pragmatic, stating,

> The question is, now that we have it, will it continue to come under the guise of the *NewMedia Center's* program. I think to probably to 99% of the people on this campus it wouldn't matter. All I'm saying, is that, do you want to pay annual dues to have the rights to that name. We'll give it another name, unless there is something compelling about being part of a membership for this, and I think we have to see the case for that.

South U. officials seemed to be well aware of the agenda's of those involved in this alliance but decided that the benefits they received were sufficient compensation.

It may have been easy for *South U.* to ignore the corporation's motives because they didn't actively conflict with their own interests. In fact involvement by the consortium in the affairs locally at *South U.* were negligible. When asked if the consortium had put any pressure on *South U.* to do certain things, *Thatcher*, another university official working closely with the day to day operation of the center, replied, "No, I think there could even be a tighter structure in terms of keeping up with the schools and what they are doing," and "I found the few attempts at communication (with

the national *NewMedia Center's* consortium office) were really frustrating, basically I never got a response."

The consortium provided favorable pricing but did not require *South U.* to buy a certain quantity or to limit their purchases to consortium products. As *Veblin* suggested, "The whole idea is that they are making their products very attractive in terms of cost but if it is a bad product, you know cost can be real attractive but the product won't get used, so what's the point."

Although the consortium made some demands upon the *SUMF*, primarily in the form of requiring access to the public, and most *South U.* officials didn't see this as being undesirable. Although they acknowledged that the facility was primarily for the faculty of *South U.* the university administration was interested in providing access to the general public. Somewhat disappointed, *Veblin* mentioned to me after attending a conference with all of the consortium's various members that, "The word public was not ever brought up."

Although public access was required, it seems at least in the introductory period the consortium did not stress it. It seemed that although the consortium required that provision, they allowed some flexibility in the ways their collegiate partners achieved such access. That flexibility impressed *Thatcher*. After returning from a conference with the other consortium members she remarked, "I guess what we learned was that everyone was going at their own pace," and "the ultimate thing that was stressed was the individuality of each schools."

After being accepted as a charter member of the *NewMedia Center's* program, officials at *South U.* began looking for a physical location to put the facility. This was not an easy decision because of lack of available space university wide. In order to find an appropriate space they needed to build another alliance. They found what they needed

through a relationship that had already been established. They put the facility within the library.

The bureaucracy of *South U.* placed the university's branches of educational technologies, media services, and the university libraries, under the dominion of information systems. These departments were independent and autonomous but often collaborated. Officials in educational technologies, along with those in media services, were the primary proponents of creating the *SUMF* . They had gotten their proposal to join the *NewMedia Center's* consortium approved and they had financial resources to purchase the necessary hardware and software. They needed space, and space was at a premium. Naturally they looked to the library because of its administrative ties with information systems.

It was important that those administrators from educational technologies, media services and university libraries were able to build a strong mutually beneficial relationship. Both parties seemed to benefit from the creation of the *SUMF* facility. As *Abel* commented,

> I believe that the library folks wanted, they needed to have a high-tech visible activity. Since the library is part of information systems we already had a good working relationship with the management built over years. We had previously placed the student computer lab in the Media Center and put in computers in the old classroom. We had also demonstrated that because the activity level in that classroom that other library activities which prior to that used that space, were now in competition for that room. Internally I think there was pressure to find another way to get all this accomplished. That gave management some flexibility and some latitude that they could renovate this space, move our activity out of that classroom, take the pressure off that, create a high-tech center, and be

supportive to our faculty development activity which is also a goal of theirs, to be a partner. The deal was that if they'll renovate it and contribute some operating dollars towards staff, we'll supply the equipment and most of the programmatic elements. It was a good deal for both of us. We didn't have to argue at all. I think agreement came over lunch or something.

Veblin describes the initial meeting between officials from educational technologies and the library administration as follows,

> I got into this meeting, it was over here at the library, and there were all these librarians on the one side of the table. And (officials from media services and educational technologies) and myself. But we had basically this table with people on both sides. It was at that time that I sort of figured out what was going on. It became clear after a short period of time that there were two very different agendas being approached with the proposal.

Those agendas being that of the education technology people and the library people. He continues,

> There was a lot of common ground there. But coming out of two different, very different points of view. And I also realized that just the fact that we were in someone else's space was a real issue. And realized that I was getting in the middle of what could be a very ticklish situation. And it became real clear that the issue was we wanted space and they wanted to get into, well they wanted to get into the information age, they wanted to be part of what's going on. They wanted to play. There is this game going on out here and they are sitting on the sidelines and they wanted to come in and play the game. So it worked out very well, what they brought to the

> table was what we needed, what we brought to the table was exactly what they needed. It was just a matter of working out the details which was not a big issue. I must say that from the beginning I realized that I wasn't going to be making any big decisions here. All I was going to be doing was trying to make everything in the middle, that was my job, to write a proposal that could be accepted and number two to make sure that all of these needs met in the middle because there was plenty of overlap. It was just a matter of taking the radical ideas on either end and pushing them more towards the middle.

In an effort to forge a working alliance in spirit as well as in practice, two directors were assigned to the facility, *Veblin* from educational technologies and *Thatcher* from university libraries. In that way both departments had an active voice in the way the facility progressed. It was an alliance that helped educational technologies pursue their organizational change agenda and eventually may help the library fulfill its outreach mission. As *Laird*, a senior official in the library's administration told me, "We will continue to have a good relationship to media services, even though we always have, we haven't had a substantial project to work on together. It gives us a commitment to each other."

By forming a shared commitment, both groups can look out for the interest of the other through self interest in a common endeavor. By making a commitment to one another both departments could learn more about one another and be better prepared to work together on larger projects in the future.

Veblin, *Thatcher,* and *Smith* often discussed with me the cost and benefits of restricting access by defining multimedia as narrowly as they had. Initially patrons were permitted to use the facility to browse the internet. After a few months of operation, they decided that although internet access was potentially critical to obtaining the rich

resources of sound and images for multimedia development, browsing alone would be discouraged. The same restrictions applied to using the *SUMF* for word processing.

Managing under this policy was difficult because of the mixed messages that patrons received. Many of the computer programs were flexible and could be used in a number of useful ways, however, the *SUMF* 's staff had to determine if what the patron wanted to do was legitimately multimedia; and in particular multimedia development. Multimedia consumption was discouraged.

The *SUMF* administration realized that this policy discouraged many users particularly novices from exploring the machines and perhaps generating some curiosity and interest in producing multimedia. During the time I studied the facility they determined that the *SUMF* lacked the resources to be all things to all people and thus demanded that the facility was only used for multimedia, even if it were empty and under used at times.

Library officials accepted this situation because they felt that having a facility like the *SUMF* was an important first step that allowed them to go in a direction they previously could not. The *SUMF* allowed the library to meet its mission of extending resources to the community. Multimedia technology is in many ways in its infancy. The *SUMF* allowed the library the opportunity to experiment with a new type of outreach service.

Laird, a senior official with the library, stated:

> I think it fits very well with the idea of restructuring and outreach mission of the university being outreach, and economic development in the state and what ever we can do to serve the greater community, I think it's to our advantage to do so.

Alliance Was Means in Itself

The physical resources; money, staff, expertise, and location, that each alliance member brought to the table were often not as important as the intangible resources such as company and university names and the prestige that accompanied them. Thus the alliance itself was a agent for change. Each contributor used the reputation of the others to form a coalition. That coalition allowed them to make the powerful rhetorical argument; the appeal to authority. In essence they said, "Large corporations and prestigious universities support our agenda, if they don't know what they are doing who does?"

How Was the Facility Used by the Patrons?

The *SUMF* opened itself to the faculty, staff, students, and the local community. It was those groups that used the *SUMF* as a Toolbox; as a place where they could access the tools of multimedia. Members of those groups seemed to have little knowledge of the administration's plans and initiatives. It seemed that they did not concern themselves with the politics of the facility. Each user had determined for themselves that the tools needed for their projects were available in the *SUMF* . It was the way that they used those tools that defined multimedia in the context of this facility. The way the tools were used also defined what access was demanded.

Classroom

Throughout the academic year, I observed that the *SUMF* was used most often as a classroom. Originally the directors envisioned a facility that provided a classroom as well as a production room simultaneously. However, as mentioned before an underestimation of the space each terminal in the production room required reduced the number of production stations to half the number originally planned. On the positive side

those circumstances consequently made the classroom larger. Instructors appreciated the extra space caused by the architectural oversight. Teaching computer applications often requires the instructor to help students one on one. A larger production room would have reduced available space in the classroom. This mistake helped make the *SUMF* more of a classroom than a production facility.

Often when a class was underway, the *SUMF* 's staff would continue their work in the production room. It became common practice, however, not to allow patrons to use the production room while a class was in progress. This practice created a barrier for producing multimedia because of the limited hours available for that purpose. A few students commented on this situation stating, "When courses are given the remaining computers should be left available to other students. The last time I was there a class was being given and there were five computers not being used." and another commented, "It's booked for classes all of my free time." The idea of a simultaneously providing access to both rooms was abandoned, resulting in a significant reduction of opportunities.

