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FACTORS AFFECTING THE IMPLEMENTATION OF NEW EDUCATIONAL TECHNOLOGY IN HIGHER EDUCATION

by

Denis Darel Roark

A Dissertation Submitted to the Faculty of the CENTER FOR THE STUDY OF HIGHER EDUCATION In Partial Fulfillment of the Requirements For the Degree of DOCTOR OF EDUCATION In the Graduate College THE UNIVERSITY OF ARIZONA

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As members of the Final Examination Committee, we certify that we have read the dissertation prepared by Denis D. Roark entitled Factors Affecting the Implementation of New Educational Technology in Higher Education and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Education.

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copy of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

Dissertation Director

Date
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>viii</td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>4</td>
</tr>
<tr>
<td>Background</td>
<td>7</td>
</tr>
<tr>
<td>Research Questions</td>
<td>11</td>
</tr>
<tr>
<td>Conceptual Framework</td>
<td>16</td>
</tr>
<tr>
<td>Definitions</td>
<td>11</td>
</tr>
<tr>
<td>2. A REVIEW OF THE LITERATURE</td>
<td>19</td>
</tr>
<tr>
<td>Complex Organization Framework</td>
<td>20</td>
</tr>
<tr>
<td>Diffusion Framework</td>
<td>28</td>
</tr>
<tr>
<td>Planned Change Framework</td>
<td>32</td>
</tr>
<tr>
<td>Conflict Framework</td>
<td>40</td>
</tr>
<tr>
<td>Factors Associated With Implementation</td>
<td>43</td>
</tr>
<tr>
<td>Obstacles to Implementation</td>
<td>51</td>
</tr>
<tr>
<td>Summary</td>
<td>54</td>
</tr>
<tr>
<td>3. METHODOLOGY</td>
<td>57</td>
</tr>
<tr>
<td>Case Study Research</td>
<td>57</td>
</tr>
<tr>
<td>Procedure</td>
<td>64</td>
</tr>
<tr>
<td>Establishing Boundaries</td>
<td>64</td>
</tr>
<tr>
<td>Sample Selection</td>
<td>66</td>
</tr>
<tr>
<td>Data Collection and Analysis</td>
<td>78</td>
</tr>
<tr>
<td>4. FINDINGS</td>
<td>85</td>
</tr>
<tr>
<td>Implementation of a Microcomputer System at Vernon Regional Junior College</td>
<td>86</td>
</tr>
<tr>
<td>Overview</td>
<td>86</td>
</tr>
<tr>
<td>Definitions</td>
<td>88</td>
</tr>
<tr>
<td>Outdated Technology</td>
<td>88</td>
</tr>
<tr>
<td>Advocates of Improved Computer Technology</td>
<td>91</td>
</tr>
<tr>
<td>The Converging of Forces</td>
<td>99</td>
</tr>
<tr>
<td>Problems Associated With Implementation</td>
<td>101</td>
</tr>
<tr>
<td>The Study Committee</td>
<td>103</td>
</tr>
<tr>
<td>Final Approval</td>
<td>107</td>
</tr>
<tr>
<td>Consideration of Factors at Vernon Regional Junior College</td>
<td>110</td>
</tr>
</tbody>
</table>

vi
TABLE OF CONTENTS - Continued

Page

External Factors ........................................... 110
Internal Factors .......................................... 112
Change Agent ............................................. 115

Implementation of Word Processing Curriculum and
Technology at Dona Ana Branch Community College .... 117
Overview .................................................... 117
Early Development ......................................... 120
The Coordinator as an Advocate for Change ............... 121
Program Approval .......................................... 125
The First Word Processors .................................. 128
Development of a Word Processing Center .................. 130

Consideration of Factors at Dona Ana Branch Community
College ....................................................... 139
External Factors .......................................... 139
Internal Factors .......................................... 142
Change Agent ............................................. 145

Implementation of Instructional Television at New Mexico
Junior College ............................................... 147
Instructional Television ..................................... 147
Overview .................................................... 148
Philosophical Environment Conducive for Innovation .... 149
The PBS Initiative .......................................... 151
Problems Associated With Implementation ................. 155
Contributing Factors to Successful Implementation .... 158
Resistance to Innovation ................................... 164
Decision-Making Process ................................... 166

Consideration of Factors at New Mexico Junior College .... 169
External Factors .......................................... 170
Internal Factors .......................................... 172
Change Agent ............................................. 175

5. ANALYSIS OF FACTORS AND CONCLUSION .................. 177

External Factors .......................................... 178
Internal Factors .......................................... 182
Change Agents ............................................ 198
Case Studies and Frameworks ................................ 201
Implications for Higher Education ......................... 211
Recommendations for Future Research ...................... 216

APPENDIX A: LIST OF INTERVIEWS .......................... 218

APPENDIX B: LIST OF REFERENCES ........................ 221
ABSTRACT

Advances in computer and video technology, coupled with their decreasing cost, have placed considerable impetus for implementation of new technology in the educational environment. While many institutions of higher education are considering implementing systems of new educational technology, the actual process of implementing change is not well understood. The purpose of this study was to attempt to gain greater insight into the implementation process. The research questions guiding this study were: 1) What are the factors associated with the implementation of new educational technology at community colleges? 2) Who are the change agents associated with the implementation of new educational technology at community colleges?

The case study methodology was selected as the most appropriate technique for this study because: 1) research involving the implementation stage of the change process has been limited; 2) the change process does not have a single theoretical basis for conducting empirical testing; and 3) the complexity of the subject being investigated. Three community colleges in the southwestern United States, which have recently completed the implementation of an innovation, were selected for the case study research. The innovation under investigation at Vernon Regional Junior College was the implementation of a microcomputer system. The subject of investigation at Dona Ana Branch Community College was the implementation of
equipment to support a word processing program. The implementation of
an instructional television program was studied at New Mexico Junior
College.

Seven factors emerged as common to all three institutions as they implemented innovation. The seven common factors were: 1) the
availability of funds outside the normal operating budget to finance
implementation of innovation; 2) elimination of boundary contraction;
3) individuals affected by the innovation had input into the
implementation process; 4) clear channels of communication existed
among those involved in the implementation process; 5) the hierarchy
involved in the approval process was limited; 6) the administration
supported plans to implement the innovation; and 7) measures were taken
to reduce resistance to the innovation. Change agents were found to be
a necessary catalyst for change and can emerge from any level of
governance.
CHAPTER 1

INTRODUCTION

Bringing about change in higher education has been a subject of interest for decades. While serving as President of Princeton University (1902–1910), Woodrow Wilson attempted to implement a number of academic reforms. Most of these reform efforts were met with resistance from the alumni and other concerned groups, leading Wilson to conclude, as cited in Bragdon (1967), that "reforming a college curriculum is as difficult as moving a graveyard."

Levine (1980) and other researchers reaffirmed the appraisal that change is difficult to implement in higher education. One reason for this difficulty is that institutions of higher education pose problems unlike other organizations in our society. There is a number of varied and often conflicting components which comprise our institutions of higher education. Students, faculty, administrators, and alumni seldom agree on many educational issues, making a consensus of opinion almost impossible and change difficult to implement. Despite frequent opposition, however, institutions do implement changes. Sometimes events external to the collegiate environment can compel changes within the educational enterprise. One such external influence is technological advancements made in the electronic industry.
The electronic industry has impacted the educational process, especially at community colleges. This research project investigated the factors affecting implementing new educational technology. Case studies involving three community colleges in the Southwestern United States were conducted. Each of the three institutions had implemented either video or computer technology in its instructional program. The research attempted to identify common factors present in the implementation process. Video and computer technology were selected as these forms of new educational technology have played a significant role in changing the instructional process.

Advances in video and computer technology are especially significant as increased capabilities have been matched with decreasing costs. These technological developments have brought about parallel improvements in educational technology which, in turn, have placed considerable impetus for change on higher education owing to the perceived financial and technical advantages offered by the new educational technology. Only a few years ago an institution would have had to invest vast financial resources to develop video or computer instructional capabilities. For example, twenty years ago a black and white television camera with a video tape recorder would require a significant outlay of capital to purchase. Today, both a color camera and video recorder can be purchased for a fraction of what it would cost to purchase a black and white system of twenty years ago. Thus, even more technically sophisticated systems can be implemented with less financial burden than previously possible. As a result, many more
institutions of higher education are considering implementing state-of-the-art systems of educational technology. It is this process of implementing innovations relating to educational technology in higher education that was the subject for investigation in this dissertation.

Implementing change, however, is only part of the change process. As indicated above, educational researchers (Mort and Cornell 1938; Hefferlin 1969) have studied the change process for decades. Most researchers seem to agree with Zaltman, Duncan, and Holbek (1973) that there are two stages involved in the change process—the initiation stage and the implementation stage. There is not clear agreement on what separates the initiation stage from the implementation stage. However, many researchers separate the two stages according to when the decision is made to translate knowledge of an innovation into practice. Events leading up to the decision to implement an innovation are considered part of the initiation stage, while events taking place after the decision to implement are considered part of the implementation stage. Tornatzky and Johnson (1982) further expanded on the definition of implementation in stating that:

Implementation can be defined as the translation of any tool or technique, process, or method of doing, from knowledge to practice. It encompasses that range of activities which take place between "adoption" of a tool or technique (defined as a decision or intent to use the technology) and its stable incorporation into on-going organizational practice (p. 193).
In short, implementation takes place after a decision has been made to bring about change. For the purposes of this study, the distinction referred to above between the initiation and implementation stages will be used to separate the two stages.

Most of the research involving the change process is centered around the initiation stage. However, it is the implementation stage where so many difficulties such as resistance to innovation arise, leading to the failure of many promising educational innovations. Since there has been relatively little research on the implementation stage, this study investigated this stage of the change process.

**Statement of the Problem**

The search for strategies for effectively implementing innovations in educational settings has been beset with difficulties. Blumberg (1976) contended that it was difficult to implement an innovation in an educational environment for the following reasons: 1) administrators' perceptions that the organization was interpersonal in nature and any problems encountered were simply a result of idiosyncratic behavior patterns; 2) the nature and tradition of staff development generally encouraged the development of individual goals in lieu of organizational goals; and 3) there was a lack of data concerning the results of new programs (pp. 213-226). Derr (1976) stated that educational systems have experimented with many innovations only to eventually discard them. The nature of educational organizations tended to resist change. Derr argued that the factors which inhibited the implementation of innovation in education are: 1)
the lack of common indicators of performance; 2) guaranteed survival of
the institution; 3) autonomy needs of employees; 4) low required
interdependence among employees; and 5) few resources to effect change
(pp. 227-241).

The literature on the implementation stage establishes that
there are many accounts of failure in attempting to implement
innovations. Paul (1977) argued that incomplete implementation was
more common than successful implementation. In a study of the change
process in higher education, Lindquist (1978) tested existing theories
by examining the case histories of seven colleges attempting to
implement major reform. The results of his study indicated that
institutions of higher education were inflexible in relation to change.
According to Lindquist:

Colleges and universities combine deeply rooted norms, values,
structures, sub-groups and power relations with great
complexity, low formalization and decentralization of control.
Many new ideas penetrate such organizations but very few can
bulge the status quo . . . rarely does reform or innovation of
much magnitude get implemented (pp. 29-30).

Levine (1980) proposed a model to explain how and why
innovations were terminated or continued. The model was developed from
Levine's study of the creation and eventual termination of
organizational subdivisions labeled "colleges" at State University of
New York at Buffalo. The process of change, according to Levine,
creates instability within an institution due to encroachment of the
innovation in established boundaries. When multiple sets of boundaries
exist and compete for scarce resources, the result is conflict. The
organization can resolve the conflict by either institutionalizing the
innovation (boundary expansion) or terminating it (boundary
contraction). Compatibility and profitability are two attributes of an
innovation which determine whether it will be institutionalized or
terminated. Levine defines compatibility as the measure of
appropriateness of an innovation within existing organizational
boundaries and profitability as how well the innovation satisfies the
needs of an organization. The more compatible and profitable an
innovation is to the institution, the greater the probability that it
will be institutionalized.

In reviewing the change process, Nordvall (1982) identified a
number of problems encountered in the implementation stage. The
implementation stage may be left without a leader's driving force to
see the project through to completion if the initiation stage consumed
most of the innovator's energy. Another problem that could surface is
change in the leadership before the innovation is institutionalized.
New leadership could redirect the institutional goals away from the
innovation. Finally, a lack of resources may impede the implementation
of an innovation (p. 40).

Despite the problems of implementing innovation, we do know
that sometimes educational institutions are successful in their
efforts. Many of these efforts seem to be in the area of educational
technology. The use of instructional television as part of the regular
academic curriculum at Miami-Dade Community College is one example of
the implementation of an innovation (Hershfield 1980, p. 48).
Carnegie-Mellon University recently purchased 1,000 computer workstations, and the university has entered into an agreement with IBM to develop a campus-wide network of 7,500 personal computers in an effort to computerize the entire campus by the end of this decade (Farrell 1983). These two examples of comprehensive implementations of innovations mirror what is happening on many other campuses.

Because of the difficulty of implementing innovation in education, it is important that educators attempt to improve their understanding of factors which contribute to successful implementation of innovations. What is not fully understood is why some institutions or departments readily implement innovations while some are slower or unable to implement new educational technology. If educators understand the factors associated with implementation, then steps can be taken within an institution to establish an environment in which innovation can be successfully implemented, thereby avoiding the negligible or negative results that institutions often experience when implementation is attempted.

The problems associated with implementing innovation demonstrate the need to develop a more complete understanding of the implementation process in higher education. The purpose of this study was to identify factors affecting the implementation of new educational technology in community colleges.