Some patrons experienced much frustration from these circumstances. In an effort to help patrons identity when they could use the facility the *SUMF* 's directors placed a bulletin board outside of the *SUMF* that contained a schedule of the classes. Even with this posting many had trouble predicting when the facility was available to them. Too often the schedule varied from day to day confusing patrons. Each day differed from the next. On some days the facility was scheduled the entire day while others were not scheduled at all.

The *SUMF* was a duel purpose facility and often that duality generated frustration. One student who expressed disappointment after arriving at the *SUMF* , on numerous occasions, only to find a class in session, commented on the dual roles,

> This is not a good idea since people who use the facility expect it to be open to them during the posted hours and can't keep an eye on whether there is a class there at a time when they want and need to use it.

SUMF officials recognized that some patrons had difficulties but decided that the classes provided services to more people and thus had priority. They also decided that there were still many hours each week when the facility remained vacant and that patrons should try to use the facility at those times.

A wide range of community groups took advantage of this opportunity and held classes in the *SUMF* . These groups included; a local girl scouts troop, a computer users' group, and a 4-H youth group. The community members who used the classroom the most were the local schools. At least once a week a local public school teacher would bring in a class of students. In addition, groups of teachers would meet in the *SUMF* for professional development sessions concerning computer training. As Niles, a public school teacher suggested;

> We have virtually nothing at school newer than six or seven years old and the ability to do anything "worthwhile" is most difficult. I have personally purchased computers as well as begged them from industry. But again most of these are little better than green-screen terminals. So the lab provides us with a wonderful opportunity.

and "My Students are sixth graders. For many of them working in the *SUMF* has been their first really hands-on attempt with computers." Another teacher holding a professional development seminar for a local elementary school remarked, "It is my dream that someday every school will have a facility like this for the teachers to learn in. That will be the only way that we can keep teachers updated on technology." Almost without exception the classes were on exploring the internet and gaining experience with the Macintosh interface.

Multimedia skills were perhaps more highly demanded in this community than in others because of a partnership between the university, town, and the local telephone utility, which was trying to connect every household in town to a digital network (at the time of this writing a statistic showed that this was the most connected town, per capita, in the world). Many in the community did not have a personal computer much less a connection to the network. A large number of the people who were fortunate enough to have access to this network needed some rudimentary training to help them maximize the network resource. A classroom such as the one in the *SUMF* was important for those who wanted to learn.

There was no other site available for a group to explore the internet under the guidance of an instructor. A few local teachers took advantage of this opportunity and held classes for their students so that they could benefit from the digital network that connected many local homes and schools. Teachers who brought their students to the *SUMF* both during and after school hours, had to overcome logistics and school politics. Being allowed to use the facility was only a first step in accessing it. Teachers re-arranged student's class schedules, obtained parental permission slips, scheduled buses and drivers, and found parking for those buses, all in their effort to use the *SUMF* .

On rare occasions the *SUMF* administration would supply an instructor for a particular training session. Most often, however, members of the community who wanted to use the classroom had to supply their own instructors because the *SUMF* had limited staff resources. These circumstances made it difficult for novices to bring their students or groups in. A few local teachers requested an instructor for the first session and then, on subsequent visits, took that responsibility for themselves once they had acquainted themselves with the facility. Teachers had access to the *SUMF* , but there often wasn't enough expertise to maximize the resource.

Most of these community and public school classes did not utilize the *SUMF* to learn multimedia production, even though promoting multimedia production was the stated mission of the consortium. By allowing the public as well as the faculty and students to hold sessions in the facility, the administration created an opportunity to access technology in a different but, nonetheless, important way. These classes were a more low-end oriented. There was more demand for these low-end services than the high-end.

Exploring the internet, particularly through the World Wide Web, which is user friendly and exciting because of the graphics, movies, animation, and sound available, generated a great deal of excitement and enthusiasm among those who were in a class. Exploring this medium was perhaps a first step in developing a need that would require multimedia production capabilities. Although no one from the community held classes on other multimedia issues, the facility did spark some additional interests. Niles commented, "Several of my students have returned with one or other of their parents to share their experiences with them."

The *South U.* administration's primary goal for the facility was to provide a location where faculty development workshops on technology could be held. Community use of the classroom was allowed as long as it did not interfere with the these workshops. Because of faculty schedules, these intensive workshops were scheduled primarily over the holidays. Community use had been a useful public relations tool but it was clear that training and encouraging faculty to become familiar with multimedia was the highest priority.

Faculty workshop topics included one to two hour sessions on the following topics; presentation software, such as Powerpoint; interactive software, primarily Authorware; graphic creation and manipulation software, Photoshop; video manipulation software, including Premier and Fusion Recorder; Internet software, e-mail, gopher, and

WWW browsing. Along with all of that each group received instruction on some curriculum specific software. For example, faculty from the English department learned Daedalus, an on-line writing communications software package. Faculty from the math department received instruction on Mathematica. Mathematica is software designed to teach and perform all types of mathematical operations.

By voluntarily attending these workshops the faculty were rewarded with their own Power Macintosh. This possibility excited most attendees. The ultimate goal of this effort was to supply each faculty member with a Macintosh computer and some training to allow them to use it appropriately. As mentioned before, this massive effort would eventually train approximately 1500 faculty members. The administration realized that technology was constantly changing and had already planned to upgrade the faculty's equipment and training every fourth year which should ensure the *SUMF* 's role as a tool primarily for faculty development.

In addition to the week-long workshops, many shorter sessions were held throughout each session for faculty that gave them more in-depth experience with computer applications. Usually one or two of these would be held each week. The introductory year of this facility coincided with the introductory period of the Faculty Development Initiative. The *SUMF* 's resources would be under increasing pressure from that source as the initiative proceeded. Week-long workshops had already been scheduled for the entire summer. It had been suggested that because of this high use the *SUMF* might have to close its doors entirely to other patrons during the summer.

Many faculty and students scheduled the classroom during the introductory year for non-faculty development activities. The *SUMF* allowed an instructor to demonstrate through a computer hooked up to an LCD panel and at the same time students practiced on their own computer station. Instructors scheduled the classroom for special

demonstrations. The particular arrangement of the *SUMF* classroom was not available elsewhere.

The *SUMF* classroom was scheduled for a variety of reasons by faculty and students. Instructors have integrated software of all types into their courses. Many times over the course of this study, instructors used the *SUMF* for a one time demonstration of a particular kind of software that they used in their courses. A few instructors assigned multimedia projects to their students and scheduled the facility for the presentation of those projects. Some students, whose instructors knew nothing about multimedia, scheduled the facility to so they could deliver a professional quality presentation. The *SUMF* 's flexible schedule allowed them to do this when it was impossible to do it elsewhere.

Since there was no comparable facility on campus with the IBM-PC compatible platform, a few students and faculty members who were comfortable with the PC gained experience on the Macintosh platform so they could hold demonstrations in the *SUMF* . Occasionally faculty from the engineering and business colleges which had previously made a computing commitment to IBM-PC compatible platforms had a guest who preferred to demonstrate through the Macintosh platform and would use the *SUMF* for such purposes.

Influence of the World Wide Web

Exploring the internet was the primary activity for the classes scheduled in the *SUMF* . A few years ago this would not have required audio and visual machines, like the ones in the *SUMF* , because it was primarily a textual environment. But with the popularization of the, World Wide Web (WWW), which is a way of presenting and consuming information through the internet augmented by multimedia, a user must now have access to a more powerful, capable, machine. The WWW is an attractive medium that promotes considerable interest and enthusiasm for viewing the internet.

When the facility first opened, patrons would come in solely to browse the internet. One family used the WWW to view a home page created by their son who was living abroad. Their son had personalized a home page that included pictures of himself celebrating his sister's Birthday as if he were there with them. There was an endless variety of topics that were available for exploration. Some professors on campus had placed support materials for their classes on-line and students came to the *SUMF* to examine them.

The directors and the site manager had continual discussions whether they should permit patrons to browse the internet when a class wasn't in session. Initially they decided that it was okay because there was no other lab on campus with the appropriate software. During this time several patrons who were only using the *SUMF* for internet exploration "discovered" some of the multimedia software on the machines and became interested in creating multimedia projects. As *Veblin*, one of the *SUMF* 's directors said,

> I figure that's fine, we can start limiting that as the need for the higher level kinds of uses come about because the fact of the matter is that we want people to go out onto the network, find stuff, capture it, and bring it down and put it into their programs and in order to do that they have to feel more comfortable with the networks, you have to let them surf a little bit. It's one of those real touchy things. So as long as we are cautious about how we deal with it we will be okay.

A few months later, the Media Center, located on the same floor as the *SUMF* made a WWW browser available on the computers in their lab. As a result, the *SUMF* 's directors agreed that patrons wanting browse the internet would use the Media Center and not the *SUMF* . The directors felt that this would maximize both labs. Both labs offered similar numbers of computers but the Media Center's lab, which offered general, low-end

access, often had a waiting list of patrons wanting to use their resources, while the *SUMF* rarely had more than two or three patrons using the facility for production work.

The WWW was popular because of its interesting sites to explore and its simple, easy to learn language called HyperText Markup Language or HTML. In a short time, novices were capable of creating their own sites. To make a site interesting, many want to include graphics, sounds, and video capabilities that require access to high-end computing resources.