Background

Since new educational technology was the subject of this study of change in higher education, some background information about the
role of educational technology in higher education is appropriate. Some understanding of the role of new educational technology can be gained by reviewing past developments and projections for the future. The Carnegie Commission on Higher Education published a book in 1972 entitled The Fourth Revolution: Instructional Technology in Higher Education. The title evolved from an article that Ashby (1967) wrote in which he defined three past revolutions in education: 1) the formal role of educating the young was shifted from parents to teachers; 2) the adoption of the written word as an instructional tool to coexist with oral instruction; and 3) the invention of printing and the production of books that resulted from the invention. Ashby then predicted a forthcoming revolution in education, stating that developments in electronic technology would affect education in a revolutionary manner. The Commission observed that use of new educational technologies would enhance education by: 1) enabling education to be brought to the sick, aged, handicapped, and people in remote areas; 2) increasing the opportunity for independent study and providing a greater variety of instructional methods and courses offered to students; and 3) lessening routine instructional responsibilities for faculty. Initially, the implementation of educational technology is not generally cost-efficient owing to costly equipment purchases. However, the Commission argued that the use of educational technology would reduce instructional costs (in comparison to traditional methods) over a period of years arising from savings in personnel costs. The potential benefits of electronics in education
are so positive that the Commission predicted that by the year 2000 instructional technology would significantly alter the method of collegiate instruction. A decade later the Carnegie Council on Policy Studies in Higher Education (1981) admitted that the "Fourth Revolution" was not developing as the Commission expected, but now it may "be ready for its 'take-off' period" (p. 87).

Reluctance to change by educational institutions may have been the cause of the slower than expected acceptance of the new educational technology. There are a number of factors that may contribute to the reluctance by individual institutions to implement new instructional technology. This resistance to change can be manifested in individuals or organizations. In Watson's (1972) study of resistance to change in individuals he listed six factors as contributing to stability in personality, which translates into reluctance to change. These six factors were: 1) homeostasis, which is defined as reverting to complacency as a basic psychological characteristic; 2) habit; 3) primacy, which is continuing to respond in a manner that was initially successful; 4) incorporating attitudes and values of those on whom we were originally dependent; 5) the superego; and 6) insecurity, self-distrust, and regression (pp. 611-14). Rokeach (1960) dealt with the problem of closed-minded individuals from the sociopsychological angle. He stated that resistance to change exhibited a dogmatic personality. Organizations also are able to resist change. Nordvall (1982) compiled a list of organizational characteristics which contribute to resistance to change. The characteristics he identified
include inertia (reliance on known patterns of behavior), conformity, vested interest (resistance to any innovation that threatens the economic livelihood or prestige of the institution), and loyalty to existing satisfactions (p. 6).

If the new educational technology is to become the fourth revolution as predicted by Ashby and the Carnegie Commission, then the new technology will have to overcome the inherit resistance in individuals and organizations. Dede and Bowman (1981) reported that there are a number of factors favoring the adoption of the new educational technology. They contended that a "reformation" in education is about to happen as a result of four converging forces:

1. The costs of computer and telecommunications hardware have fallen precipitously and will continue to plummet for at least another ten years.

2. The capabilities of courseware for computers and telecommunications devices have been greatly expanded, partly through increased programming experience, and partly through the development of new "artificial intelligence" based approaches.

3. Public dissatisfaction with the expense of schooling relative to the levels of achievement students are attaining has become acute. Educators are being given an ultimatum to be more effective at less cost.

4. Home computers and cable television are bringing many households into direct contact with instructional technology as an alternative learning tool (p. 111).

Boaz (1982) echoed the same position when she stated that "another educative force is now in the mainstream in our information communications-centered society--instructional technology" (p. 2). Since the new educational technology promises to solve a number of
difficulties presently encountered in higher education (for example, reaching new clients in an era of declining traditional college-age students and reducing the cost of instruction when budget cuts are the rule rather than the exception), there seems to be a strong possibility that institutions will implement these innovations. Indeed, if the Carnegie Commission is correct in its assessment of the role that instructional technology will play in the educational process, then higher education is entering a period in which many institutions will be spending vast sums of money to implement new educational technology in their instructional programs. However, despite all of the pressures for implementing educational technology, it has been slow in developing its potential at many institutions. The pattern of accepting new educational technology varies among institutions and among various departments within an institution, illustrating the need to better understand the factors that are present when an institution overcomes the various obstacles to change.

Research Questions

The research questions for this study are: 1) What are the factors associated with the implementation of new educational technology in community colleges? 2) Who are the change agents associated with the implementation of new educational technology in community colleges?

Conceptual Framework

There was not a single theoretical basis on which to draw a conceptual framework for this study. However, a number of theorists
proposed constructs that were used as a guide for research. One of the more widely accepted constructs to explain the change process was advanced by Gamson (1974) in which she identified four models of innovation and change: 1) complex organization; 2) conflict (or political); 3) diffusion; and 4) planned change. Dill and Friedman (1979) further defined each of the four frameworks in their article on innovation in higher education. Each of these models identifies particular variables associated with change and provide the basis for investigating factors associated with the implementation of change in relation to new educational technology in community colleges. All four frameworks were used to guide the research.

Building on Gamson's work, Dill and Friedman identified the complex organization framework as one that attempts to associate innovativeness in institutions with factors that characterize the system as a whole. Variables in this framework include age, complexity, formalization, centralization, affluence, the nature of the system's environment, and size. Usually, the analysis of innovation in the complex organization framework is done by examining the rate at which an organization adds new and differing programs. Accordingly, a number of innovations are usually examined within this framework, and differing rates are accounted for by the above variables. In addition to the variables associated with organizational characteristics, the innovation itself might act as a variable in the change process. For example, Blau (1973) found a positive correlation between innovation and the length of tenure of the previous and current president.
Another dimension in this framework is the relationship between past successful innovations and the willingness of the organization to adopt a new innovation. If an organization has been successful in implementing innovations in the past there is a tendency for that organization to be willing to continue to implement innovations. A longitudinal study would identify institutions with a history of successfully implementing innovations (Dill and Friedman, pp. 415-417).

The conflict framework (sometimes referred to as the political framework) suggests that interest groups control the innovation process. Interest groups place pressure on the organization either for or against change. The variables usually associated with this framework include intensity of conflict, job mobility, duration of conflict, level of satisfaction with the change, and the extensiveness of organizational change. The development of the conflict framework can be traced back to earlier work in sociology and political science. Unlike the complex organization framework, the conflict framework usually focuses on the natural history of one particular innovation; therefore, the analysis is concerned only with one event. Dahrendorf (1958) suggested that social conditions contribute to determine the form and intensity of the conflict. When an innovation is introduced, interest groups form and conflict is present until the innovation is either discarded or institutionalized. For example, the introduction of computers on campus might disrupt the established equilibrium and intensify claims for status, power, and scarce resources among various groups on campus. The conflict framework is unique in that it
emphasizes the formulation of policy over execution. The framework purports to explain the dynamics of the organization in flux. Changes that are brought about are the seeds which develop into later conflict, which in turn must be addressed by the institution; hence, this framework concentrates more on circumstances that bring about change than the change itself (Dill and Friedman, pp. 417-419).

The diffusion framework describes the manner in which an innovation filters down through a system until after a period of years it has been institutionalized. In this framework, the researcher must conceptualize the institution under analysis as a number of equivalent "adopter units" (subdivisions within an organization that adopt or refrain from adopting an innovation) which become the unit of analysis. The researcher identifies one or more innovations introduced at some level within the institution and studies the manner in which the innovation is adopted (or not adopted) by the subunits. The adoption or nonadoption is related to characteristics of the innovation and of the unit. These characteristics usually include complexity, attitude toward the innovation, characteristics of the innovation, perceived relative advantage, compatibility with current practice, and ability to test trial the innovation. This framework can be used to describe either the natural history of one innovation or how an institution has reacted to a succession of innovations. Most studies attempt to distinguish between adopters and nonadopters and early and late adopters of innovations. Some studies examine the role of an opinion leader in the adoption of an innovation. An opinion leader is defined
as a person who is usually the first to know about an innovation and influences others in the organization to adopt or not adopt the innovation. In applying the framework, the researcher attempts to identify either characteristics of innovations themselves which influence their diffusion, or traits of potential adopters which are associated with individual innovativeness. A problem with this framework is the assumption that an innovation is "good" and should be adopted by all subdivisions in the organization (Dill and Friedman, pp. 419-420).

The planned change framework (also referred to as organizational development) encompasses models that deal with efforts to introduce innovation through managed change. Change is accomplished through a change agent, an individual (usually from outside the organization) who can interject change into the system. The model assumes that individuals within an organization will be self-motivated and, with skills provided by the change agent, the organization will be able to work through its own change process. This framework differs from the previous three frameworks in that it emphasizes the intervention and implementation process; thus, it does not describe change as much as "changing" and factors that influence the direction and rate of change. The variables in this framework depend upon the type of change, but they generally involve such factors as the homomorphy of the change agent, level of intervention, and attitudinal acceptance of the change agent. The change agent usually moves through several stages, including: 1) establishing a relationship within the
organization by the change agent; 2) determining the nature and extent of the problem; 3) intervening; 4) establishing an organizational self-monitoring and problem-solving capacity; and 5) disengaging (Havelock 1973). The analysis of the change process is usually conducted upon the effectiveness of the intervention strategy as perceived from the human element; consequently, a problem in applying this framework is that most research involves subjective perceptions. (Dill and Friedman, pp. 420-425).

In the research conducted in this study of innovations in community colleges, variables identified in the above frameworks were used as a guide to the investigation. Although the research was not limited to variables associated with individual frameworks, these variables provided a point of departure for examining the change process.

**Definitions**

One of the key terms used in this dissertation was "innovation." The definition used by Zaltman, Duncan, and Holbek (1973), which was a modification of the definition advocated by Rogers and Shoemaker (1971), was used in this study. Zaltman and his colleagues defined innovation as "any idea, practice, or material artifact perceived to be new by the relevant unit of adoption" (p. 10). Zaltman and his associates stated that the adopting unit can be an individual or organization. Since this study used organizations as the units of investigation, this definition lent itself well to use in this study. In addition, the phrase "perceived to be new" provided greater
Rogers and Shoemaker further defined this phrase in their discussion on what is innovation by stating that an idea, practice, or material artifact need not be absolutely new as measured by the lapse of time since its first use or discovery. It need only be "new" to the adopting unit. An example is the use of television as a method of instruction. The use of television as an instructional tool is not new to higher education, but it is considered an innovation by an institution that is adopting this method of instruction for the first time.

The phrase "educational technology" requires some clarification. The term is defined here as the teaching, learning, and information delivery assisted by applied science. The term educational technology includes hardware, such as various types of projection equipment (for example, overheads, filmstrips, and motion picture), language laboratories, individualized learning laboratories, video systems, and computer applications in instruction. Because of the types of innovations investigated in this study, this research concentrated on the video and computer applications of educational technology. Unlike some applications of educational technology, such as the printed word and the blackboard, video and computer technology is a relatively new application of technology, thus the phrase "new educational technology."

As indicated above, the term "implementation" has been defined by Tornatzky and Johnson as "the translation of any tool or technique,
process, or method of doing, from knowledge to practice" (p. 193). Implementation is the later part of the change process in which an innovation is first initiated and then implemented after a decision has been made to bring about change.

In summary, higher education in general and community colleges in particular are moving into an era in which educational technology will play an important role in the instructional program. It is important that the process of implementing change in higher education be better understood. The more knowledge about the process the more effectively institutions can address the problems that arise in implementing change. The goal of this study is to contribute to the knowledge base relating to the implementation of innovation.
Most scholars divide the change process into two major stages. First the change is "initiated" and then the process of "implementation" is carried out to complete the change process. Conrad (1980) defined the initiation stage as encompassing all the processes and pressures that bring about a decision to introduce an innovation, while the implementation stage covers the adoption and institutionalization of the innovation. Cerych (1979) suggested that implementation "starts with the formal adoption of the change in question and with the creation of the necessary initial conditions (e. g. resources) for its launching" (p. 9). Since this author's study examined the implementation stage of the change process, this review of the literature emphasizes those models and studies that relate to the implementation stage as well as present several classical works dealing with the general change process. The reader should be made aware, however, that it is difficult to separate the two stages in most studies and models as many authors do not distinguish between the two. In reality, the two stages often blend together, making it difficult to separate the process into two distinct stages. Still, the distinction is a useful one and will be employed here.
While there is no single conceptual framework that has guided most research on academic change, there are a number of theoretical frameworks that have been employed in various studies. Dill and Friedman (1979) used a typology developed by Gamson (1974) which identified four frameworks in which to organize research on the change process. The frameworks identified by Gamson are: 1) complex organization; 2) diffusion; 3) planned change; and 4) conflict. These frameworks have been used here to organize the literature. One caveat needs to be issued. The reader should be aware that some of the studies discussed in this review of literature transcend more than one framework. For example, a change within an institution could involve elements of the conflict framework as well as the planned change framework. Therefore, it has been necessary for the author to make arbitrary decisions regarding the classification of some of the studies.

**Complex Organization Framework**

Dill and Friedman (1979) described the complex organization framework as one that "attempts to correlate innovativeness in social systems with variables which characterize the system as a whole" (p. 415). Typically, the organizational variables examined include such characteristics as age, complexity, stratification, size, and centralization of authority. The following is a summary of several works which are consonant with this framework, beginning with the work of Katz and Kahn.
Katz and Kahn (1966) developed an "open systems" model of organization which influenced much of the early research. The open system describes an organization as being influenced by forces and pressures from within the institution (internal) as well as from society (external). These pressures act as constraints on innovation. According to Katz and Kahn, organizations are influenced by external forces which compel them to reflect the demands of society; thus, society and the organization interact in an open system.

Hefferlin (1969) conducted one of the most comprehensive studies of academic change in higher education. Although Hefferlin did not identify implementation as a separate stage, it is clear that he viewed implementation as part of the complete change process. Through historical research, Hefferlin identified three major sources of change in higher education: 1) advocates interested in change; 2) resources available for change; and 3) openness of the system to change (p. 49). Then, using a survey instrument and interviews as research tools, Hefferlin drew several conclusions from his study of 426 departments in 110 institutions. First, he identified ten variables that correlated with academic reform. These factors include attitudes, procedures, mechanisms, and pressures. However, no one factor appeared to be indispensable in accounting for differences which exist among institutions in their willingness and ability to change their academic program. In addition, most of the elements are external to the academic sphere. Second, Hefferlin concluded that an avuncular type of academic organization (as opposed to a patriarchal or collegium-type
institution) was most conducive to academic change. An avuncular institution: 1) assigns high status on the basis of expertise; 2) shifts positions of status according to different tasks rather than in strict rotation; and 3) does not disperse nor centralize initiative on a permanent basis. Third, Hefferlin identified the faculty and administrators as having the most direct influence in bringing about academic change. Fourth, institutional differences affect the change process. The institutional differences, according to Hefferlin, are the attitudes of the most influential members of the institution, the expansion of the institution, and how influence is distributed among members of the institution. Hefferlin stated that the smaller religious colleges are able to institute a greater amount of change. This might be an indication that smaller institutions have to contend with fewer bureaucratic procedures and therefore are more flexible than larger institutions. He further concluded, that financial resources are the key to academic reform. A new program will be tolerated if it does not involve an expenditure of funds or if it brings its own financial support. If existing resources must be divided to include a new program, then it will be actively opposed and accepted only under duress by the other established institutional programs.