The popularization of the WWW coincided with the creation of this facility. The common practice was to refer the information placed on the WWW, by an individual or group, as a home page. Patrons making their own home pages were some of the *SUMF* most prolific users. I believe the WWW created a reason and an incentive for patrons to explore multimedia and use the equipment in the *SUMF* . Some days it seemed like everyone on campus was trying to put together their own home page. Before the introduction of the WWW there was not an outlet commonly available to display all types of digital media. The WWW provided an outlet for the consumption of this type of media by a large audience. Comments such as; "I use it to scan photos and digitized video for use on a WWW site that I maintain." and "I am developing new pages for the *South U.* College of Engineering. I am also in the midst of a thesis -- using Mosaic as an information storage and retrieval tool for project management." and "I am using the *SUMF* to write complex HTML's." were numerous. Students, faculty, local business, and local teachers, all showed enthusiasm for browsing the WWW, as well as making home pages to display whatever kind of information that they thought was pertinent.

WWW home pages were the driving force behind much of the interest in the *SUMF* capabilities as a production facility. *Smith*, the *SUMF* 's site manager, took an active role in creating and exploring the capabilities of HTML and was continually creating additions to the *SUMF* 's home page. The directors of the *SUMF* encouraged

this activity. As a result, the *SUMF* not only contained physical resources, which were essential for creating home pages, it also became a centralized location of expertise.

Many patrons had access to the equipment for making home pages but lacked expertise. Some would come or call the *SUMF* for advice and instruction. I would say that the staff, and in particular the site manager, expended a great deal of their time purely on various types of advice.

The WWW allowed patrons to distribute their multimedia products to an almost unlimited audience with little personal expense other than the time it took to create the home page. The entire process is a digital transfer from one computer to another. The much promised paperless society had not, at the time of this writing, become a reality. Patrons were interested in using the facility to create traditional, paper-based media. The *SUMF* 's computers were used to incorporate pictures and graphics into their projects with relative ease. Patrons made printouts of some of these projects.

Desktop publishing

Using the computers to create paper documents that incorporated visual media gave patrons an ability to communicate that wasn't possible without expensive publishing tools. These publishing tools require expertise and skill to be used successfully. Many patrons belonged to organizations that needed to publish paper newsletters and flyers to announce their activities and took advantage of the opportunities at the *SUMF* .

The *SUMF* 's directors wanted to focus the facility's efforts on digital media but realized that traditional paper desktop publishing was an important first step towards digital media for many patrons. However, the patrons were limited in their output options. In an effort to focus the *SUMF* on electronic media and to keep costs down, patrons were only permitted to print out three pages of their work at any one time. This policy was intended to encourage patrons to use the facility digitally and to use the Media

Center for their paper needs. Frustration at this policy was expressed by several patrons including these statements, "I am not allowed to make enough copies per visit. For example, when I need to turn in a 6 page newsletter, I am only able to print 3 pages. What is the logic of that? " and

> Printing is a problem because it has to go through the main terminal. It's like you have to get approval to do anything and then there is a limit if you have a really big project and you guys are the only ones with this technology, where else am I going to get it printed?

and "I do not have alternative resources to work elsewhere."

In addition to limiting the number of pages the facility would print the patrons were limited to a black and white printout. *South U.*'s photographic services provided color prints for a fee.

If a patron had access to another printing facility they could transfer their materials there as long as that site was connected to the network. Otherwise, files quickly became to big to transfer on disks. The directors of the facility empathized with this problem but decided it was a fair compromise given the available resources. Nonetheless, many patrons did not understand the rational behind this rule. They wanted to complete their project in the *SUMF* where we had the tools to they needed and were disappointed and confused when told to use the other computer labs on campus available to print out copies of their work.

Many desktop publishing tasks could be performed at these other labs. The attraction of using the *SUMF* was the availability of four color scanners. At the time of this writing, color scanners were rapidly falling in price but were still beyond the range of the average user. The scanners were one of the easiest technologies to learn how to use. Most patrons could use them somewhat effectively after a brief introduction. The scanners were the most heavily used pieces of equipment the *SUMF* had. I would

estimate that perhaps ninety percent of the patrons used the *SUMF* exclusively for its scanners.

It seemed that everyone wanted to put pictures into their projects. Whether the end destination was in digital form, for presentations perhaps to be posted on the WWW, or if they wanted to put them into a paper document, there seemed to be a large demand for infusing communication with graphics and photographs. Activities of this type included all types of projects. For example, two students from the local high school spent hundreds of hours preparing the school newspaper. A student leader in a campus animation society was preparing numerous high quality flyers for an animation convention being held on campus.

Some students would make flyers for the bands they were playing in. Many students just wanted to incorporate graphics in their class papers. Some were making electronic photo albums. All of these patrons were able to create professional looking products to promote their activities.

One student had created an in-depth business proposal. He wanted to make it stand out among the hundreds of others that it was competing against. He wanted to make several three dimensional effects that would grab attention. I advised him that he would have to spend a considerable amount of time learning the software to do this, but it was important to him and he did create an impressive product.

Scanning was used for just about everything. One student was making his own screen saver out of photos of his family and friends that he had scanned in. Another couple of students used the scanners to capture pictures that they were going to incorporate in their own DOOM type game. A local school teacher was using the scanners in an ongoing effort to capture student photos and art work for their use in Hypercard development stacks. In this case the teacher was attempting to use the creation

of multimedia as a teaching tool and was hoping that eventually her students would become interested in using the *SUMF* for that purpose.

One student heard that the *SUMF* had scanners available. He became interested in scanning journal articles to save himself the cost of photocopying. He told me, "The library needs a place where you can scan images and not just photocopy, with electronic publishing so important the ability to scan the resources in the library is a must." He was not referring to pictures or graphics. He was referring to the text resources in the library. He and many others heard that the *SUMF* had scanners and had assumed that the *SUMF* had OCR, or optical character recognition software, which allows the user to scan in text and recognize it as characters and not just one big picture of characters. The facility didn't have this capability and the directors were not interested in obtaining it. The directors suggested that, although scanning text into a computer readable format might be a helpful service, it was not part of the mission of this facility. They stated, "The official library view is "what's wrong with photocopying." and "Taking (scanning) a text book is not what we are all about. Supporting OCR is just another can of worms that we don't want to get into." Yet the demand for this service continued throughout the academic year.

High-end Multimedia

Most of the uses that I have described so far would normally be considered low-end. The vast majority of the projects approached in this facility were low-end. Yet the *SUMF* had the capability to meet many users high-end needs. Digital video was approached on occasion. Interactive applications were rare. There were plenty of patrons who were curious about the possibilities of multimedia, but were reluctant to enter into a project. Many couldn't identify a need. Most patrons who did create high-end projects had previous multimedia experience.

The administration had a continuing conversation, throughout the time of the study, trying to determine how far on the high-end spectrum should they go. In particular,

they discussed whether or not a machine that would allow patrons to press their own CD-ROMs was essential. It is not an overstatement to say that patrons daily inquired about whether we had purchased one yet. Several patrons wanted to use it to make backup copies of their work. Others wanted to make demo CD's of their music. The reasons given were numerous. However, during the time of this study, I observed only a few cases where such a device was absolutely necessary. Most of the low-end projects could not benefit from such a device.

The *SUMF* provided resources for digital mediums only. A few students from the communications department had been told by a professor that they could do analog video editing at the facility. This was not the case and to my knowledge there wasn't a resource on campus to meet those types of needs. Yet digital video applications were used several times each week. The digital video programs allowed patrons to insert audio and video tracks and rearrange them without prior planning. Compared to analog video editing, digital video is relatively easy to learn and use.

The key word is, relatively, because it still required a great deal of time even to prepare a thirty to forty-five second video. One of the few professors who attempted to do production work in the *SUMF* expressed exasperation after working for five hours attempting to digitize a forty-five second compilation of clips from a popular movie on ancient Rome. She had just completed a week-long workshop with the Faculty Development Initiative and was enthusiastic about the possibilities of adding digitized video to her classroom presentations. She was hoping to show the key scenes and explore them in class.

Unfortunately the *SUMF* didn't have the resources to give her individual attention. She was frustrated that the process took so long. Apparently it had seemed quite easy to her when the instructor for the workshop demonstrated the process. She told me that it was unreasonable for her to spend so much time on such a project. I tried to

console her by expressing my belief that the next time it wouldn't take as long because she had gained some experience in the process. This apparently was of little reconciliation because I didn't see her in the *SUMF* for the rest of the year.

Another professor had obtained about sixty graphs that displayed the results of an experiment in progress. He spent an hour or so a day for several weeks turning these into a digital video that he eventually turned into a analog video tape. He too expressed exasperation that the process was taking so long. A few students spent a great deal of time learning and producing digital video. Students generally had more time to pursue these activities than their professors. For instance one students explained, "I want to go to film school and I am editing a few short movies using Premiere to send in as part of my portfolio."

He had created a three-dimensional animation that ran for several minutes. The time spent in this effort easily exceeded two hundred hours. To his credit, the final product was professional quality.

> Another student was using digital video to promote a conference, he states, We'll be using Adobe Premier to make a 10 minute video for a conference proposal. We will basically be showcasing some of our campus' resources in hopes of convincing the rest of our region that this is the best place for our fall conference this year.

This project was personally important to him and he did not mind spending large amounts of time on it. Many students who engaged in this type of digital video project planned to use it as part of their portfolios in the hopes that it would help them gain employment in the future. They seemed more interested in developing their capabilities to use the tools than creating multimedia products themselves.

Digital video can be used in presentations or included as part of an interactive program. It is these interactive programs that many consider to be the real high-end

capabilities of multimedia. The administration had spent a great deal of money and effort obtaining site licenses for authoring systems so that each student and faculty member would have access to these interactive tools.

Although this capability was considered the pinnacle of how the technology at the *SUMF* could be used, it was the least used capability of the *SUMF* . Many faculty took workshops in the *SUMF* on these authoring systems and a few would come in once or twice to practice or review the tutorial they received through the workshops, but few would actually create interactive applications themselves.

Several students were sent to the *SUMF* by their professors. One student from engineering was receiving grant money to produce an application that would demonstrate the various complexities associated with particles settling in water. This project continued throughout the time of the study and would be supported in a continuing effort even after that student graduated. The product that was produced was exemplary, but couldn't have been done without a great deal of monetary support. Eventually the student's department purchased their own equipment and the student only returned for occasional advice.

Another student spent a considerable amount of time developing an interactive multimedia presentation as a treatment condition for his thesis. His research was the incentive to make the product. Several graduate students reserved the production room for several weeks straight. They were building an application on alcohol awareness that included live video footage that displayed the results of decisions that a user would make. The project was presented for the National Institute of Health in an effort to get a grant for a larger project.

Many other students used the *SUMF* to learn about multimedia. A computer science professor teaching a class on multimedia specifically sent his students to the facility to create projects for the class. Others used it independently to update their skills and gain exposure to the latest version of software and hardware. The *SUMF* provided

patrons the opportunity to "test drive" the products and decide which ones were worth purchasing. The staff was used for advice in these purchasing decisions as well.

These examples demonstrate that those who were using the *SUMF* for its high-end capabilities had distinct incentives to do so. Other students made comments such as, "I wish there were more sound equipment available but what student really has the time the get into all that during school, anyway?" and "I thought of recording my own CD, but who has time for that?" These patrons and others acknowledged that using the high-end capabilities of the *SUMF* required more than access to equipment.

The learning curve for many of the applications was often high. By and large, most of the facility's patrons who attempted more high-end activities had some degree of previous experience.

Many novices requested that classes be offered on the various applications. The *SUMF* 's directors acknowledged this need and even found volunteers to teach these classes. These classes would be open to anyone, particularly the students and members of the public who were not permitted to participate in the faculty workshops. However, these classes were never conducted. Initially, *Veblin*, one of the directors explains the initial delay,

> *Thatcher* and I have talked about it and we believe if we had started the classes three weeks ago we wouldn't have been prepared because of the technical issues of getting the machines up to speed. We'll start the classes toward the end of November and some of the more advanced ones next spring.

Although classes for the public were not conducted during the course of this study, the directors still plan to begin them on a regular basis. The reasons for the delay seem to be an issue of staff resources and a concern about the influx of patrons that might accompany such classes. Both directors continually expressed a concern of the

importance of such activities but wanted to conduct them only when they felt they had sufficient resources.

Novices experienced many difficulties in becoming acquainted with the possibilities that the *SUMF* made available. Not only were classes not offered, the staff often could not give individual attention to the patrons. Patrons made comments such as, "The selectivity of the operators of the *SUMF* seem to believe that a specific reason to use the machines is necessary. I don't know what I'd do with them if I can't find out what they can really do." and "Nice machines, nice software, if you know how to use them. It does seem to appeal to the specialist. The atmosphere doesn't seem to encourage messing around, discovery, or beginners." and "Those in the *SUMF* (staff) need to be more helpful even if you are computer illiterate." and "Possibly better, or easier to follow instructions on how to use some of the equipment. The learning curve tends to be high on its use."

How much is enough?

On occasion patrons would come in wanting to do things that the *SUMF* was not equipped to handle. For instance one student wanted to create an animation driven by complex mathematical equations. He was disappointed when we suggested that to do that he would have to invest considerable amount of time learning and programming code to do that. We suggested he use a mathematical application to create the graphics and then import them into one of our animation programs.

Patrons requested all kinds of resources including virtual reality software, a sound-proof-like recording area, a slide scanner, math co-processors, and of course the aforementioned CD-ROM burner. The directors and administration agreed with all of the request in the sense that "yes, we would like that too," but from a practical point of view they recognized that their resources were not adequate to buy every available piece of equipment.

One of the most requested items was the availability of IBM-PC compatible machines. Most of the comments reflect the reality of the university where half the colleges have made a commitment to the PC compatible platform while the university as a whole has made the decision to move to the Macintosh platform. One of the reasons the *SUMF* was built by the administration was the leverage they hoped to gain by providing another incentive to switch to the Macintosh. Patrons, particularly students from the engineering college, commonly made comments such as , "You need an IBM type workstation for working with 'Multimedia Toolbook.'" and "A DOS based machine connected to a scanner would be most helpful. It would save the need to translate from Mac to PC." to more vocal pleas including,

> I am an engineer, and being so , I followed the school's rule to purchase a PC. This being the case, I would like to see some of this equipment geared for PC users. Having some PC's in there would be nice though I can work around it. I don't however think that engineers should be made to purchase Macs instead! After using both extensively and more importantly being on the "purchaser's side" I feel that the PC is the better choice for the student

and "Engineers who have grown up using IBM's might have trouble figuring out the systems capability and how to get the most out of it." as well as, "I loathe the Macintosh personal computing equipment in general, but I find the compatibility of the graphics programs with IBM-PC compatible systems to be important."

Comments such as these reflect the frustration many people find when they have made purchases and invested time learning a particular platform only to find that there is a significant contingency on campus that is going in another direction. The administration chose the machines in the *SUMF* to have the RISC processing chip, which at the time of this writing held the promise of eliminating much of the incompatibilities associated with using multiple platforms.

Who were the Users?

When the *SUMF* opened at the beginning of the fall semester, there wasn't a rush of users. In fact there wasn't anyone using the facility at all. The only patrons who came through the door were those students who just happened to be walking through the library or those looking for the computer lab recently installed on the same floor as the *SUMF* that was to be used for general purposes such as word processing, internet access, e-mail, and curriculum specific software such as Mathematica and Purseus. Both the computing lab and the *SUMF* had Macintoshes. The proximity of these facilities caused a great deal of confusion.

The *SUMF* was dedicated to providing access to a multimedia classroom and multimedia production equipment. Although the equipment located in the *SUMF* was more than capable of being used in a general manner, the administration decided that although the *SUMF* was often under used it would be too difficult in the long run to restrict the facility to multimedia once it had been opened up for general use. As a result many patrons were referred to the other computing lab which usually had to place patrons on a waiting list.

Community.

The main reason *South U.* was chosen to be a member of the *NewMedia Center's* consortium was because of the university's alliance with the town government and a regional telecommunications company. As noted before, this alliance was formed to create an experimental "electronic village" that was intended to be a model for providing access to digital communications to all the members of the community. The "electronic village" afforded access to information locally and from around the world through the internet. It was envisioned that this effort would promote the possibility of using the network for banking, shopping, government, and educational purposes. Entrepreneurs and experimenters could test out their ideas in the community before making larger

investments elsewhere. Other communities would be able to emulate the partnership. Thus, this community technology alliance was the catalyst for *South U.*'s membership to the *NewMedia Center's* consortium.

However, once the facility was built it was apparent that providing the community access to multimedia production resources was not of the highest priority. As a result of the other demands placed on the *SUMF* the administration did not publicize the facility to the public. Nonetheless many local community members did make use of the facility.

A number of individuals from the community used the facility to produce multimedia but these individuals were few. One of the main reasons for this was the facility's hours of operation. The *SUMF* was open only during the week and did not stay open late at night. This excluded many members of the local community who worked a standard week. I assisted one local artist who was very interested in scanning in some of his sketches and photographs. He said he wanted to get into multimedia authoring as a potential source of a second income. He said he preferred to work on IBM-PC compatibles (that is what he had at home). He was one of the only community members that expressed interest in creating interactive applications. I thought he had sufficient motivation and I thought he might become a "regular," but when I told him our hours of operation his enthusiasm decreased. He commented that it would be difficult to come during those hours. I didn't see him at the *SUMF* after that.

The fact that the *SUMF* was not well publicized to the public also resulted in the low turnout of community users. When the facility opened initially opened *Veblin*, one of the *SUMF* 's directors, wanted to bring in local artists to experiment. He wanted to send our questionnaires to the teachers at the local public and private schools. He wanted to coordinate with the university information office to publicize the facility. Both directors were very enthusiastic about offering access to the public and wanted to notify town officials, the chamber of commerce as well as the local newspaper. Various kinds of

publicity were proposed including advertising, by posting an announcement, on the community access cable channel.

However, during the academic year that I observed the facility none of these efforts were pursued. The directors suggested that this was because they had decided to make sure that the *SUMF* was prepared to handle the people they were getting through word of mouth and that actively encouraging patrons would make it difficult to provide high-quality service to those with projects. They further suggested that doubling the *SUMF* hours was relatively easy and inexpensive and that once the staff had reached a certain comfort level, services could be increased.

Faculty.