Hefferlin found that the attitude of the most influential members of the institution is one of the key elements affecting the change process. Hefferlin's finding was reaffirmed by Hennigar and Taylor's (1980) study of the relationship between the receptivity to change in educational management personnel with their management style.
Two significant findings of their research are that administrators with a high concern for productivity are more open to change than those with a low concern; and administrators with a high concern for people are more open to change than those with a low concern.

Two researchers from the University of Wisconsin made a major contribution to the theory of the change process. Hage and Aiken's (1970) study explored a number of organizational relationships in sixteen health and social welfare agencies in the midwestern United States. The theory of change proposed by Hage and Aiken examined both the various stages of the innovation process and the organizational characteristics that affect the rate of innovation. The seven organizational characteristics identified by the authors as affecting the rate of innovation are: 1) complexity, which is defined as "the number of occupational specialties in the organization and the degree of professionalism of each" (p. 33); 2) centralization (the concentration of the decision making process in the hands of a proportionally few); 3) formalization (the degree of codification of jobs); 4) stratification (the different distribution of rewards); 5) production (emphasis on quantity in relation to quality); 6) efficiency, which was defined as the "relative emphasis on the cost reduction of the product or service" (p. 50); and 7) job satisfaction. Hage and Aiken found that increased change correlates with organizations that have the characteristics of complexity, formalization, and job satisfaction. The other four characteristics are negative factors in the rate of change.
Hage and Aiken's model also included four stages of the innovation process: evaluation, initiation, implementation, and routinization. In addressing the implementation stage, the authors stated that the implementation stage occurs when the organization attempts to integrate the innovation. Resistance to the innovation is usually encountered at this stage, arising from unexpected problems in implementation and reluctance by individuals to accept the innovation.

The Hage and Aiken model is instructive because it is one of the first models to examine the implementation stage as a separate stage in the change process. In addition, Hage and Aiken addressed the problem of resistance involved in the change process, which emphasizes the importance of resistance as a factor to be considered by anyone attempting the implementation of innovation. As discussed later in the chapter, resistance is an especially important consideration during the implementation stage.

The model presented by Hage and Aiken was tested by Howard (1981) in a study of innovation at four university libraries in the northeastern United States. The findings of her study indicated that with some modifications Hage and Aiken's theory can be applied to other settings. Howard found a relationship between the structural variable of complexity and the rate of innovation and a negative relationship between centralization and stratification.

Three years after Hage and Aiken published their study, another group of theorists (Zaltman, Duncan, and Holbek 1973) published the results of their study in which the implementation stage was examined
in more detail. The authors' goal was to isolate variables and conditions associated with the adoption of innovation in organizations. They tried to accomplish this through a study of organizational structure and process in an attempt to identify types of environments which are conducive to, or inhibit, the introduction and acceptance of innovation. The authors subdivided the implementation stage into two substages. In the "Initial Implementation Substage," the maximum potential for conflict and disequilibrium exists, resulting from a manifesting of latent animosities and feelings of loss of power. (pp. 90-92). These feelings translate into resistance which can impede the implementation of innovation. Resistance can take numerous forms, including active rejection, tactical manipulation in the operational sphere, lack of support, and passive resistance. The other subdivision of the implementation stage was entitled the "Continued-Sustained Implementation Substage." They found that this substage was where an innovation might fail due to changes in personnel, continued resistance, or poor performance by the innovation.

The authors also hypothesized that "organic" (less rigid) organizations provide an environment more suitable for initiating innovations, while "mechanistic" (formal manner of operating) organizations provide an environment more suitable for implementing innovations. Implementation would be enhanced in institutions which are more highly centralized and less complex, because this environment reduces role conflict and ambiguity (pp. 137-155). However, the authors acknowledged that resistance can be manifested at any point in
the change process. The reasons for resistance include the stratification of the power structure, competition among interest groups for power, attempts to maintain the status quo, hierarchical differentials, and traditional reward systems.

Zaltman and his associates contended that for an innovation to become a reality it is often dependent upon the "management-decision variables," which can be manipulated or controlled. Management plays a critical role in gaining commitment, attitudinal changes, and behavior acceptance in relation to the innovation. The authors also found that for an innovation to be effectively implemented there needs to be in place an administration that establishes clear channels of authority and responsibility. Innovation is also enhanced by the participative approach to management, which provides channels for feedback so the innovation can be modified to gain acceptance.

The importance of the work by Zaltman and his colleagues is that they: 1) examined the dynamics of the personnel (including administrators) involved in the implementing of innovation; 2) expanded upon earlier work on the problem of resistance; 3) found that while one type of organization provides fertile ground for the initiation stage another type of organization enhances the implementation stage; and 4) provided a model that divides the change process into two stages that most authorities now accept.

In an attempt to discover correlates of institutional innovation, Blau (1973) applied the complex organization framework to higher education. He measured the ratio of preselected new departments
to traditional departments and found a positive correlation between the size of the institution and the department, and the amount of decentralized authority and innovation. Blau also found that when other variables are controlled, institutional age correlates negatively with the rate of innovation. In other words, as the institution grows older it becomes more traditional and less willing to adopt innovations. Several years earlier Clark (1970) revealed a similar conclusion in his study of how four "distinctive" colleges evolved.

A number of studies have attempted to correlate an institution's receptiveness to change and its size. As it has already been noted, Hefferlin (1969) and Blau (1973) examined this variable. In a study of smaller liberal arts colleges, Glover (1980) found that these colleges were more likely to adopt academic changes than larger institutions. This reaffirms Hefferlin's findings, but contradicts the findings of Blau. To complicate matters further, a study by Drum (1979) of innovations at community colleges found no correlation between the variables of institutional size and complexity and innovation.

In summary, although the findings are sometimes contradictory, studies based on the complex organization framework help to expand our awareness of the very complex and divergent nature of social organizations in general and higher education in particular. In fact, this very intricate and divergent nature of complex organizations may explain why researchers sometimes report contradictory findings since it is difficult to control the vast array of variables. Future studies need to control for extraneous variables to overcome this problem.
Diffusion Framework

The diffusion framework receives its name for the way an innovation is adopted by one unit and then the idea (and later the innovation itself) is diffused through the system. A classical study by Rogers (1962) illustrated the diffusion perspective. Rogers studied the efforts of agricultural agents to get farmers to plant a new hybrid corn. His study showed how an innovation (hybrid corn) would, under the right conditions, be adopted (diffused) throughout the system. The innovation, in effect, trickles down through the system until after a period of time all of the units within a system have adopted the innovation.

Columbia University conducted a number of the early diffusion studies over a period of two decades. A study by Mort and Cornell (1938) examined public school systems to see if there was a relationship between school innovativeness and local control of school financial decisions. The major findings of the Columbia University studies were: 1) there is approximately a twenty-five year lag time between the introduction of an innovation and its widespread adoption; 2) the adoption of an innovation follows a general S-shaped pattern (at first a few schools implement the innovation, then a majority of schools adopt the idea, and finally the remaining schools adopt the innovation); and 3) the variable creating the greatest variance (predictor) of school innovativeness is the educational cost per pupil (Mort 1946, pp. 199-200).
The Columbia University studies are important in the implementation literature. In particular, these studies underscore the importance of the role that financial factors play in implementing innovations. While this factor is not lost upon administrators who must deal with the financial aspects of an institution on a daily basis, the financial considerations are often overlooked by many advocates of innovation. These studies also suggest the importance of the time element involved in the diffusion of an innovation and that there is a predictable pattern in the acceptance of innovations.

A comprehensive study of the adoption of innovations was conducted by Rogers (1962) in an effort to determine the characteristics of innovations which encourage people to use them. In his research, Rogers reviewed over 1500 studies relating to the diffusion of innovations. The studies were classified into eight types of diffusion, including the rate that an innovation is adopted by society. Rogers then conducted his own research with county agricultural agents who were attempting to get farmers to use a new hybrid corn. The findings of the research by Rogers not only illuminated the process of innovation adoption, but also identified key factors in the nature of the innovations that the farmers accepted.

Approaching the problem of innovation from the practitioner's viewpoint Rogers investigated the desirable characteristics of an innovation. Roger's research concluded that the desirable characteristics of an innovation are: 1) the perceived advantage of an innovation (an apparent utilitarian value) over what the individual (or
system) is currently doing; 2) the compatibility of the innovation with the practitioner's values and past experiences; 3) the accessibility of the innovation or the degree to which the innovation can be readily understood and used; 4) the divisibility of the innovation, or the ability to try the innovation on a limited basis or to try parts of it before using it in totality; and 5) the communicability of the innovation or the ease with which it can be clearly and accurately described so that the practitioner can visualize the innovation. These same five characteristics reappear in a later study by Rogers and Shoemaker (1971). In a study based on a different framework, Pugh (1974) conducted a study of what happened to each of the one hundred and twenty-six recommendations made by the Sub-committee on Teaching at Indiana University. Pugh found that many of the same characteristics referred to by Rogers were reaffirmed in his study as critical to the change process, such as ease of implementation, trialability, and ability to be readily understood.

While the research by Rogers lends a great deal to our understanding of why innovations are accepted or rejected, several questions remain unanswered by Roger's research. Can research done in the realm of agricultural science be generalized to other areas such as educational technology? What are the dynamics of the implementation process?

As stated above, one characteristic identified by Rogers that encourages the adoption of an innovation is the communicability of the innovation. Schultz and Webb (1979) conducted a study of the adoption
of a screening model for the evaluation of proposed programs and curricula in community colleges. They found that successful adoption occurs when data are used to direct the planning for new programs. The data that the authors refer to were based on information generated from computers and other technical tools (pp. 112-113).

A more recent diffusion study was conducted at Wichita State University. Winstead's (1982) study examined the effectiveness of a Management Planning Model which emphasizes the participatory approach to organizational change through decentralized decision-making and the adoption of management by objectives. The results of the case study examining the diffusion method indicated that successful implementation of an innovation requires a strong commitment to the innovation by the higher echelons of the administration. Winstead also found that the subunits involved in the change process must clearly understand the effect of the proposed change and possess a clear understanding of the institutional mission (p. 122).

In summary, there are a number of reoccurring themes in the research involving the diffusion framework. The acceptance of an innovation is based upon an element of time, that is, there is an assumption that the innovation will be adopted by one subunit and then move on to another organizational subunit. This type of movement through an organization requires time. Another common theme is that the innovation must have a perceived advantage and compatibility with the current method of operation. Finally, the innovation must have the ability to be tried before full implementation occurs.
**Planned Change Framework**

Bennis, Benne, and Chin (1961) defined planned change as a "conscious, deliberate, and collaborative effort to improve the operation of a system through the utilization of scientific knowledge" (p. 3). In short, it is the intentional effort of an organization to make a change. The assumption is that administrators can control the direction and rate of change. According to this view, the behavioral sciences have developed scientific knowledge which can be applied in the change process so that the change becomes a managed event.

Lewin (1958) described the change process as a three-step procedure of: 1) the initial phase ("unfreezing") in which the need for change is realized, and there is a general willingness to change established habits; 2) the activity ("moving") involved in implementing change; and 3) the establishment and firm rooting ("freezing") of the new behavior. For the change to remain effective over a long period of time, the forces opposed to the change must be dealt with in a manner that reduces their resistance. If part of the change involves social values, customs, or habits, then the change agent must attempt to alter the group standards as opposed to trying to alter values of individuals (Lewin 1962, pp. 237-238).

Lewin's theory was empirically investigated by Allan (1979) in a study conducted at three community colleges. There were 90 participants involved in the study. Allan developed 68 statements relating to a change project (the introduction of a new management training program) used as a basis of the study. Depending on how the
participants responded to the statements they were classified as unfrozen or not unfrozen according to Lewin's definition. With respect to the theories presented as driving or inhibiting forces of change, the evidence in this study is particularly confirming of Lewin's model.

Zander (1961) also examined the problem of resistance. He analyzed the problem of resistance to change as it applies to industry. He concluded that not only does change alter the organization, but it also produces resistance to the implementation of change because the organizational social system is altered. Zander defined resistance as "behavior which is intended to protect an individual from the effects of real or imagined change" (p. 543). Resistance to the implementation of change can be minimized, according to Zander, if the change agent can bring about a degree of awareness, understanding, and acceptance among participants (pp. 543-546).

Lippitt, Watson, and Westley (1958) expanded upon Lewin's work and defined the "planned change" model of the change process as the conscious effort of making a change that involves the two major components of a change agent and a client system (the organization or work unit to be changed). The change agent is viewed as an individual outside the client system who is brought in to the organization to facilitate the change. Lippitt and his associates argued that if these individuals that have the ability to change the system are confident that the innovation has the ability to produce the desired results, then the change will probably occur. In viewing the community college environment, Hammons and Hunter (1977) defined the functions of an
external change agent. They stated that the primary role of the consultant was to help administrators improve the quality of their institution through strategic planning. To ensure success, they suggested that consultants could assist administrators in developing change strategies that are compatible with organizational structures (pp. 37-40). Kintzer and Chase (1969) amplified the role of the external professional change agent as a vital component in a community college planned change strategy. They advocated a method by which a community college could best benefit while using an external change agent, including how to select a consultant, what the institution should expect from the consultant, and the importance of an objective review of the consultant's recommendations. They also emphasized the importance of the implementation of the consultant's recommendations.