Faculty members were the largest group to use the classroom, yet they were the smallest group of users on an individual basis. Faculty members continually participated in workshops because the Faculty Development Institute had made plans to provide at least a week of multimedia training for each of the approximately 1500 faculty members. Since the classroom could only handle twenty people in each class, it would take at least a year and a half to train each faculty (assuming the *SUMF* is used for that purpose each week and no other classrooms are created). As a result of this effort, faculty used the classroom more than any other group. These faculty efforts consumed most of the resources of the *SUMF* in terms of time and staff.

However the faculty rarely used the *SUMF* as a production resource. This was understandable given the constraints on their time and the institutional incentives that reward research, but gives little credence to the notion that innovative technological products that might enhance their teaching. When a faculty member did use the multimedia production resources they usually did so out of personal interest, curiosity, or misguided assumptions of the time it would take to learn and gain experience with the technology and the time to produce an application.

Students.

Students were the most prolific users of the multimedia production resources. Many students experimented with the media for personal satisfaction while many used the *SUMF* to improve projects and presentations for classes. A few students created projects to help then build a portfolio for employment. Many students who came to the facility for general computing purposes expressed frustration with what they saw as discriminatory policies. Students were not allowed to use the computers to type their term papers and were annoyed that they couldn't use the *SUMF* , especially when the facility was not being used.

ANALYSIS AND INTERPRETATION

In the previous sections I have described, with as much brevity as possible, how the *SUMF* was used by both its creators and by its patrons. I hope I have illustrated that the *SUMF* was not used in a monolithic manner. The issues that can be distilled from my descriptions are many, and I hope that the reader will explore them for their own needs. It is my assessment that the following are the subjects that are the most significant.

The *SUMF* was created through alliances that shared resources. Each of the groups that contributed to this alliance in turn contributed to the form of the *SUMF* . Each alliance member defined the facility in a slightly different way, since they each had their own agendas that they needed the address through the *SUMF* .

Such an alliance attempted to satisfy all of its members, and, in the case of the *SUMF* , that could only be done through compromise and mediation. The net result was that the form of the *SUMF* was a product of the combination of each contributor's agendas and not of any one member's plans.

As a result, the services and opportunities that the *SUMF* offered were somewhat unexpected. The synthesis of the members' agendas created a hybrid facility. This is a common result of alliances. Each member will remain a part of the alliance as long as they believe they can be satisfied by the hybrid product more than they could be by their own individual effort.

The question of how alliances between corporations and educational and governmental institutions combine and provide products and services to our society are of particular interest. This study was an examination of how one such facility was created by such a partnership and the issues that arose as a result of the agendas involved.

One of the purposes of this research was to gain an understanding of what those agendas were and compare them to our own agendas and needs. In this process I have attempted to illustrate many of the issues that may be relevant when considering the opportunities that the *SUMF* provides and what a similar facility might provide.

Institutional Innovation

When I first began thinking of the *SUMF* , I thought of it as an innovation, which makes a certain degree of sense since it was something that was new. But what type of innovation was it? Through this study it became clear that it was a not a technological innovation but an organizational one. It acted as a conduit for other innovations. It was a change agent that promoted the adoption of other innovations.

The way the *SUMF* was used by its creators helps us define what kind of change agent it was and the innovations it was promoting. Examining the way the patrons used the facility indicated issues that may need to be addressed when attempting to maximize resources. This study did not explicitly address how successful the *SUMF* was at diffusing these innovations, there was not enough time to do that but it should provide the reader with an understanding of how this particular organizational innovation was and can be used.

Users

Faculty, students, community.

If the faculty rewards system (based upon my perceptions of observed faculty) remains the same, faculty may never become producers of their own multimedia applications. There may be pressure on them to use software that has been produced by others in somewhat the same way as textbooks are used today. The challenge then becomes one of preparing the faculty to integrate these systems into their classes.

South U. administration's effort to provide the faculty with opportunities to produce multimedia may have the net effect of encouraging faculty to demand, or at least accept, products built by professional developers. Faculty members may realize that there can be a great benefit from using these resources, yet they may also come to the conclusion that producing multimedia can be a time consuming process, both from a learning and a producing standpoint.

Creating multimedia applications is a time consuming process. The faculty perception is that the rewards system does not recognize achievements in this area. This situation is not lost on major publishing houses and software companies. As multimedia technology becomes more dispersed throughout our society and through higher education in particular, they are more likely to invest in producing high-quality, multimedia, classroom aids, tutorials, simulations. If they can offer their products at reasonable rates they may be successful.

Through out this study, the faculty have demonstrated little interest in spending their time developing applications at the *SUMF* . There are simply not appropriate incentives for them to do this. While the *SUMF* is an important first step, it is not enough. Not only does creating multimedia take a great deal of time there is also a high learning curve as well. Significant amounts of time need to be dedicated to the process. The faculty rewards system does not acknowledge this type of effort and thus faculty have little incentive to engage in the process.

The *South U.* administration recognized that the rewards system could be a problem. That debate rages on without any indication that changes of that type will come about. Instead of hoping for this type of change they wanted to apply pressure on the faculty from a number of additional directions. One of these directions was the students themselves.

Many students, on their own initiative, created projects using the *SUMF* 's resources to demonstrate to themselves, as well as potential employers, that they could use multimedia to communicate effectively, in the belief that that type of skill will be expected. Many faculty have also come to believe that the ability to create multimedia will be of assistance for their students. Some faculty, who are not willing to spend their own time on such efforts, have begun to harness the energy and enthusiasm of their students by making assignments that students may chose to create with multimedia. I believe it is these faculty who will be most effective at integrating multimedia into their curriculum and thus, there is an incentive for faculty to make these types of assignments.

When the *South U.* administration first considered combining their need for a training facility and a production facility they were aware of the rewards system and were particularly interested in providing students access. If they did so, they could leverage the students for organizational change.

The growth of use of the *SUMF* has been steady, but it has the potential to increase exponentially. If just a few of the faculty make assignments to their students to create multimedia then the resources could be in high demand, especially as classes are increasingly scheduled. If that were the case, then the administration would be wise to expand the facility. With the minimum resources initially allocated having acted as a catalyst for change, they would be well on their way to achieving organizational change.

Classroom

The classroom has been widely scheduled and these classes limit when the facility can be used for production purposes. At the time of this writing the *SUMF* was only open fifty-five hours a week. With a small additional expense those hours could be doubled. And even though many patrons have found scheduling difficult, there are still plenty of times when the *SUMF* is empty or only serving one or two patrons.

The Faculty Development Workshops have been limited because of faculty schedules. However, the *SUMF* has been scheduled every day, all day, over the summer for faculty training. This event should change usage patterns considerably. While the data collected for this study ended at the conclusion of the second semester of operation, I can only predict, based on my observations, that these classes will make it more difficult to maintain the facility's production opportunities.

FDI Will Increasingly Use the SUMF

The *SUMF* 's main purpose is to support the FDI. As that initiative moves along it will consume more and more resources. Faculty will have to be trained and retrained. As more faculty become familiar with multimedia, many will want to begin producing projects that require high-end resources as well as advice and expertise. Clever instructors will assign their students the task of creating projects as part of their classes to build a catalog of multimedia instructional applications.

Regardless of whether faculty use the facility or send students as proxies, I expect that usage of the *SUMF* will increase. The *SUMF* directors have a number of inexpensive options to handle additional patrons including expanding the hours of operation and increasing the size of the staff. Unfortunately the size of the facility cannot be increased to hold more computers without a substantial investment in remodeling the library.

Multimedia

The *SUMF* was created to provide digital resources to whoever wanted to use them. However, it is clear from my lengthy observations that we are far from a paperless society. Most of the projects created in the *SUMF* were to be printed out in some form or another. Many people believe that the definition of multimedia must include some type of computer-mediated interaction. The directors tried to encourage patrons to focus on digital products, but it was clear that most patrons viewed the *SUMF* 's equipment as a

method for improving their paper based projects, not as an opportunity to embrace purely digital media.

For decades, pundits have declared that we are entering a paperless society. Year after year the opposite has been true. We are more dependent upon paper now than ever. Perhaps we are finally entering an era where the possibilities of digital media can more fully exploited. My observations of the *SUMF* tell me that we are not at that time yet.

The *SUMF* was set up to cater to high-end multimedia needs, yet the vast majority of patrons wanted to use the more low-end equipment. The technology may offer many possibilities but the people have to find reasons and incentives to explore the those possibilities. Throughout the study, I observed patrons focus on the *SUMF*'s low-end equipment. I suspect this was because they had more familiarity with potential products using these tools. People may have to go through a stage, gaining experience with more basic technology, before they are prepared to move to more advanced technology.

The introduction of the World Wide Web may be a significant step in promoting digital mediums. The enthusiasm for creating "web pages" was strong. Wanting to communicate through the web was a spark that generated interest in multimedia. People have never had a way to distribute digital media inexpensively. Now, armed with a server and a connection to the internet, communicating through this method is easy and inexpensive.

I predict that the demand for multimedia production tools will grow as the WWW grows to handle the resulting products. The two have developed hand in hand over the time of this study and will continue to do so.

I believe that the popularization of the WWW has changed the way people communicate, but to take advantage of this medium people are going to have to have the tools and skills necessary to make multimedia. The *SUMF* was an experiment in

providing those tools. Can the *SUMF* be a model to be replicated for providing those tools on a mass scale?

Access to multimedia requires much more than the opportunity to use a particular piece of software or hardware; although that is certainly a requisite. I have identified a few other requisites for access including, access to networks and access to expertise.

Without a network connection, individuals are limited in their choices in how to distribute any multimedia products that they might produce. They also must have access to a server with sufficient storage space to hold their creations. Just about everyone associated with *South U.* had such access. Many members of the community also had access provided by the "electronic village" partnership.

Many in the community, without storage space on a server, who desired a home page on the WWW rented space from a vendor. Providing storage space has become a haven for entrepreneurs. Unfortunately access is relegated to those that can afford it; either through association or through their own funds. Those who cannot afford it are left out.

Storage was not just an issue when distributing data. Producing multimedia often required an enormous amount of storage space well beyond what could be contained an individual's 3.5 inch disk. Maintaining the integrity of a patron's file on a public hard disk was full of problems. The file could be locked but that required staff resources. The *SUMF* couldn't take responsibility for the safe keeping of the data. The *SUMF* also had limited storage space available. A number of users with large projects could easily overwhelm the available resources.

People also need expertise to be able to use multimedia production hardware and software efficiently and effectively. The *SUMF* staff's primary job was to assist patrons. Unfortunately, due to the staff's limited size and the many demands placed on the facility,

most of the staff's time was spent performing administrative duties, such as loading and unloading software and maintaining a uniform setup on all the machines.

The *SUMF* was unable to offer classes for members of the public, which may prove to be crucial to expanding access to these types of technologies.

What Was Demanded?

Many of my observations indicated to me that, although many types of high-end or advanced multimedia opportunities had a high learning curve and required a great deal of time to create, other low-end uses could be learned in a few minutes and projects could be completed in relatively short periods of time. Before the *SUMF* was created, many people, from the university and from the community, didn't have access to either low-end or high-end multimedia. I found that though many were curious and excited by the opportunity to use the high-end resources, most only used the low-end resources.

These low-end resources included, exploring the internet and scanning pictures. Far and away, these were the most widely used resources the facility offered. One of the most important access issues was providing access to a computer that had a large hard-drive, a quick processor, access to the computers operating system. The university had a few other computer labs that were open to the students and others, however, many of these did not allow access to the computers operating system which made it impossible to create documents that were larger than a single disk.

DISCUSSION

Alliances Were Created to Leverage Change

Creating the *SUMF* required the resources of business along with several campus entities. Not only could these sources provide physical resources, they also provided a number of intangible resources such as prestige, name recognition, and expertise. These resources could be harnessed to create legitimacy and to influence the decisions of state officials.

The physical resources that the *SUMF* provided offered many individuals and groups opportunities and access that was previously not available. The alliances that were developed to gather these resources encouraged patrons to explore and adopt this resource. The alliance itself was the most valuable commodity. All of the creators entered the relationship with only small amounts of physical resources and yet were able to use the leverage the gained from the alliance.

What Type of Access Is Needed

Providing access to technology is a value-laden process. There are infinite choices and options available for implementation. Whoever attempts to provide access to these tools must decide which tools are to be provided and why. In the case of the *SUMF* it was decided to provide high-end tools. However, in practice the demand for these tools was limited. Most patrons, regardless of their affiliation, were more interested using low-end tools.

Demand for tools depends on the forums that are available to use them in. During this study it is clear that an sufficient infrastructure was not in place to encourage the use of high-end multimedia tools to any significant degree. Resources could have been more efficiently allocated by focusing on low-end tools.

However, fulfilling needs was not the primary reason for creating this facility. The more important point of the facility was to create a demand for high-end tools. The *SUMF* was part of an effort to create the necessary infrastructure for future needs while at the same time guide what those future needs should be.

What Type of Access Does the SUMF Provide

The *SUMF* provided more access to multimedia production tools than had ever been provided before at *South U.*. However, access was not unconditional. As with any public facility access is mediated by the constraints that the facility operates under. Because of the diverse interest of the creators, the *SUMF* was under pressure to meet primary needs, particularly the Faculty Development Initiative.

These constraints restricted when and how the facility could be used. It is unlikely that any type of public facility will be able to provide unconditional access. The challenge is to provide sufficient resources to those who cannot afford to purchase such tools. Defining what technology is sufficient is constantly changing and shifting depending upon what is available at a particular price.

It is also clear from this study that access to multimedia production technology is much more involved than merely providing tools. Patrons need to have access to knowledge, expertise and instruction if they are going to be able to maximize a particular tool. Experts and support materials must be made available. The *SUMF* always had experienced staff available, however, the time that they could allocate to patrons was often limited because of administrative duties. Classes for the public were never scheduled because of a concern of stretching staff resources too thin. More patrons using the *SUMF* will require more staff to assist patrons as well as maintain the machines.

Because there were limited staff resources, many novices may have been reluctant to begin exploring the medium. Most users, particularly those who used the high-end

tools, had previous experience and didn't require large amounts of the staff's time. The diffusion of innovation literature characterizes early adopters as innovators and they often adopt an innovation because they have a degree of homophily with others promoting or adopting an innovation. Because the staff was experienced with the technology it is likely that they attracted patrons who were also familiar with the technology. Many patrons came to the *SUMF* not only to use and explore the tools, but to discuss computing technology in general with those who had an interest in those topics.

Access Was a By-product Not the Focus

So, it would appear that the *SUMF* that promoted itself as providing access to these high-end multimedia tools falls short. But when examined closely, the facility had different goals and missions other than those stated and it is meeting those and fulfilling those needs most effectively. It is not that access is unimportant, it was certainly valued. It is perhaps an important first step.

In this case, access was a by-product of the agendas that created the facility. This by-product provided an opportunity that wasn't previously available. The existence of this facility may certainly spark demand and interest from its consumers to use their resources, (political, social, and economic) to provide further access. Which may very well be in the interest of the various creators because it was them who created the initial environment of exposure.

Access to Classroom Is Demanded Now

The *SUMF* had to balance the demand for its classroom and the demand for the multimedia production tools. Often the multimedia production portion of the facility was sacrificed for the classroom activities. This classroom however did provide many faculty, students and community members with a resource that was previously not available.

When considering what type of access is to be provided a multimedia laden classroom is an option that there clearly is a demand for from diverse groups.

Future Challenges of the SUMF and Technology Access in General

Continued Funding

This study examined the introductory period of the *SUMF* . The facility will change as technology changes and as more technology infrastructure is implemented on campus and within the community. How driving technologies such as the World Wide Web evolve may determine the *SUMF* 's role in the future.

A primary determiner of how the facility will evolve is funding. *South U.* has made a large financial commitment to continually training and upgrading the campus faculty in multimedia technology. That effort was the primary reason why resources were allocated to the *SUMF* . Obviously, if money allocated for that purpose is eliminated then the *SUMF* will no longer exist.

If money for this effort does continue, the facility will likely face more demands for its usage, particularly for the classroom. Faculty may demand that classes are offered for more advanced applications in addition to the initial training. If this is so then the capability for the *SUMF* to continue its dual roles as a classroom and a production facility will be degraded. New sources of funding will have to found if the production facility will be able to continue. Further, the alliance itself is dependent on all of the creating parties continually benefiting from the relationship. One year is too short of a time period to determine whether this relationship meets its constituents needs.

Usage Patterns

Future implications: at the beginning of this facility there were no other facilities on campus or in the community that could function as a classroom that permitted each student to have their own computer. Other labs have since been built that offer this

opportunity. The local schools are getting their own high-tech classrooms as well. The demand for a multipurpose classroom (not dedicated to curriculum classes will diminish as other classrooms are made available. As long as the production resources are kept high-end; and high-end will always be in a constant state of change. Then the production resources will be consumed by more people as the demand for multimedia grows.

The demand for a facility that offers access to these production resources depends on the shape that technology takes. Can people have access to these types of resources through networks? Will the expense come down? Will software be available affordably on an individuals home machine? Could software be rented to users to learn and experiment with before a purchase decision is made? Can expertise be made available through networks? How does each of these scenarios impact the existence of the larger consortium? At what point does this facility become irrelevant? Is this type of access necessary to move to a point where access is more available? How may this facility change as those players who created in encounter new challenges and experiences?

Redefining the Library

The *South U.* library used the *SUMF* to explore the possibility of providing a new type of service. This was intended to find a new role for the library as a response to changing technology. Library officials felt that their traditional function, that of supplying access to information resources, could be handled to a large degree through computerized networks. Traditional paper books would probably still have a critical role, however, their access could be mediated through computers and those resources could be placed an on call basis.

The tools available in the *SUMF* are not available through such networks and might provide a reasonable direction for institutions to examine to maintain relevancy. However, multimedia technology will continue to evolve and the tools that today are too

expensive or otherwise impractical may become commonly available. If libraries attempt to provide access to these tools they must always provide tools that are not otherwise available both in the realm of hardware and software. If information and the tools needed to manipulate that information become widely available without regard to physical space, then a facility such as the *SUMF* will become obsolete at least as far as its physical manifestation.

Corporations Solidifying Position in Higher Education

The alliance that was needed to create the *SUMF* represents an important change in the relationship between higher education and corporations. The microcomputer revolution has created a synthesis between the two communities. Many schools promote the use of these tools in all areas of curriculum. Not only do students need to have computers to do word processing, they must also have access to information networks as a resource for learning and research.