In a similar vein, Bennis, Benne, and Chin (1961) suggested that planned change was a process in which individuals involved in change improve the operation of the organization by using scientific knowledge that was systematically collected (p. 30). The authors modified the planned change model to include the possibility of a change agent who is part of the client system. In a college and university setting, this viewpoint allows for individual administrators, faculty, staff, and students to be potential change agents.

The implementation stage of the change process was further explored by Bennis (1966). Bennis investigated how the ability to understand the need for change, the depth of commitment to change, and
reduction of the threat to peoples emotional and value systems affect the implementation of innovation. He contended that the type of relationship that is established between the change agent and the client system is critical in determining whether or not the implementation of an innovation will be successful. Bennis defined the implementation stage as that part of the change process in which the client system gains understanding of and commitment to the innovation. The client system then carries out internal changes which allow the innovation to become an integral part of the system's operation (p. 175). As one of the first theorists to separate and discuss the implementation stage as a separate phase in the change process, Bennis pointed out that the client system must go beyond simply understanding an innovation if successful implementation is to occur. The commitment to an innovation is a critical aspect. If the change is perceived to be threatening to the social life or self-image of individuals, then new forms of gratification and self-evaluation must be provided to replace any perceived loss in order to induce acceptance of change. As Bennis suggested: "The change program must include emotional value as well as cognitive ... elements for successful implementation. It is doubtful that relying solely on rational persuasion is sufficient" (pp. 175-176).

The theme of resistance as a problem inherent in the change process is once again seen in Bennis's work. Bennis, like Lewin, considered the non-scientific and non-rational aspects of the individuals involved in the change process. It is evident from his
work that he considered the very complex nature of individual personality and its affects on the change process.

Havelock and his colleagues (1971) isolated three major elements of successful planned change, including the implementation of planned change. These elements represent an integration of several diverse strategies. Havelock's elements of successful planned change are: 1) the combination of the research development and the diffusion process; 2) the social interaction process; and 3) the problem solving approach (pp. 1101-1104).

Planned change theorists contribute to the implementation literature by isolating the implementation stage ("moving" from a frozen position in Lewin's terminology), emphasizing the importance of the implementation stage, and addressing the role of the change agent in the change process. While there is a disparity in how these theorist's view the locus of the change agent (internal or external), they do agree on the role of the change agent in implementing change. Many planned change theorists, especially those writing before the 1970's, tended to examine only the early phase (the phase before an innovation becomes institutionalized) of the implementation stage. There are a few researchers who have studied the institutionalization phase of the implementation process in more detail.

During the 1970's, a number of researchers began to examine the implementation stage of the change process more closely in an effort to expand knowledge of its dynamics. Gross, Giacquinta, and Berstein's (1971) research of educational innovation in an elementary school is
one such study. The purpose of their study was to identify factors that either inhibit or contribute to the implementation stage of planned change. The authors categorized the change process into four phases: 1) the introduction; 2) the initiation; 3) the attempted implementation; and 4) the incorporation of the innovation into the organization. The authors hypothesized that the degree to which an innovation is implemented relates to the number of factors that are involved in the innovation and the amount of initial resistance to change that is exhibited. The results of their research indicated that the implementation of innovation is impeded by failure to identify and articulate difficulties that teachers are likely to encounter and the failure to establish and use effective feedback mechanisms. According to their study, even after an innovation is initiated the original supporters can become frustrated in the implementation process and resistance can mount which can block the adoption of the innovation (p. 198).

The role that administrators play in the implementation of innovation is critical to its success according to Gross, Giacquinta, and Berstein. Administrators can assist in the adoption of an innovation by: 1) providing subordinates with a clear understanding of any new role requirements; 2) providing necessary resources; 3) realigning the organization and its policies so that they are compatible with the innovation; 4) providing necessary retraining; 5) maintaining support of the innovation by establishing a reward system; and 6) maintaining commitment to the innovation.
Gross and his colleagues attempted to isolate and identify the variables which inhibit or enhance the change process. The importance of their work to this study was their concentration on the implementation aspect of the change process. Gross' work emphasized the importance of administrative strategy. The researchers focused on the leadership role that administrators play in achieving success in implementing innovation. The major limitation in the work by Gross and his colleagues to this study is that it is a single case study involving a minor innovation and it did not examine higher education.

After an exhaustive review and analysis of the literature, Lindquist (1978) presented a model for applying a strategy for change. The model, which expanded upon Havelock's work, pointed out that there was not a single method for instituting change. Instead, "planned change is a local development, but one which is stimulated and guided by the adaptation of external innovations rather than the invention of new ones." (p. 223). The external concepts are simply modified to meet the needs at the local level. This is accomplished by communicating (such as through staff meetings or memoranda) the modified change concept to potential users of the concept. According to Lindquist, the potential users of the concept will accept it if the new concept contains the components of relative advantage over the status quo, simplicity, low risk, and compatibility with individual or organizational goals. The change model of innovation is referred to as "adaptive development," meaning that for successful change to evolve, the personnel involved in the process must exhibit "interpersonal and
informational linkage, active openness, facilitating as well as initiating leadership, ownership by those who can make implementation happen and rewards both material and psychic" (p. 243). Lindquist contended that diverse strategies should be applied in planned change, which require the combination of several skills and roles. It might even be necessary for the advocates of change to confront authority figures in the process. The advocates of change need to communicate with the sources and users of innovation, both internal and external to the institution. In addition, various services should be established to facilitate the adaptive development. After the new ideas are adopted, it is recommended they be tried in a pilot project or in stages to assure their successful implementation.

While Lindquist's model is basically untested, his scholarship reflects a view supported by recent research, namely, that the implementation of change is more complex than some assume. To be successful a variety of strategies must be employed and the change must be compatible with the existing system. Compatibility is a theme in many of the studies and models relating to the change process (Rogers 1962; Bennis 1966; Gross, Giacquinta, and Berstein 1971; Hammons and Hunter 1977; Levine 1980).

To summarize, the key element in the planned change framework is the change agent and how this agent relates to the organization. Other elements in the change process are identified as the relative advantage of the proposed change over the status quo, compatibility, and the amount of resistance generated to the change. In general, many
of the same elements that were identified under the diffusion framework are also factors in the planned change framework.

Conflict Framework

The final framework under Gamson typology is the conflict framework. The conflict framework is also referred to as the "power-coercive" framework in Turner's (1974) typology and the "political" model in Baldridge's (1971) case study. The framework revolves around the perspective that, during the change process interest groups form and put pressure in the direction of change or they resist the proposed change.

Dahrendorf (1958) suggested that inequalities in social systems lead to the development of groups within systems which attempt to place pressure upon the organization for change to remedy the perceived inequalities. Other groups form to retain the status quo because the current system places them in a favored position. The result is conflict until the issue is resolved.

Baldridge's (1971) longitudinal study of decision making at New York University showed that the structure and role of the university changes through internal and external pressures. The author draws upon three sources (conflict theory, community power studies, and interest groups) to construct a model to explain the political process of change. The internal pressures upon the university involve policy issues (such as departmental reorganization and centralization), while the external pressures generate from such forces as increased competition from state universities for low income students. In a
conflict framework analysis centers on the role that administrators play as change agents and the conflict among segments of the faculty. Pressures for change by interest groups are challenged by other interest groups that resist the change. Intense conflict develops as interest groups fight to become the dominant force. Over a period of time various forces for change are successful in redirecting the mission of the university.

The study by Levine (1980) is a classic work in the examination of conflict in higher education. Levine studied the creation and eventual termination of organizational subdivisions labeled "colleges" at State University of New York at Buffalo. Levine found that institutions have established boundaries which are protected by interest groups. An innovation will encroach upon one or more boundaries, therefore creating instability as multiple sets of boundaries compete for scarce resources. The innovation will be institutionalized only if it is compatible and now profitable to the organization.

Conrad's (1978) study of curriculum change at four institutions found that there are five overlapping stages involved in the change process. The first stage, labeled as the "social structure," sets the stage for change in establishing that conflict is a natural process that does not necessarily lead to change in higher education. However, change does lead to conflict between new and old social conditions and their defenders. If change is to come about then power groups must exercise their power in favor of the change. The second stage,
"conflict and interest group formation," describes the formation of interest groups in response to pressures for change. Conflict develops as groups with divergent goals and values seek influence. In the third stage, "administrative intervention," the administration responds to interest group pressures and reexamines its policies. The fourth stage, "policy-recommending stage," is one in which a recommendation is made to change existing policy. The fifth and final stage, "policy-making stage," outlines the establishment of a new policy by the appropriate decision-making body. As in the case study by Baldridge, Conrad discovered that interest groups emerge and play a central role during the various stages of change. Administrators play a brokerage role between the two dominant interest groups, striking a compromise that favors the more powerful interest group.

The faculty have the potential to represent a powerful interest group on many campuses. In a study of the decision making process in community colleges, Cooney (1976) found that community college faculty value programs that emphasize educational quality. Cooney concluded that in order to translate faculty values into policy, faculty members must form as an interest group. The faculty then can seek to gain access to the decision making process. Individual members of the faculty should attempt to gain positions of authority, such as chairpersons and deans, within the institution. If they are successful they will become decision makers within the institution's political process.
As the above studies illustrate, the conflict framework emphasizes the process in which interest groups develop and attempt to influence change through pressure on decision making bodies. Interest groups form around an issue, remain active as long as the issue is being contested and dissipate when the issue is resolved. Individuals that may have been in alliance on one issue might be in opposing groups on another issue. Most of the studies involving conflict concentrated on the initiation stage of change. Nevertheless, it is important to understand the role of interest groups and the conflict framework as these forces could become a factor during the implementation stage.

**Factors Associated With Implementation**

Since this study examined the factors related to the implementation of innovation it is instructive to examine more systematically the literature regarding the major factors affecting the implementation of innovation. Many of the studies in the literature mention the role of the change agent in the change process. We will begin our review of these factors by examining the role of the change agent as indicated by the literature.

The concept of the change agent, personified as either an individual or a group, is a consideration in many of the studies on the implementation of innovation. Lewin (1962) described the role of the change agent as one of altering group standards. Benne (1962) viewed the change agent as an individual who serves as a communication link between those advocating the change and those receiving the change (p. 230). The original concept of a change agent was a person who was
external to the organization and brought in as a consultant to facilitate internal change. The concept of a change agent changed over a number of years to include individuals, or group, within an organization. According to the literature, an internal change agent has several advantages over an external change agent. Since the individual serving as an internal change agent will remain with the organization there is incentive for that individual to facilitate successful change. Also, the internal change agent is familiar with the organization and therefore knows the structure and values of the organization. In addition, the internal change agent is familiar with the employees of the organization and consequently less threatening (Havelock 1973). There are also several disadvantages of an internal change agent. An individual within an organization may lack the respect from fellow employees that would be generated by someone external to the organization. There is also a question as to the objectivity of an internal change agent. An external person would at least carry the image of objectivity. Sometimes internal change agents are not given the authority to enact recommended changes, thus undermining their role. Goodman (1977) stated that in a community college setting an internal change agent can play a vital role in the change process. However, if the internal change agent is to be an effective link in the change process the individual must have access to key channels of communication and given authority to make decisions, assuming the change agent has the ability to use the delegated authority properly. Finally, several authors (Havelock 1973;
Wattanbarger and Scaggs (1979) contended that an internal change agent may have a problem separating their role as employee from that of a change agent.

External change agents bring a set of positive and negative elements inherit in their role. Obviously, many of the weakness and strengths of an internal change agent reverse polarity when the external change agent is involved in the process. For example, whereas an internal change agent is familiar with the structure and values of the organization an external change agent does not possess these advantages. However, this allows the external change agent to enter with few preconceptions about the organization. Schultz (1977) found that in a community college environment external change agents are often instrumental in fostering change. University affiliated specialists can act as change agents in consulting with community colleges on needed change. They can assist with outreach programs, university based workshops, and seminars to, not only initiate change, but also help the faculty in adopting to the change. In addition, the external change agent can bring independence and prestige into the organization (Havelock 1973; Sikes, Schlesinger, and Seashore 1974). There is one key disadvantage to bringing in an outside consultant. The external change agent has no power base beyond what the administration is willing to grant; thus, leaving the institution free to accept or reject parts or all of the innovation under consideration (Firestone 1977).
Many studies have sought to identify change agents. In Hefferlin's (1969) study of change in higher education he identified the faculty and administrators as the most influential advocates interested in change. All of the planned change studies involve the concept of a change agent as the key factor in implementing change. Gross, Giacquinta, and Berstein (1971) pointed to administrators as major contributors to the success of implementing innovation. Zaltman, Duncan, and Holbek (1973) reaffirmed the critical role of administrators as change agents in the change process. Lindquist (1974) identified linking agents as individuals or groups that establish communication channels, and assist in bringing information about innovations to potential users. In an educational environment, linking agents are usually found among three types of individuals: 1) those who are abreast of new developments (referred to as cosmopolitans) who might serve as linking agents; 2) new members to the institution with fresh concepts; and 3) individuals involved in research. In a later publication, Lindquist (1978) discussed the role of the advocates of change and how they bring about change if they accept a new concept. He identified top level administrators and senior faculty as having the greatest influence. Evans (1967) established a hierarchy of potential users of innovation as: 1) innovators; 2) early adopters; 3) early majority; 4) late majority; and 5) laggards (p. 20). Change agents are found in the innovator and early adopter categories; therefore, these people would be targeted as individuals to take the lead in the change process.
Paul (1977) contended that although the change agent status may revolve around individuals in higher echelons of the organization, these individuals perceive more risk in change than do people below them in the organization (p. 60). Therefore, individuals in the lower echelon tend to be more receptive of innovations taking place outside the institution and will advocate those changes within the organization. However, the innovation needs to gain the support of higher level administrators to gain acceptance. It is interesting to note that Lahti (1979) found that community college administrators are more authoritarian than administrators in other sectors of higher education (pp. 12-16); consequently, once the concept has gained the support of the administration at a community college there will be significant pressure for adoption. This may also explain why community colleges are thought to be more innovative than other sectors of higher education (Office of Technology Assessment 1982).