These tools may very well provide students with opportunities that never existed before. However, there is a cost. Computers cost several thousands of dollars. By the time a student is outfitted with the necessary peripheral devices and software they may have spent the equivalent of a year's tuition at a public university. Some universities not only suggest that their students make these purchases but they require it.

Never before has there been such a strong financial link between higher education and corporations. It seems that higher education can no longer exist without relationships with the corporations that make these tools. The influence that corporations now have within higher education is considerable. One of the primary benefits of creating the *SUMF* was that it developed a relationship with these corporations and that relationship could be used as leverage with state officials. These corporation now bring legitimize efforts in higher education to a degree that they never have before.

As higher education becomes more equipment oriented, it is going to have to increasingly rely on the corporations to provide them with tools; both hardware and software. *South U.* was building an infrastructure that would allow the faculty to create their own multimedia instructional applications. From studying the *SUMF* it is apparent that faculty have little time nor incentive to create such materials.

> It is likely that to maximize the technology infrastructure faculty at *South U.* may have to look for instructional materials created by independent vendors instead of creating them themselves. Under these circumstances it is possible that faculty will be forced to sacrifice a degree of autonomy over the instructional content of their classrooms. This does not have to happen and the individual instructor will have to determine how to maximize their time and effort. What is clear is that if faculty do not have the time to create their own materials they will have to be vigilant in selecting the appropriate ones and carefully integrate them into the curriculum. A facility such as the *SUMF* may have to change to create an environment were these materials are available to be examined as well as being produced.

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APPENDIX A: GLOSSARY

Apple Power Macintosh® The Power Macintosh is a computer designed around RISC computer chip technology. It has the advantage of being able to read many file types including the IBM-PC compatible formats. The RISC computer chip is considered by many to be the chip architecture of the future.

Authorware: Authorware is an authoring language produced by Macromedia® that allows a user to create interactive multimedia applications without any specific knowledge of a programming language.

CD-ROM Burner: A CD-ROM burner allows the user to imprint a CD-ROM with their own information providing a massive amount of storage which is often essential for high-end multimedia.

C++: This is a high level computing language that most commercial programs were created under.

Daedalus: This program allows students to communicate in real time through the computer. Students type on the keyboard and their responses are sent everyone else who is networked to that system.

Digital camera: This device is similar to a traditional camera except that it records images digitally instead of chemically.

Distributed desktop technology: This technology allows a number of networked computers to interact and communicate to maximize the resources of each computer connected.

DOOM: This is a commercial action game that can be customized by its players

Educational Technologies: This is an administrative branch of South U. that is responsible for integrating instructional technology into the campus structure. It is staffed with instructors, technicians, and technology experts.

E-mail: Electronic mail is based on the metaphor of traditional mail. Users can send messages and digital files to one another almost instantaneously.

Ethernet: A type of network system that is usually confined to a single organization, in this case the South U. campus. It provides the infrastructure for distributed desktop technology.

Faculty Development Initiative: A South U. initiative that attempts to provide each faculty member with the hardware, software, training, and support to integrate multimedia into the curriculum.

Fusion Recorder®: This is a program that allows clips of video to be captured and digitized for use through a computer.

Gopher: Gopher is essentially a menu-driven database providing information of interest to users primarily in text form.

High-8 video camera: An analog video camera that has better quality than a VHS system that is more common in homes.

High-end Multimedia: "Programs at this level usually contain a high degree of full-motion video, animation, graphics, text, and audio, in addition to intracately designed instructional software. Following are some of the technologies involved; computer with keyboard, color monitor, authoring software, overlay card, video digitizer, frame grabber, audio card, CD-ROM, video input source, scanner, audio speakers" (Galbreath, 1994, p.18).

Homepage: A location on the World Wide Web that holds information presented by a user on a server connected to the internet.

HyperText Markup Language: This is a simple programming language that allows a user to create documents for the World Wide Web.

IBM-PC compatible platform: This type of computer is the most common today. It is based on IBM's design and usually runs DOS and Windows®. Many different companies make this type of platform.

Indexed for credit class: A traditional college class. Students are required to pay tuition to participate and receive credit towards graduation for successful completion.

Information Systems: South U.'s administrative branch whose focus is on information technology. It has sub branches consisting of Educational Technologies, Media Services, and University Libraries.

Internet: "The network of networks. a connection to the Internet offers electronic access to many forms of information, including document (text and graphical) browsers, general communication systems, electronic mail, news groups, and HyperText retrieval systems" (Pool, Blanchard, & Hale, 1995, p.24).

LCD Panel: The Liquid Crystal Display panel allows the screen of a computer to be displayed much like a slide presentation. It allows a class to observe an instructor manipulating a computer for demonstration.

Low-end multimedia: Multimedia applications that require little or no interaction, motion, and computing power.

Mainframe: A type of powerful computer that can handle multiple users interfacing with it at any one time. Has the disadvantage of requiring users to be connected through a network for all uses as well as being expensive compared to alternatives.

Mathematica®: This is an application that can perform complicated mathematical computations including integral calculus. Results can be viewed graphically. It is commonly used as a teaching platform for advanced mathematics.

Media Center: South U. facility located on the same floor as the SUMF. Holds computer lab for general use such as word processing, internet access, spreadsheets.

MIDI: A digital sound manipulation protocol. Especially used for music.

OCR: Optical Character Recognition is a type of software that can examine text visually and convert an image of text into a computer readable text file.

Powerpoint®: A program for creating computer mediated presentations and traditional slide presentations.

Photoshop®: A program for capturing and manipulating photographic images.

Premier®: A program for editing video digitally.

Scanner: A device that allows a user to digitally capture any flat image.

Script-X®: A high-level computer language designed especially for multimedia.

World Wide Web: A popular system for navigating the internet. Allows information to be presented through text, video, audio, and graphically with relative ease.

Model 6100: Apple Power Macintosh® audio/visual ready computer with midrange performance.

Model 8100: Apple Power Macintosh® audio/visual ready computer with high range performance.

APPENDIX B: DATA COLLECTED

Interviews

Formal

South U. Administration

Veblin

Thatcher

Abel

Muchninsky

Briggs

Laird

Patrons

Informal

Participant Observations

Average 25 hours/week over academic year

Patron Questionnaire

all patrons

Electronic Survey

107 responses

Documents

on-line documents

NewMedia Center documents

APPENDIX C: CONSENT FORM

Consent Form

Title of Project: Constructing meaning from access to multimedia technology

Principle Investigator: David Richard Moore

I. The Purpose of this research

You are invited to participate in a study that is intended to discover how people view and construct meaning of a facility that provides access to multimedia technology.

II. Procedures

The procedures to be used in this research are primarily interviews. I would like to interview you, on tape, at a time convenient to your schedule with the possibility of clarifying your responses at a latter date. You will receive a copy of a transcript of the interview soon after to insure accuracy.

III. Benefits of this research

I believe that you may hold an interesting perspective on the subject of this research. Your contribution may be important in developing an understanding of the social impacts of multimedia technology.

IV. Extent of Anonymity and Confidentiality

The results of this study will be kept strictly confidential. At no time will the researcher release the results of the interview to anyone other than individuals working

on the project with out your written consent. The information you provide will have your name removed and only a pseudonym will identify you during analyses and any written reports of the research.

The researcher will do his best to insure that your comments remain anonymous. However, it may be necessary for the researcher to provide context to the comments.

If taping occurs: These tapes will only be reviewed by the researcher and will be erased when the study is completed. Transcripts of the tapes will be created using pseudonyms and will be provided to the interviewee to correct any misunderstandings.

V. Approval of Research

This research project has been approved, as required, by the Institutional review Board for projects involving human subjects at Virginia Polytechnic Institute and State University. As well as the department of Curriculum and Instruction in the College of Education.

VI. Subjects Permission

If you have questions regarding any aspect of this study or if you wish to withdraw after signing the form contact any one of the following.

David Moore (703) 951-0345 Researcher

Dr. John Burton (703) 231-9694 Curriculum and Instruction, Virginia Tech

Dr. Jan Nespor (703) 231-5598 Curriculum and Instruction, Virginia Tech

Ernest Stout (703) 231-9359 Chair, IRB Research Division

Your signature below indicates that you have read the information above and have decided to participate. You will be provided a copy of this form to keep.

_____ _____

Your Signature Date

David Moore

_____

Researchers signature

APPENDIX D: HYPERCARD APPLICATION

SUMF Patron Survey

Name:

Home Address:

Town:

State:

Zip:

Employer:

Work Address:

Town:

State:

Zip:

E-Mail:

Affiliation:

Purpose:

Activities:

Occupation:

Age:

Gender:

Mail List:

Referral:

APPENDIX E: SAMPLE OF FIELDNOTES

October 18, 1994

It's totally dead tonight. No one is developing anything. We have had a few people looking around and investigating, pagemaker, photoshop, a few have found OW and have played with it. I expressed my concern to *Smith* about the *SUMF* being taken over and being used as a general lab like the one in the MC (at least the classroom portion.) *Smith* said, "I think *Muchinsky* and *Abel* are pretty committed to this place."