Groups also act as change agents. A group can be an established unit (such as a standing committee or department) or one appointed to act on a particular situation (such as an ad hoc committee or task force). An appointed group can be constituted by the organization or self-appointed. A self-appointed group must establish and maintain its legitimacy to be effective. Jones (1969) contended that regardless of how the group arrives on the scene, the most effective group change agents are those that are internal to the institution (p. 40). However, in the community college environment the external forces have been found to be the key source of change.
Governing boards, advisory committees, and the community affect the community college decision making process. Community colleges have found that these external forces translate their demands by highly visible and political methods (Greenfield 1978, pp. 34-36; and Kimbrough and Nunnery 1976, pp. 51-58).

There are a number of non-personnel factors that may affect the implementation of innovation. An institution's fiscal resources is a variable that could potentially influence the implementation process. An innovation that is expensive for the institution to implement might meet greater resistance than an innovation that would be considered cost effective. Hefferlin (1969) found historical evidence, reaffirmed though his own research, that the resources available for change are one of the three major sources for change in higher education. The Columbia University studies (Mort 1946) and Rogers and Shoemaker (1971) maintained that the greatest predictor of school innovativeness was the cost per pupil. Gross, Giacquinta, and Berstein (1971) referred to the necessity for administrators to provide the resources to successfully implement an innovation. In a more recent research project, Dykes (1978) conducted a random sample of 100 faculty and found that their willingness to accept innovation was related, in part, to their perceived reward for participation. Kozma (1979) reported on a study investigating factors involved in the adoption and dissemination of classroom innovations by college faculty. He made a comparison between faculty given support (release time and financial compensation) for the development and implementation of innovation and a random sample of
faculty not given support for similar innovation. His findings indicated that support is necessary for the implementation of innovation. These studies and others document what most individuals have experienced at some point in their lives—that their ability to secure what they want is restrained by limited resources.

Another factor in the implementation of innovation is the character of the institution. Institutions, like individuals, develop a unique character. In relation to the acceptance of innovation, Evans (1967) classified individuals into five categories ranging from innovators to laggards. The same classification scheme could be applied to institutions. A number of authors have attempted to isolate the characteristics that typify an innovative institution. Burns and Stalker (1962, pp. 121-122) and later Lindquist (1978, p. 18) listed eleven characteristics of an innovative institution. These authors stated that an organic institution will tend to be more innovative than a mechanistic institution. Hage and Aiken (1970) listed seven factors that impede or enhance the ability of an institution to respond to innovation. A number of other authors, such as Peterson (1982, p. 127) and Palola and Padgett (1971, pp. 74-78) attempted to list the characteristics of innovative educational institutions. The general consensus of these and other authors was that innovative institutions: 1) are able to develop achievable goals, which are reviewed and modified periodically; 2) allow open communication; 3) have administrations that support innovative individuals; 4) provide a decision making process involving all constituencies; 5) have an
administration that is dedicated to the change process and willing to risk change; 6) maintain an organization that is futuristic in its orientation; and 7) are internally cohesive. In relation to the last point there is contradictory research evidence. Hefferlin (1969) and Bennis (1966) argued that instability creates an atmosphere conducive to change. The contradictory evidence might be explained by the fact that the various researchers were investigating different elements in the change process.

There is also contradictory evidence in the area of centralization versus decentralization of the decision making process. Blau (1973) stated that decentralization enhances institutional flexibility which may promote institutional innovativeness. Dill and Friedman (1979) and Lindquist (1978) contended that the implementation of innovation was enhanced by a less complex and more centralized administration. Here again, the difference of opinion may be due more to the different perspectives of the research than to any actual contradictory evidence. Blau was viewing the entire change process whereas Dill and Friedman and Lindquist were examining the implementation stage.

The final factor to be considered in the literature on the change process is the size of the institution. As noted before, Hefferlin (1969) found the greatest amount of change in small institutions, whereas Blau (1973) found more innovation in large institutions. These studies and other similar studies indicated that
there is little agreement as to how the size of the institution influences the change process.

Obstacles to Implementation

In reviewing the literature it becomes obvious that the implementation process is filled with many accounts of failure. Paul (1977) stated that regarding innovation, incomplete implementation is more common than successful implementation.

Levine (1980) proposed a model to explain how and why innovations are terminated or continued. Levine stated that the innovation process is composed of four stages: 1) the existence of the need for change created by an organizational dissatisfaction; 2) a plan is created to satisfy the recognized need; 3) the plan is initiated and implemented on a trial basis; and 4) the program is institutionalized or terminated. The process of change creates instability within the institution arising from the innovation's encroachment within the established boundaries. The result is that conflict is created when multiple sets of boundaries exist and compete for scarce organizational resources. The organization can resolve the conflict in one of two ways. The institution can adopt the innovation's norms, goals, and values, thus institutionalizing it (boundary expansion), or exclude the innovation's differences by either reformatting the innovation to the organization's norms (boundary contraction) or terminating it. Lévine stated that compatibility and profitability are two attributes of an innovation which will determine whether it will be institutionalized or terminated. Compatibility is defined as the extent to which the
innovation conforms to the existing boundaries. Profitability is how the innovation satisfies the needs of the organization. The more compatible and profitable an innovation is the greater the probability that it will be institutionalized.

The model was developed from Levine's study of the creation of an organizational subdivision labeled "colleges" at State University of New York at Buffalo. Levine studied the innovation (the creation of colleges) from the conception of the program through to the failure of the innovation to become institutionalized. The model proved to be accurate in its ability to explain the institutionalization or termination of an innovation.

Levine's model explained why some innovations fail to become institutionalized. According to the various studies relating to innovation, failure of implementation is made up of a number of subcomponents, such as resistance and lack of resources.

One problem in implementing innovation is the element of resistance. A number of authors (Lewin 1958; Hage and Aiken 1970; Zaltman, Duncan, and Holbek 1973) dealt directly with the problem of resistance. In fact, most authors who write in this area refer to the problem of resistance at least implicitly in their writing. Some authors offer solutions to the resistance problem. Lewin recommended that group standards instead of individual standards be altered to reduce resistance to the innovation. Zander (1961) suggested that resistance can be minimized via the change agent.
There may not be a common approach to solve the resistance problem in implementing innovation, but there is general agreement that the problem does exist. Nordvall (1982) summarized a number of other problems in implementing innovation. The initiation stage may consume most of the innovator's energy and leave the implementation stage without a leader's driving force to see the project through to completion (p. 40). To guard against this happening, Hook (1980) suggested that a plan for implementation should be developed during the initial efforts to introduce an innovation. According to Nordvall, there are some other problems that might develop during the implementation of innovation. Sometimes it takes years for an innovation to become institutionalized and the leadership could change during this time. If an individual leader is critical to the life of an innovation, it might not become institutionalized with the departure of that individual from the organization. Gross, Giacquinta, and Berstein (1971) pointed out that a lack of understanding or a lack of resources may impede the implementation of an innovation (p. 196). Finally, Zaltman, Duncan, and Gross (1973) indicated that an innovation may fail due to poor performance. Any change has an inherent risk that the new method or product may solve fewer problems than it creates. If it does, then support for the innovation will evaporate.

In order for an innovation to succeed all of the factors need to be either positively related to the innovation, or at least the negative elements have to be negated. The literature suggests that it is possible that an innovation will fail if any one of the six elements
described above is allowed to successfully challenge it. With this in mind, it is easier to understand why the implementation of innovation is, according to Paul (1977), more often incomplete than complete.

Summary

The review of literature has afforded us with several major points to bear in mind when examining the change process as it relates to an innovation. One issue is the division of the change process into several stages. Most authors and researchers on the subject now agree with Zaltman, Duncan, and Holbek (1973) that the change process has two major stages. The first stage is the initiation stage which encompasses all of the factors that bring about a decision to introduce an innovation. The second stage begins once a decision has been made to bring about change. The second stage is that of implementation which covers the adoption and institutionalization of an innovation. The preceding review of literature emphasizes the implementation stage; however, most of the research has been concentrated on the initiation stage. Much of what has been written about implementation has not drawn a clear line between the two stages; thus, a blur between the two stages makes the distinction somewhat arbitrary in many of the studies.

The organizing principle used in this review of the literature has been the four frameworks developed by Gamson (1974). The complex organization framework is one that correlates innovativeness in institutions with factors that characterize the system as a whole. Hage and Aiken (1970) and Zaltman, Duncan, and Holbek (1973) are two classical works examined under this framework. The diffusion framework
describes the manner in which an innovation filters down through a system until over a period of years the innovation is institutionalized. The work by Rogers (1962) is a classic in the study of the diffusion method. The planned change framework encompasses models that deal with efforts to introduce innovation through managed change. Lewin (1958), Bennis (1966), and Lindquist (1978) represented several of the more prominent authors whose works are classified under this framework. Finally, the conflict framework revolves around the concept that interest groups control the innovation process. An illustration of this framework is the case study by Baldridge (1971).

The research and models developed under the four frameworks were then analyzed to those factors that are often associated with the implementation process. The major factors that surfaced were: 1) internal and external change agents; 2) fiscal resources; 3) institutional characteristics; 4) centralization of the decision process; and 5) size of the institution.

Because the literature addressed problems associated with implementing innovation, a review of these obstacles was outlined. The problems were placed into categories of: 1) resistance; 2) lack of energy on the part of the innovator to implement after the initiation process; 3) change of leadership; 4) lack of understanding concerning the innovation; 5) lack of resources; and 6) poor performance by the innovation.

This review of the literature has outlined not only the problems, but also the prospects for implementing innovation. But,
limited amount of research on the implementation aspect of the change process suggests that more research is needed in order for the prospects of implementing innovation to brighten.
CHAPTER 3

METHODOLOGY

Case Study Research

The case study methodology was selected as the most appropriate technique for this study. Before discussing the procedure used in this research, it is appropriate to discuss some preliminary information which provides the basic rationale supporting the procedure. Some background information will be provided in this section in regards to: 1) research methodology in general; 2) the definition of case study research; 3) the rationale for selecting the case study methodology; and 4) some limitations regarding this methodology. This chapter will conclude with an examination of the procedure used in conducting the case studies involved in this research.

There are a wide variety of methodologies used to conduct research. In the social sciences the various methodologies can be grouped in two general approaches—logical positivism and phenomenology. According to Bogdan and Taylor (1975), the logical positivists seek "the facts or causes of social phenomena with little regard for the subjective states of individuals. . . . [T]he social scientist [is] to consider 'social facts,' or social phenomena as 'things' that exercise an external and coercive influence on human behavior" (p. 2). On the other hand, phenomenologists are concerned
with understanding human behavior from the perspective of the individual. Therefore, phenomenologists interpret human behavior as a product of how the individual sees their environment. Phenomenologists believe that human behavior cannot be understood without understanding the framework within which those being studied interpret their thoughts, actions, feelings, and motives.

The distinction between logical positivism and phenomenology is important as it relates to the rationale for selecting the case study methodology in conducting this research. Most social science research activities follow the logical positivist methodology of objectivity and deductive reasoning by attempting to minimize subjectivity and standardize the interpretations attributed to data generated from this method. Little emphasis has been given to phenomenologists who espouse a belief that perhaps the most important structures to understand might belong to those being studied. In fact, this dichotomy of methodology can be traced to the difference in a priori (inductive) and a posteriori (deductive) reasoning. Logical positivists emphasize deductive reasoning, which is a process of reasoning that makes the transition from one or several premisses to a conclusion. Phenomenologists, by contrast, emphasize inductive reasoning, in which assertions are inferred from observed facts (Eysenck, Arnold, and Meili 1972).

Owing to differences in the way researchers approach a problem, the methods that logical positivists and phenomenologists use are often disparate since they seek different answers. For example, logical
positivists search for facts and causes through analysis which produces quantitative data that is statistically analyzed to infer relationships among variables. Phenomenologists, on the other hand, often use qualitative methods, such as interviews, document analysis, and observations, to generate descriptive data that will demonstrate how those being studied view their world. The case study methodology tends to emphasize qualitative data and, therefore, is usually classified as being part of phenomenological research. In the statistically oriented environment in which we live, most research has been in the logical positivist tradition (Stake 1978). In fact, some researchers view phenomenological research as lower status than research involving statistical analysis. Is the case study methodology of less value than a study involving statistical analysis based on logical positivism? Not according to many authorities. As Zelditch (1970) states: "How can the 'goodness' of different methods [quantitative and qualitative] for different purposes be evaluated" (p. 497). Eisner (1981) reinforces Zelditch's position by arguing: "It is to the artistic [phenomenologist] to which we must turn, not as a rejection of the scientific [logical positivist], but because with both we can achieve binocular vision" (p. 9). The case study methodology is an appropriate research technique in situations in which complexity must be examined, or there is a lack of knowledge or theoretical base surrounding the event under investigation.

For purposes of this study, a case study was defined as "a process of research which tries to describe and analyze some entity in
qualitative, complex, and comprehensive terms . . ." (Wilson 1979, p. 448). Anderson et al. (1975) note that the case study is an intensive, detailed analysis and description of a single organism, institution, or phenomenon in the context of its environment.

Four characteristics are common to the case study methodology. One of the characteristics, according to Stake (1979), is that the case study is particularistic. That is, the case study focuses on a single entity (usually under natural conditions) so that a phenomenon associated with it can be better understood. The phenomenon is not something that is represented by statistical frequency distributions; rather, it is something complex that must be investigated beyond the bounds of statistical analysis in order to gain a better understanding of the phenomenon.

Another characteristic, according to Wilson (1979), is that the case study is holistic. The case study tries to capture the totality of the phenomenon. Therefore, the case study portrays the interplay of different factors that influence the case under study as well as presenting the views of the different groups involved. The objective of the research in the case study methodology is a rich description and deep understanding of the complexity and dynamic nature of the phenomenon.

The third characteristic of the case study is that it usually is longitudinal. That is, it traces an event over a period of time. The element of time allows a picture of the event to unfold. If the case study is not longitudinal, then it tends to be a record of a
moment in time, giving a "slice of life" vantage point to the
phenomenon being studied. In either situation, the case study provides
a detailed description of the phenomenon.

A fourth and final characteristic of the case study is that it
is usually qualitative in nature. As stated above in the discussion on
the difference between logical positivism and phenomenology, the case
study tends to fall in the category of phenomenological research due to
its emphasis on research techniques that are usually qualitative. This
does not mean that case studies are limited to qualitative methods, but
only that these methods (such as interviews and observations) are
usually the primary methods used in case study research.

The rationale for selecting the case study methodology in this
particular research project was quite simple. This study examined the
implementation of innovation in higher education. While a great deal
has been written about the change process, most studies have
concentrated on the initiation stage of the change process. Research
involving the implementation stage of the change process has been
limited. In addition, the change process does not have a single
theoretical basis that would normally serve as the framework for
conducting empirical testing. Consequently, the lack of knowledge and
theoretical base associated with the implementation stage of the change
process established the need for inductive research.

Not only was inductive research applicable in this situation,
but the case study is a form of inductive research that is being used
by a growing number of researchers. Spirer (1980) contends that the
case study methodology is growing in acceptance as a form of inductive research because there is disenchantment among researchers of the traditional experimental designs that so often find "no significant difference," and there is a need for research designs that develop an understanding of complex problems. Since the case study is an appropriate design for understanding complex problems, the case study is seen as a method that meets the needs of a growing body of researchers. Spirer summarizes the value of case study methodology in stating that:

In sum, the case study, which usually relies on qualitative methods, provides a richness of information that reflects the dynamics of the program. From a methodological viewpoint, the case study method should allow evaluators to avoid meaningless or misleading questions because they can (1) formulate problems as the evaluation progresses, i.e., they are not bound to \textit{a priori} questions; (2) modify data categories constantly, making them more suitable to analysis; and (3) reduce the distortion of variables that may be difficult to quantify by using quantitative methods. Last, the case study is perceived as having heuristic value. The information obtained through a case study is both rich and rewarding and may be used to define concepts, generate hypotheses, and ground new theory for further testing.

The case study methodology is appropriate in attempting to develop more information about the implementation stage of the change process since this methodology's strengths are congruent with the needs of the study. The lack of knowledge and theoretical base in this area, as well as the complexity of the problem, suggested an inductive research technique such as the case study.

To be sure, there are intrinsic limitations and problems related to case study research that need to be acknowledged. One of
the problems of case study research, according to Mouly (1963), is obtaining dependable data upon which valid interpretations can be generated. Gaps in the information collected are bound to exist; thus, the researcher must make every effort to limit the gaps to a point where they do not threaten the validity of the information base. Van Dalen and Meyer (1966) point out another problem of case study research. They emphasize that a researcher's personal biases can influence the interpretation of information. The researcher must guard against personal bias by reporting the facts as precisely and objectively as possible.

The major limitation of case study research is its generalizability. The principles of statistics establish that the findings of limited samples cannot be assumed to accurately reflect what one would find if they studied all of the population. According to Kazdin (1982), two events, the development of the Studentized "t" test in 1908 by Gosset and R. A. Fisher's book on statistical methods in 1925, persuaded most researchers to abandon the case study methodology in favor of more sophisticated techniques, such as analysis of variance, which could be generalized to the population under study. The reason that case studies cannot be generalized to the population concerns the problem of external validity. In this study, it is impossible to know how accurately the three case study institutions (the accessible population) reflect other institutions in higher education (the target population). Therefore, it is not possible to infer with a high degree of certainly that what happened at these
institutions would also be expected to transpire at other institutions. Case study research is conducted because a lack of a knowledge base suggests a need for exploratory (or preliminary) studies in this area.

Since the case study methodology cannot be used to generalize to the population, does that mean the findings have no meaning beyond the case at hand? Stake (1978) argues that if the research is in harmony with the reader's experience and knowledge, then a natural basis for generalization does exist. Kennedy (1978) takes a similar position in stating that the judgment for the appropriateness of generalization is to be made by the user. If the user finds sufficient similarity between the case study and the point of comparison, then a generalization is appropriate.

Procedure

This section discusses the application of the case study methodology and is divided into three major areas which elaborate on the procedure used in this study. The first area covered is the preliminary work that was done in preparing for the actual case studies. This includes information about the setting of the boundaries and determining the units of analysis. The second area pertains to the selection of the sample. The third major area discussed addresses data collection and analysis, including how data was collected through the use of interviews and document analysis.

Establishing Boundaries

The setting of the boundaries amounts to setting the limits of the research. One method of establishing boundaries is to define the
terms used in the study. A problem that arose early in the preliminary planning stage for the research was the definition of "educational technology." Broadly defined, use of the blackboard could be considered as part of educational technology. The use of the term "new" in relation to the phrase educational technology assisted in limiting the area to be examined, but this term also had to be defined. The work by Rogers and Shoemaker (1971) assisted in defining "new" in relation to the research. They state that something is new if the idea, practice, or object is perceived by the individual or organization as being new. Consequently, one institution might consider computer-assisted instruction as new even though another institution might have implemented the technique many years before.

Given that the phrase educational technology had been limited in a general sense by the term "new," consideration then had to be given to how to further define the phrase "new educational technology." In other words, in relation to the proposed research, what type of educational innovations would qualify as new educational technology? It was determined that innovations would have to have a significant impact upon the instructional program of an institution in order to be classified as new instructional technology. For example, the purchase of a computerized multi-pen plotter would not normally qualify, as it would not make a significant change to the instructional program.

An additional limitation was placed on the phrase new educational technology. Only innovations that involved video or computer technology were considered, since it was generally agreed that
The more significant technological innovations in higher education are concentrated in these two areas. This view was supported by the Office of Technology Assessment (1982), as this federal legislative panel stated that the most profound changes were taking place in computer and video technology.

In summary, the definition for the term "new" was borrowed from Rogers and Shoemaker which provided a broad perspective to its application. However, the phrase "educational technology" was narrowly defined for this study to only significant innovations in video and computer technology.

Sample Selection

The selection of a sample in case study research is different than in statistically-based deductive research where random sample is generally used. Case study research often uses the guidelines of what Glaser and Strauss (1967) call "theoretical sampling." That is, comparison groups (in this case, institutions) were selected based on their relevance to the research question. In terms of this study, this meant that only institutions that had implemented innovations of new educational technology qualified for the sample. In addition, the first level of selecting the sample attempts to minimize differences in the sample (such as same type of institution and same geographic area). Therefore, in order to restrict the extraneous variables and obtain a more homogeneous sample for this research project, consideration for inclusion in this sample was limited to institutions of higher education in the Southwest. While any region could have been selected
as the geographic area in which to conduct the research, accessibility had to be considered as a factor in conducting the research. Since the researcher lives in the Southwest, that region became a natural selection. The sample was also limited to community colleges because, according to the Office of Technology Assessment (1982), they exhibit the greatest ability to be innovative and adopt new approaches to education.

The second level of selecting the sample attempted to maximize the differences (for example, institutional size and environment) among institutions. Selecting the sample for the research was a process of trying to obtain a number of various elements to be represented by the sample. Ideally, the institutions should be geographically dispersed. In addition, they should represent a variety in the type of communities in which they are located, from small rural communities to metropolitan areas. Relatedly, community colleges selected would be expected to range from rather small institutions, which would have a modest number of faculty and administrators, to larger institutions with more complex organizational patterns. A wide variety of community college types and locations would provide a cross-section of the community colleges in the Southwest and therefore maximize the differences in the sample.

The process of obtaining the actual sample consisted of the researcher inquiring through professional contacts and organizations (such as the New Mexico LRC Council and the League for Innovation in the Community College) for case study sites that might fit the established criteria. Since the case study methodology requires an
intensive and detailed analysis of the subject, it was impossible in relation to the time and financial resources that were available to select a large number of institutions in which to conduct the case study research. Therefore, it was decided that three case studies would provide the information needed to conduct an analysis that would meet the criteria discussed above. The three community colleges that were selected for the sample were Vernon Regional Junior College, New Mexico Junior College, and Dona Ana Branch Community College - New Mexico State University. These community colleges are geographically dispersed across the Southwest and provided the variety of characteristics that were desired for this research project, as amplified by the following descriptions.

**Vernon Regional Junior College.** The first case study was conducted at Vernon Regional Junior College (VRJC), which is located at Vernon, Texas, a small city of 12,000 population in north Texas. The local economy is based primarily on agriculture. Vernon Regional Junior College was founded in early 1970 when the electorate of Wilbarger County created the Wilbarger County Junior College District and approved a property tax for the establishment of a new community college. Campus construction began in 1971 and led to the building of an Academic Science Center, Administration-Fine Arts Center, Applied Arts Center, Learning Resource Center, and Student Activities Center. In 1984 Vernon Regional Junior College had an enrollment of 1,863 students.
Vernon Regional Junior College was established for the purpose of making readily available postsecondary educational programs that are compatible with a wide spectrum of community needs in the north Texas area. The primary mission of the college is to extend educational opportunity to people of all ages by providing: 1) vocational, technical, and semi-professional programs which will prepare individuals for employment in the business, industrial, and professional community; 2) courses acceptable for transfer to four-year colleges; 3) courses for adults who desire to enhance their skills, learn new skills, or improve their personal efficiency; and 4) services that enrich the social and cultural environment of the students and community. To meet these objectives, VRJC offers classes leading to a Certificate of Completion and degrees in Associate of Arts, Associate of Science, Associate of Fine Arts, and Associate of Applied Science. Students in academic transfer programs must complete 63 semester hours, including 38 total hours in English, history, political science, natural science, and mathematics. Students who desire vocational training can select from fifteen different programs, including Agricultural Power Equipment Technology, Electrical Systems Technology, Cosmetology, Farm and Ranch Management, Paramedicine, and Vocational Nursing. A wide variety of continuing education classes are offered, ranging from aerobic dancing to workshops for the professional employee.

Following the opening of the college in August 1972, a learning center was established in 1973-74 and located in the town of
Burkburnett. The purposes of this learning center was to make educational opportunities available to a greater number of prospective students in the north Texas area. In the following academic year additional learning centers were developed in the north Texas communities of Seymour, Iowa Park, and Quanah.

From 1972 through the mid-seventies, Vernon Regional Junior College also expanded its physical plant at the Vernon campus with the addition of a Physical Education Center and Student Residence Center. In addition to construction of on-campus centers, Vernon Regional Junior College continued to expand its presence throughout the region through offering various programs. A North Texas Skill Center (referred to now as the Career Development Center) was established at Wichita Falls and the Vocational Nursing Program was enlarged with annexation of the Greenbelt School of Vocational Nursing in Crowell and the Bethania School of Vocational Nursing in Wichita Falls. During the 1975-76 academic year, Vernon Regional Junior College expanded its services to include a learning center at Sheppard Air Force Base in Wichita Falls. Thus, within a span of four years, Vernon Regional Junior College had expanded its off-campus learning centers to cover a large area of north Texas (Vernon Regional Junior College Catalog 1984-1985).

Since its founding in 1970, Vernon Regional Junior College has expanded its services to provide academic, vocational, and continuing education opportunities to the residents of a twelve-county region of north Texas. Especially through the expansion of its off-campus
programs and services, it has attempted to fulfill its responsibility as a regional community college.

The innovation of interest for this research was VRJC's application of computer technology in the instructional and student service areas. In the instructional area, microcomputers were purchased to develop a computer lab and placed at the Career Development Center, in addition to curricular development in data processing, office occupations, and the design and drafting courses. The application of microcomputer technology to design and drafting courses is labeled "Computer Aided Design" (CAD) which, according to Watcke (1982-83), is considered a high technology application of drafting. Microcomputers were purchased for the registrar's office to assist with student records and registration. All the microcomputer equipment and related software was purchased as a institutional effort to develop a compatible system of educational tools.

Dona Ana Branch Community College. The second case study was conducted at Dona Branch Community College, which is in Las Cruces, New Mexico. Las Cruces is located in Dona Ana County and lies approximately 45 miles north of El Paso, Texas. Las Cruces has a metropolitan population of over 90,000. The White Sands Missile Range and New Mexico State University (NMSU) dominate the local economy. Dona Ana Branch Community College is a two-year campus of NMSU located on the New Mexico State University campus and serves the community college needs for the southern area of New Mexico. Dona Ana Branch
Community College was founded in July 1973 and as of the Spring Semester of 1985 had an enrollment of 736.

The establishment of Dona Ana Branch Community College can be traced back to 1965 when Dona Ana County was designated as an appropriate area for a vocational-technical school on the basis of a feasibility study conducted by New Mexico State University and the New Mexico State Department of Education. After approval by the New Mexico Board of Educational Finance (the state higher education coordinating board), a local tax levy was approved by the electorate of Dona Ana County in April, 1973. Subsequently, Dona Ana Branch Community College became an official entity on July 1, 1973 as a branch campus of New Mexico State University (NMSU) at Las Cruces under the Branch Community College Act of New Mexico.

The purpose of Dona Ana Branch Community College is to provide training to individuals in skills that will lead to employment. As a designated area vocational school, various programs are offered for those persons for whom employment appears to be available. Advisory boards for specific programs provide industry input regarding the type of skills required by industry so that vocational courses can offer training that is relevant and necessary.

Dona Ana Branch Community College has established five objectives in its effort to provide educational opportunity. The objectives are to provide: 1) occupational training programs to meet the needs of persons of all ages preparing to enter the labor market; 2) retraining for persons in the labor market who need to upgrade or
change their skills; 3) occupational training programs for high school juniors and seniors on a cooperative basis with local public schools; 4) adult basic education services; and 5) community service programs (Dona Ana Branch Community College 1984-85 Catalog).

Students attending Dona Ana Branch Community College can enroll in either occupational noncredit programs or in programs leading to an Associate Degree. Occupational noncredit programs include automotive trades, building trades, emergency medical technician, heating and air conditioning, microcomputer technician, office education, retail marketing and distribution, and welding. Students can obtain an Associate Degree with majors in architectural drafting, occupational business, radiologic technology, secretarial/administrative support, water utilities, and word processing (Dona Ana Branch Community College 1984-85 Catalog).