Smith wouldn't let someone use the lab since they brought their own software. *Smith* got a prank call, someone claiming that, "I burnt my finger when I reached around your computers....." *Smith* said he thinks he knows who it was and called him a nut case.

October 25, 1994

Advanced authorware class is getting out as I came in..

Stacey works for Bell Atlantic and is an artist. He brought in some of his work, photographs of his paintings and wanted to scan them. The pictures were of outdoor gear, wolves, etc. They were quite good. He had never used the scanner before and after working with him for an hour or so it was apparent that he wasn't experienced with the mac platform. Stacey said that he had a pc at home. He asked about the price of authorware. Apparently he was using it at home and said that he really had a knack for it. I got the impression his copy wasn't a registered one. He asked about other authoring systems especially toolbook. He offered that he was interested in pursuing some type of authoring part time. I suggested he make a few applications and post them on the local internet and see if anyone was interested in contracting with him. I mentioned that authorware demanded some royalties for any commercial product created. This seemed to surprise him. He asked if any other software the *SUMF* had required royalties and I told him I didn't think so. Stacey asked if we had any cd-rom with royalty free clip art. I said yes and suggested that he might want to look on the internet using Mosaic. He said he hadn't thought of that before, sounding interested. Stacey inquired about other community members (artist) coming in. I told him that we had almost no community members except for some public school teachers using the classroom. I told him that in the next year or two I suspected that authorware's price would come down but in the mean time I could always use the *SUMF* . He said that is what he would have to do. I get the impression he would rather work at home.

The quiet guy was in again working on animation stuff. He was colorizing a picture he had scanned in.

APPENDIX F: SOFTWARE AND HARDWARE CONFIGURATION

Classroom Computer Configuration

PowerMacintosh 6100/60AV
16 Megabytes of RAM
Internal SCSI 250 Megabyte hard drive
Internal SCSI CD-ROM drive
3.5" internal high-density floppy drive
Asant_ Ethernet transceiver
16" Apple monitor
Apple Extended Keyboard II
System 7.1.2
Built-in video capture and display
Microphone and built-in speaker
Stereo headset

Instructor Computer Configuration

PowerMacintosh 6100/60AV
24 Megabytes of RAM
Internal SCSI 250 Megabyte hard drive
Internal SCSI CD-ROM drive
External 2.8 Gigabyte hard drive
3.5" internal high-density floppy drive
Asant_ Ethernet transceiver
14" Apple monitor
Apple Extended Keyboard II
System 7.1.2
Built-in video capture and display
Microphone and built-in speaker
AppleDesign Powered Speakers
NView color LCD display panel
Stereo headset

Major *SUMF* Applications

Acrobat Distiller 2.0
Acrobat Exchange 2.0
Adobe Illustrator 5.5
Adobe Photoshop 3.0.1
Adobe Premiere 4.0
Authorware 2.2.2
Director 4.0.3
HyperCard 2.1
Macromodel 1.5.2*
PageMaker 5.0/PowerMac
Persuasion

PowerPoint 4.0

Video Capture Computer Configuration

PowerMacintosh 8100/80AV
32 Megabytes of RAM
Internal SCSI 500 Megabyte hard drive
Internal SCSI CD-ROM drive
3.5" internal high-density floppy drive
Asant_ Ethernet transceiver
16" Apple monitor
Apple Extended Keyboard II
System 7.1.2
Built-in video capture and display
Microphone and built-in speaker
Stereo headset
Sony S-VHS Hi-Fi VCR
Sony Hi8 Camcorder

Graphics/Desktop Publishing Configuration

PowerMacintosh 8100/80AV
24 Megabytes of RAM
Internal SCSI 500 Megabyte hard drive
External SCSI 2.8 Gigabyte hard drive
Internal FWB Jackhammer accelerator card
Internal SCSI CD-ROM drive
Apple Color One scanner
3.5" internal high-density floppy drive
Asant_ Ethernet transceiver
16" Apple monitor
Apple Extended Keyboard II
System 7.1.2
Built-in video capture and display
Microphone and built-in speaker
Stereo headset

3-D and Animation Configuration

PowerMacintosh 8100/80AV
24 Megabytes of RAM
Internal SCSI 500 Megabyte hard drive
External SCSI 2.8 Gigabyte hard drive
Internal FWB Jackhammer accelerator card
Internal SCSI CD-ROM drive
3.5" internal high-density floppy drive
Asant_ Ethernet transceiver
16" Apple monitor
Apple Extended Keyboard II
System 7.1.2
Built-in video capture and display

Microphone and built-in speaker
Stereo headset

Audio Capture Configuration

PowerMacintosh 7100/66AV
24 Megabytes of RAM
Internal SCSI 500 Megabyte hard drive
External SCSI 2.8 Gigabyte hard drive
Internal hard disk accelerator card
Internal SCSI CD-ROM drive
3.5" internal high-density floppy drive
Asant_ Ethernet transceiver
16" Apple monitor
Apple Extended Keyboard II
System 7.1.2
Built-in video capture and display
Microphone and built-in speaker
Stereo headset

Major *SUMF* Applications

Acrobat Distiller 2.0
Acrobat Exchange 2.0
Adobe Illustrator 5.5
Adobe Photoshop 3.0.1
Adobe Premiere 4.0
Authorware 2.2.2
Director 4.0.3
Fractal Design Painter*
HyperCard 2.2*
Macromodel 1.5.2
PageMaker 5.0/PowerMac
Persuasion
PowerPoint 4.0
Ray Dream Designer*
Freehand*

Utility Applications

BinHex 5.0
BBEdit Lite 3.0
GIFConverter 2.3.7
JPEGView 3.3
Giffer 1.1.2
Movie Player
SoundMachine 2.1
Stuffit Expander 3.5.2
RTFtoHTML 2.7.5
Transparency 1.0
Sparkle 2.2.3

Fusion Recorder 1.0.2

Network Applications

BLUE SKIES v1.1 PowerMac
Mosaic 2.00a17
TurboGopher 1.08b4
Netscape 1.0N

CURRICULUM VITA

David Richard Moore

Education:

Doctor of Philosophy
Virginia Polytechnic Institute and State University (Virginia Tech)
Instructional Technology

Master of Arts, 1993
Virginia Polytechnic Institute and State University
Major: Training and Development

Bachelor of Science, 1991
Virginia Polytechnic Institute and State University
Major: Agricultural Economics

Professional Experience:

Graduate Assistant: Fall, 1994- Spring, 1995
New Media Center ®
Instructor and Design Consultant
Virginia Tech
-Innovative facility providing access to multimedia production equipment to faculty, students, and the local community

Faculty Development Institute Instructor: Summer, 1994
Multimedia and Software Instruction
Learning Resources Center, Virginia Tech
-Authorware, Photoshop, Premier, WWW, etc.

Graduate Assistant: Spring, 1994
Macintosh Lab Instructor, Media Center
Learning Resources Center, Virginia Tech

Graduate Assistant: Fall 1992 - Fall, 1993
Reference Specialist
Newman Library, Reference Dept., Virginia Tech
- assisted library patrons use information databases

Hypercard Programmer: Summer, 1993
Newman Library, Virginia Tech
-Developed Hypercard application to assist library patrons in finding reference materials

Computer Assisted Instruction Program Leader: May, 1993
Naval Education and Training Command, Pensacola, FL.
-Developed computer-based instruction materials
-Evaluated organization training system

Training and Development Intern: Spring, 1993
Center for Training and Development, New River Community College
-Developed and implemented training unit on TQM

Graduate Teaching Assistant: Fall Semester, 1991
Agricultural Economics Dept., Virginia Tech
- Assisted in teaching Principles of Economics, Rural and Regional Development, Wordperfect and Supercalc

Research Intern: May-August, 1991
Agricultural Economics Dept., Virginia Tech
-Researched effects of trade liberalization on domestic agriculture production

Petty Officer: 1988-current
United States Naval Reserve
-Augmented Fast Frigate; U.S.S. Donald B. Beary
-Augmented Amphibious Construction Battalion; ACB-2
-Training officer for U.S. Naval and Marine Corp Reserve Center, Roanoke, VA.

Awards:

Virginia State Instructional Fee Scholarship: 1993-1994
Virginia Tech

Naval Meritorious Service Medal: May, 1992
United States Naval Reserve

National Defense Medal: May, 1992
United States Naval Reserve

Sailor of the Quarter: Spring, 1990
U.S. Naval and Marine Corp. Reserve Center, Roanoke, VA

Joseph W. Gregg Award (Outstanding Recruit): Summer, 1988
U.S. Naval Recruit Training Command, Great Lakes, IL.

Presentations and Publications:

Moore, D.R., (1995, April). Introduction to the World Wide Web. Invited presentation for Virginia Cooperative Extension, Blacksburg, VA.

Moore, D.R., (1995, March). The New Media Center: Comparing and Contrasting Perspectives of a Institutional Innovation. Paper presented at the annual meeting of the Eastern EducationalResearch Association, Hilton Head, SC.

Moore, D.R., (1994, February). Beyond instruction: Interactive technology's role in training transfer. Paper presented at the annualmeeting of the Eastern Educational Research Association, Sarasota, FL.

Moore, D.R., (Spring 1993). Will Total Quality Management Fail. Communique', Center for Training and Development, New River Community College

Moore, D.R. (1987). Alone. Gaelic (Radford University), Fall.12-13.