The Branch Community College Act of New Mexico indicates that a branch campus should be located about 100 miles away from the parent institution. Of the nine branch campuses established in New Mexico under the Act, Dona Ana Branch Community College is a unique community college in that it is located on the campus of New Mexico State University, its parent four-year institution. This has the advantage of allowing the Dona Ana Branch Community College students access to New Mexico State University facilities and services, such as the library, housing, and student activities. Students at the community college also enroll for their academic courses at the parent campus, thus eliminating duplication of faculty and facilities between the
community college and the main campus. Another advantage is that faculty at the community college have access to courses at NMSU for professional development. In general, students and faculty at Dona Ana Branch Community College can enjoy advantages of a four-year campus environment while attending a community college. The major disadvantage that Dona Ana Branch Community College has in being located on the campus of its parent institution is that of establishing its own identity. The building housing the community college is modern, attractive and functional; however, it is only one of many buildings located on the main campus. Many students attending New Mexico State University are unaware of the existence of the community college on their campus. Despite an identity problem, Dona Ana Branch Community College provides needed occupational training for hundreds of students from throughout southern New Mexico (Smith 1984).

The word processing program was the subject of investigation at Dona Ana Branch Community College. The Department of Secretary Administration at Dona Ana Branch Community College has recently purchased a number of computer word processing systems in association with a redesign of their curriculum which established a new major in word processing. During the 1981-82 school year, a Word Processing Center was built to house the computer equipment which supports the word processing program. The Word Processing Center contains six different computer word processing systems from three different vendors. In 1982, the United States Department of Education awarded a
Certificate of Merit to Dona Ana Branch Community College for their development and implementation of a Word Processing Center.

**New Mexico Junior College.** The final case study was conducted at New Mexico Junior College. The campus of New Mexico Junior College (NMJC) is located at Hobbs, New Mexico, a city of 30,000 residents. Hobbs is in the extreme southeastern area of New Mexico. In 1984 NMJC enrolled 2,594 students.

The establishment of NMJC can be traced back to 1963 when the New Mexico state legislature passed the Junior College Act, giving authority to school districts to create, with voter approval, junior college districts. In October of 1964, the first election in New Mexico to create a junior college district was held in Lea County. In this county, the voters of Hobbs, Lovington, Eunice, and Tatum school districts approved a tax levy to fund the operation of a junior college. New Mexico Junior College became an official entity on July 1, 1965. Another election was held within the newly established junior college district on August 17, 1965, for the issuance of general obligation bonds. This successful election provided funds for the construction of various campus facilities. In 1979, another bond election provided funds for expansion of Caster Activity Center and Pannell Library Instructional Resources Center (New Mexico Junior College Catalog 1984-85).

The passage of various general obligation bonds has provided financial resources for New Mexico Junior College to construct a modern campus of over 243,000 square feet of floor space on 243 acres. New
Mexico Junior College has been fortunate in that the junior college district is located in the Permian Basin, one of the nation's richest oil and gas fields. The junior college district provides a generous tax base of $1.3 billion with a .004 mills tax rate for the junior college to assess in constructing and operating the institution. Thus, in addition to a healthy tax millage provided by citizens of the junior college district, the petroleum industry provides strong financial support for NMJC. In fact, the petroleum industry shoulders a large share of the tax burden to support New Mexico Junior College (Community and Junior College Journal 1984).

The mission of New Mexico Junior College is to provide a variety of life-long learning opportunities for the people of the junior college district. An array of learning experiences are offered throughout the junior college district service area. In providing educational opportunity within the junior college district, NMJC has attempted to take into consideration the educational and cultural diversity of the population and needs of communities, business, and industry. The college provides opportunities for the individual in the areas of: 1) personal growth and development; 2) job skills development; 3) professional development; and 4) courses leading to a certificate or associate degree.

Students attending New Mexico Junior College can obtain a certificate of completion in a variety of fields such as Automotive Line Mechanics, Building Trades, Intensive Machine Tool, and Welding. An Associate of Applied Science degree can be earned in areas such as
Medical Laboratory Technician, Nursing, and Petroleum Technology. In addition, degrees are offered in Associate in Arts and Associate in Science, which require a wide variety of academic courses (New Mexico Junior College Catalog 1984-85).

The subject of investigation at NMJC was the implementation of instructional television. The college has implemented "telecollege," a variety of instructional courses offered through television to facilitate learning in distance locations from Hobbs and make courses more convenient for individuals who have difficulty in attending classes on campus. The telecollege courses originate from the Public Broadcasting System (PBS) and are transmitted via a PBS station serving eastern New Mexico (KENW-TV). Students enroll in class and have the option of either viewing the televised production at home or viewing video tapes made of the broadcast. Video tapes of the PBS broadcasts are made by NMJC and are available on campus and other locations in the area for students to view.

The above three institutions met the objective of diversity in the sample as they provided a fairly wide range of institutional size and environments. Patton (1980) provides a justification for using a strategy of diversity in the sample. He states that in attempting to increase the variation in the sample, the researcher will have more confidence that those patterns that do emerge as common to all sites can be generalized to the population while variations that emerge which are unique to a certain type of institution will assist in the application of those findings to similar institutions. In addition, if
the research can isolate a number of common factors in implementing change, then there will be a greater possibility that these factors are unrelated to institutional size or environment.

Data Collection and Analysis

An important aspect in conducting research for a case study was determining the method of collecting data. In this study, data collection was based on interviewing, observing, and unobtrusive data gathering (such as reviewing documents related to the innovation). By interviewing, searching and discovering clues, observing, and interpreting evidence, a meaningful picture emerged. The same pattern of data collection was used at each institution.

The first step in data collection was to contact an individual at the institution under study who was directly involved with the innovation. This individual was asked for information about other individuals (such as opinion leaders, change agents, and resistors) involved in implementing the innovation. From this information, a list of individuals was compiled. These individuals were contacted and were asked for other individuals directly involved in the change process. Through this procedure, the researcher had some degree of confidence that all individuals directly involved with the implementation of the innovation were identified and interviewed.

The second step in collecting data was to schedule an on-site visit to each institution. The purpose of the on-site visit was to conduct interviews with individuals from the list generated in the first step. A letter was sent to each person to be interviewed,
explaining the nature of the interview and establishing the date of the on-site visit. The letter also asked for any documents relating to the implementation process.

The third and final step was actual data collection. Data was collected in three phases. First, interviews conducted during on-site visits to the institutions provided most of the information. Then follow-up visits were conducted to interview individuals not contacted by the first visits and to fill in gaps that emerged in the data. Finally, telephone interviews were conducted to fill in additional gaps in the data. Through this three phase process, a fairly complete picture of the implementation process developed by the time the case study was completed.

As described above, interviewing individuals involved with the implementation of the innovation under study was the primary method of collecting data. At Vernon Regional Junior College, nine people were interviewed in relation to the implementation of a microcomputer system. Faculty represented areas of drafting, office occupations, business, and data processing. In addition to the faculty, individuals from the registrar's office, president's office, business office, learning resource center, and the Dean of Instruction were interviewed.

Nine people were interviewed at the Dona Ana Branch Community College about their word processing program. Those interviewed included the Director and Associate Director of the Dona Ana Branch Community College, and the coordinator and faculty of the Department of Secretarial Administration.
At New Mexico Junior College, ten interviews were conducted in relation to the implementation of instructional television. Interviews were conducted with the administration, a member of the telecollege faculty, a former division chair, the Coordinator of Non-Traditional Programs, the former Telecollege Coordinator, personnel in the Instructional Resources Center, personnel at KENW-TV who provided the programming for instructional television, and the former Dean of Continuing Education at Eastern New Mexico University.

A conscious effort was made to interview individuals from a variety of areas so no particular viewpoint (such as administrative or faculty) would dominate data supplied by an institution. Interviews ranged from forty minutes to one and one-half hours. During the interviews open-ended questions were asked to give the respondent latitude in answering questions. To ensure objectivity in the interview process, the open-ended questions were general in nature and a conscious effort was made to avoid leading questions. Open-ended questions enabled the interviewees to discuss the change process freely. Follow-up questions were asked to focus the discussion on key points of the study. A conscious effort was made to ask each respondent basically the same questions so that data from other interviews could be verified or contradicted. In general, most of the data was verified by each respondent. When contradictory evidence was obtained, an effort was made to find out if other individuals supported this viewpoint. In most instances, no one else was found to support a minority viewpoint, so the researcher classified this information as
non-substantiated data, which was not included in the case study. In a rare instance when contradictory evidence was substantiated, the interviewer had to determine which evidence fit the logical pattern of implementation. In general, the interviewer felt that he was obtaining factual data, because the vast majority of data was verified.

While interviewing provided much of the information, it did not provide all of the data. Records pertaining to the implementation of the innovation were searched for additional clues. Committee and board minutes were especially useful in obtaining data. Observations of how individuals and organizational units on campus related to the innovation provided additional information. As the data was collected it was analyzed to see what information was lacking. This, in turn, generated a need to collect more data about the event. The process of collecting data, analyzing data, and collecting different types of data is sometimes referred to as triangulation. Triangulation affords the researcher the ability to view an event from a variety of perspectives. For example, data about an event might be obtained from interviews and documents. This information is compared and analyzed against each other to obtain a clearer picture of the event. Triangulation continued until the researcher had a sense that a fairly complete picture of the event had been recorded. This method of triangulation meant that each type of data used provided a different perspective of looking at the same phenomenon. These findings led to new areas of inquiry. After visiting each site, data was further analyzed and then another on-site visit to each campus was conducted to obtain additional
data. The triangulation method was again used to refine the information. In addition, the second visit gave interviewees another opportunity to provide information and bring factors involved in the change process into better focus as individuals had time to evaluate their initial responses.

The next aspect of the case study methodology to be discussed in greater detail is the analysis of data. The analysis of data in case study research differs from other methodologies in that in other methodologies data analysis consists of a discrete activity. Data is first collected and then it is usually entered into a computer which processes the information to produce a statistical analysis from which conclusions are drawn. Bogdan (1972) describes the process used in case study research:

as the researcher is in the field and recording his [her] notes, he [she] begins focusing on certain recurrent themes, which are revealed in observed behavior, [documents], and verbalization. Certain understandings begin to develop and sociological concepts are drawn upon to make sense out of the situation. Working hypotheses become refined and new concepts are developed. In many cases the analysis of the themes direct the observer in his [her] field work and help determine the areas in which he [she] will spend his [her] time (p. 58).

Thus, the data was collected and analyzed at the same time. As this process was conducted inferences were drawn, new questions raised, and themes and patterns developed that modified the scope and focus of the research. Obtaining information from different vantage points and methods confirmed or contradicted the ongoing findings, thus indicating to the researcher areas in which to narrow or expand the research. It was this method of continual triangulation that developed an accurate
reflection of what actually occurred at the institution in relation to the implementation of the innovation.

After all of the data was collected, a more intensive analysis of the data was conducted. This analysis was done through a comprehensive review of all the separate datum. As data was reviewed, new insights emerged. It was at this point that additional notes were made to record new patterns obtained from the data. The objective of the detailed analysis was to isolate factors that were associated with the implementation of innovations.

A coding system was used in organizing and analyzing data that was obtained by on-site visits. The coding system was designed so that each piece of datum was classified and recorded on a separate index card. In this way, data could be shuffled around in order to examine each piece of datum from different perspectives. The data collected was classified into two general categories relating to the research questions of: 1) factors associated with implementation; and 2) change agents associated with implementation. The data was then subdivided into the following categories of: 1) approach of implementation, classified as, complex organization, diffusion, conflict, or planned change; 2) change agents; 3) resistors; 4) organizational characteristics; 5) financial resources; 6) centralization of decision making process; and 7) boundary expansion. These seven categories provided a general direction in which to conduct a search for information about the implementation process and were based on major factors found in previous research. These categories were further
subdivided as required by the data. Records were maintained on the
supplier of the information, the method used to obtain the information
(interview, observation, or documents), and location. Finally, a
master list with sequential numbers of all interviews, observations,
and documents served as a permanent log for the case studies.

In summary, the case study methodology is a special form of
research. Most methodologies rely upon deductive research to develop
quantitative data that is statistically analyzed to infer relationships
among variables. The case study methodology attempts to gain a greater
understanding of individuals and how they interact to their
environments through inductive research that relies on qualitative
data. Case study research is a comprehensive study of an event. The
event in this case study was the implementation of an innovation at
three diverse community colleges in the Southwest. Through on-site
visits to each institution data was collected and analyzed. The object
of the research was to isolate and identify factors related to the
implementation of innovations.
CHAPTER 4

FINDINGS

The findings of the case study research are presented in this chapter. The case studies discussed in this chapter focus on the implementation of: 1) a microcomputer system at Vernon Regional Junior College; 2) the educational technology associated with word processing at Dona Ana Branch Community College; and 3) an instructional television program at New Mexico Junior College. Each case study will be examined individually in this chapter, with the format for each case study consisting of two major sections. A brief overview of the implementation process will be presented in the first section, followed by a chronological examination of events and forces that brought about implementation of the innovation under investigation. The chronological presentation, which is the major focus of this section, provides an orderly structure of events that took place. In addition, this sequential format draws attention to cause and effect relationships. In the second section, a systematic consideration of factors found to be present or absent during the implementation process are discussed. By moving from a discussion of individual events in the first section to a general consideration of factors in the second section, each case study will progress from the particular to the general.

85
Implementation of a Microcomputer System at Vernon Regional Junior College

The innovation studied at Vernon Regional Junior College (VRJC) was the implementation of a system of microcomputers in three areas within the institution. First, in the instructional area, microcomputers were implemented in office occupations, drafting, data processing, and the computer lab. Second, in the student service area, the registrar's office purchased a microcomputer, and third, microcomputer technology was obtained by off-campus programs. The two off-campus programs were the Learning Center at Sheppard Air Force Base and the Career Development Center at Wichita Falls.

Overview

The implementation of a microcomputer system at VRJC was the result of a decision made by the drafting program, the registrar, and the Learning Center in relation to computer technology. For various reasons, which will be discussed later and in more detail, these areas independently decided that they were not satisfied with their current state of computer technology, and they began advocating the implementation of improved computer technology. The first area to make this decision was the drafting program in 1979. From 1979 through 1982, proponents for change were isolated individuals advocating either additional mainframe computer capacity or microcomputer technology. However, as the movement gained momentum proponents joined together to press for a microcomputer system that would serve the entire institution. In the fall of 1983, the Dean of Instruction appointed a
Study Committee to investigate and make recommendations regarding the financing and type of computer equipment and software that would best serve the entire institution. The recommendations of the Study Committee were adopted by the administration and Board of Trustees which approved the purchase of a microcomputer system.

The microcomputer equipment and related software at VRJC was purchased through the recommendation of the Study Committee which orchestrated the selection, location, and implementation of the new technology. The same equipment could have been purchased by individual departments, but the Study Committee decided to design a comprehensive microcomputer system for the college. The equipment was purchased for eight areas and consisted of: 1) seven microcomputers and two printers for the computer lab; 2) one microcomputer, printer, and plotter in the drafting program for development of Computer Aided Design (CAD); 3) two microcomputers for the Learning Center at Sheppard Air Force Base; 4) two microcomputers for office occupations; 5) one IBM Displaywriter for word processing; 6) one microcomputer and printer for the registrar's office; 7) one microcomputer and printer for the Career Development Center at Wichita Falls; and 8) related software (Study Committee documents 1984). The implementation process was completed in January 1984. Before discussing the implementation of this microcomputer system in detail, several terms associated with computer technology that impact upon the case study at Vernon Regional Junior College require definition.
Definitions

One key definition is the term microcomputer. A microcomputer is a computer that contains a central processing unit (CPU) built as a single semiconductor chip or a small number of chips, as opposed to a mainframe CPU which is composed of many semiconductor chips. A microcomputer also has memory for storing programs and data, input and output (I/O) interfaces for the exchange of data with peripheral devices (such as printers) and timing devices to control the flow of data within the computer. Microcomputers are known as personal computers as many people have purchased these computers for home use because of their small size, cost, and ability to function as a "stand alone" system; that is, they do not have to be attached to a larger computer system to function. Another term relevant to this case study is mainframe computer. A mainframe computer is the cabinet that houses the CPU and main memory. It is separate from its peripheral devices and terminals. The mainframe computer typically has a much larger memory than a microcomputer, but microcomputer memories have rapidly expanded in recent years (Ralston and Reilly 1983).

Outdated Technology

Before the implementation of a microcomputer system at VRJC, the college could be described as lagging behind many other similar institutions in regard to the application of computer technology. While some institutions were purchasing the latest in computer technology, VRJC had made no concerted effort in this direction. The Director of the Learning Resource Center/Associate Dean of Instruction
stated that efforts of other colleges to implement microcomputer technology had a positive effect on the development of a microcomputer system at the college. As she put it: "There was a feeling that Vernon Regional Junior College was not offering the same opportunities in computer technology as other colleges. We certainly wanted to provide our students with the same benefits as other colleges, but we did not have the computer technology available to do so on our campus" (Interview, May 2, 1984). An instructor from the drafting program echoed similar sentiments: "Before we purchased these microcomputers there were only a couple of Apple personal computers on campus, and they were not tied directly to the instructional program. I knew that other colleges were using computers in the instructional program. I felt that we should be doing the same here at Vernon" (Interview, April 24, 1984). The purchase of the microcomputer system brought VRJC to the forefront in educational computer technology, especially in the drafting program. After the implementation of microcomputer technology at VRJC, the drafting instructor surveyed all seventeen community colleges in Texas that offered drafting. He found that his own program provided the most sophisticated and technologically advanced computer techniques (Interview, May 2, 1984). In a relatively short period of time, VRJC developed from an institution lagging behind in computer technology to one that was, in some respects, ahead of many other similar institutions.

The development of enhanced computer technology at Vernon can be traced to several circumstances which set the stage for
implementation of microcomputer technology. One such circumstance was the inadequate performance of the mainframe computer. The college owned a mainframe computer which, in addition to performing administrative tasks, was being used as a teaching tool in data processing classes. When the mainframe computer was purchased it had the capacity to serve both areas adequately. However, increased enrollments in data processing, along with increased administrative use, overtaxed the ability of the mainframe computer. The mainframe could carry out only a relatively few activities within a short period of time. When a data processing class and administrative offices were interacting with the mainframe simultaneously, the computer could not process the information in a timely manner. The registrar became very frustrated over this situation. He expressed the problem as follows: "The waiting times became so long that we were forced to use the computer in the evening and on weekends. Of course, that situation did not lend itself to improved office morale" (Interview, May 2, 1984).

The data processing instructor confirmed that the mainframe was not meeting the institution's requirements: "The [mainframe] computer was not able to adequately handle both the administrative tasks and what my class needed. It was very frustrating for our students" (Interview, May 2, 1984).

Waiting periods for students and administrative offices alike created frustration and established a desire by faculty and administrators to search for a solution to the problem with the mainframe computer. Not only was there frustration exhibited by
individuals using the mainframe, but its limited capacity negated the possibility of other areas enhancing their computer technology through accessing the mainframe computer. The limited capacity of the mainframe computer was especially evident to the data processing instructor. As she related the situation: "With the problems we were already experiencing with the mainframe, there was no way we could consider adding additional loads to the computer. In my opinion we simply had to move in a different direction" (Interview, May 2, 1984). In effect, the mainframe was limiting computer development throughout the entire institution. The registrar thought the problem might be solved by purchasing another mainframe computer, which would lighten the load for the original computer. Others, such as the data processing instructor and the drafting instructor, preferred microcomputer technology (Interviews, May 2, 1984). These different approaches to solving the problem remained until the Study Committee resolved the issue.

Advocates of Improved Computer Technology

According to the Dean of Instruction, the first person to advocate the purchase of enhanced computer technology was the drafting instructor (Interview, May 2, 1985). The drafting instructor had attended a workshop sponsored by the Texas Education Agency at the University of Houston in 1979 which discussed Computer Aided Design (CAD) (Interview, November 28, 1984). CAD is a process of design in which the designer creates an image on a computer terminal screen with a light pen or similar device. The image can be duplicated on a
graphics printer (Stokes 1983). Microcomputer technology is used to apply CAD techniques in drafting. Workshop personnel predicted that this new technology not only would replace older drafting techniques, but that industry would require CAD skills of their employees. This prediction shortly proved to be prescient, as related by the drafting instructor: "When two of my graduates could not find the type of work they were seeking in the Houston area because they lacked CAD skills, I decided that we had to offer that training in our program." Once the drafting instructor decided that his program needed to offer microcomputer technology, he needed the financial support to make this technology on the VRJC campus a reality. He appealed to the Dean of Instruction for financial support to purchase a microcomputer with CAD capability, so that he could teach CAD techniques to his students (Interview, May 2, 1984). Financial constraints made it impossible for the Dean of Instruction to purchase a microcomputer for the drafting class but the request did help establish movement toward enhancing computer technology at VRJC. As the Dean of Instruction related: "Here we had a program saying they could do a better job of instruction and placing graduates with some new technology. I didn't know much about microcomputers at the time, but I was interested in learning more about how these computers could be used in our instructional program" (Interview, May 2, 1984).

It is important to understand the motivation by the drafting instructor to successfully place graduates. The placement of graduates from a vocational program into meaningful and skill related employment
is critical to a community college. One of the primary missions of a community college is to train students in vocational programs with employable skills. If a vocational program is not accomplishing this mission, then the viability of the vocational program is at risk, which could even lead to the program being terminated. An instructor in a program that is having difficulty in placing graduates understands that the institution cannot continue to support a program that is not productive. An instructor in this situation seems likely to be motivated to address this problem, as was the drafting instructor at VRJC. The Dean of Business Services confirmed the importance of a community college placing graduates with appropriate skills into industry in stating: "Our vocational programs must impart the skills demanded by industry. Otherwise they lose their value as a training program. This translates into loss of enrollment, which reduces our revenues. With reduced revenues we have to scale-down our programs. To avoid this situation, we must keep pace with industry." He added that the two primary methods of knowing what skills industry demands of community college graduates are from feedback obtained from graduates and industry advisory boards which provide industry input into the curricular development of vocational programs.

The Dean of Business Services explained that college advisory boards are comprised of representatives from industry and instructors from a particular vocational area. Industrial representatives interact with and advise vocational instructors as to industry needs. With these sources of information, a community college can tailor its
programs to industry need. If a community college fails to place its graduates, then it fails to meet one of its primary missions (Interview, May 2, 1984). There was evidence that VRJC attempted to meet the needs of industry as articulated by advisory boards. The Dean of Business Services, the Dean of Instruction, and the drafting instructor told how advisory boards communicated industry needs, which helped motivate VRJC to enhance its computer technology. In short, advisory boards did influence the decision to develop a microcomputer system at VRJC (Interviews, May 2, 1984).

One factor in the movement to improve computer technology at VRJC was the influence of a former mathematics instructor. He also was instrumental in influencing the decision to select microcomputers in lieu of expanding the mainframe computer. The Dean of Instruction commented about the former mathematics instructor in stating: "The one person who really got me to do some serious consideration of microcomputers was a former math instructor. He was always telling about how they could be used in our instructional program" (Interview, May 2, 1984). The data processing instructor also made reference to the influence of this same former mathematics instructor in initiating discussions concerning the use of microcomputers as instructional tools. The data processing instructor presented her frame of reference in stating: "I was not on campus at that time, but I have heard how a former math instructor tried to generate interest in microcomputers" (Interview, May 2, 1984).
During the fall and spring semesters of the 1980-81 school year, this former instructor attempted to develop interest among the faculty and administration, especially the Dean of Instruction, in using microcomputers in the educational process. He would discuss informally the advantages of microcomputers, in relation to mainframe computers, with other members of the faculty as well as administrators. Conversations would take place over coffee in the snack bar and in other informal settings. Through this approach, he was successful in informing others on campus about microcomputers and planting the seeds that later developed into a movement away from expanding the mainframe and toward implementing a microcomputer system. He believed that microcomputers and not mainframe computers would surface as the favorite system for educational application. He also envisioned use of microcomputers as a method of attracting more students. He believed that students would be attracted to courses that offered an opportunity to work with high technology (Interviews, May 2, 1984).

After a number of discussions with the mathematics instructor, coupled with the previous request from the drafting instructor, the Dean of Instruction became convinced of the need for VRJC to move forward in computer technology. As he put it: "The math instructor and the drafting instructor convinced me that microcomputers were the wave of the future. I thought that this institution should provide these computers as part of our instructional program." In advancing this idea, the Dean of Instruction presented a proposal for a microcomputer lab to the Administrative Council in the spring of 1981.
The proposal, however, was defeated (Interview, May 2, 1984). According to the registrar and the Dean of Instruction, one reason the proposal was not favorably received by other administrators was that the administration was still considering further development of the mainframe computer to meet the educational needs of the campus (Interviews, May 2, 1984). The development of the mainframe computer never took place, according to the registrar, because even though there was a general dissatisfaction with the computer's limited capacity, there was not a consensus of opinion on the best approach to solving the problem (Interview, May 2, 1984).

The Dean of Instruction remained firm in his conviction that microcomputers should become part of the instructional program at VRJC. After receiving Title VI federal funds from the Texas Education Agency in 1982, the Dean of Instruction purchased three microcomputers and established a small microcomputer lab. While this small computer lab laid the groundwork for future computer development, this limited effort did not satisfy the advocates of enhanced computer technology. The computer lab did not meet their individual needs for more modern computer technology. For example, the computer lab did not have CAD capability to meet the needs of the drafting instructor (Interviews, May 2 and November 27, 1984).

At the same time the Dean of Instruction was attempting to develop a computer lab, there was movement in relation to computers in another area on campus. In particular, the registrar was becoming increasingly anxious to improve the efficiency of his office, since the
The registrar's office was one of the administrative offices adversely affected by the slow mainframe computer response time. Attempting to maintain student records and conduct registration at the various distant learning centers as well as the Vernon campus proved to be a difficult task without proper computer assistance. In light of this need, the registrar decided that he needed to implement improved computer technology. Accordingly, he began searching for methods of realizing his goal. He knew that being alone in his endeavor he would not be able to move toward newer computer technology. He needed the understanding and support of others on campus to convince the administration that there was a genuine need for improved computer technology. He went about developing understanding and support for this decision through circulating periodical articles on computer technology among his colleagues. The registrar noted: "I tried to read as much as I could about new computer technology. When I found an interesting article I would send it to others on campus who I thought might also be interested in reading it. I thought that we could all benefit from learning more about computers" (Interview, May 2, 1984). There was considerable evidence suggesting that this type of activity assisted in establishing a climate favorable to new computer technology among those involved in the development of a microcomputer system. According to several individuals interviewed, including the drafting instructor and the Dean of Instruction, the circulation of articles by the registrar helped inform them about developments in the computer field (Interviews, May 2, 1984).
By 1982, three individuals on the campus of VRJC—the mathematics instructor, the registrar, and the drafting instructor—had advocated change in the institution's position regarding computer technology. In 1982 VRJC hired a new data processing instructor. She joined with other advocates in calling for the enhancement of computer technology at the college. She argued that students enrolled in data processing courses needed exposure to microcomputers. The rationale was that many employment opportunities in this field required basic microcomputer skills (Interviews, May 2, 1984). At the same time the faculty at the Sheppard Learning Center was advocating the purchase of microcomputers to assist them with instruction. The faculty felt that microcomputers would assist in meeting the individualized instructional needs of the diverse student learning levels at Sheppard (Interview, May 2, 1984).

As the above events indicate, there was not just a single incident that sparked the decision made by the faculty and administration that their current technology was not satisfactory. A number of forces converged to kindle a desire by some faculty and administrators to implement new computer technology. General dissatisfaction with the performance of the mainframe computer that was serving the campus did not persuade personnel at VRJC to disavow computer technology, but fostered a search for more efficient computer technology. A number of individuals at VRJC were watching developments in computer technology to see if computers could solve their problems. Technological advances in the computer industry were leading to
increased computer capabilities and lowered equipment costs. In turn, microcomputers were becoming more attractive as a cost-efficient educational tool. In fact, the capabilities of microcomputers were advancing to the level of some older mainframe computers. When coupled with their lower cost, this made microcomputers an especially attractive alternative to mainframe computers.

The Converging of Forces

The movement toward implementing microcomputer technology gained momentum as a number of these forces began to converge. The Dean of Instruction reported that some secondary schools in the Vernon area had discontinued offering drafting courses as part of their curriculum as a result of a decline in student interest in drafting. This caused a corresponding enrollment decline in the drafting program at VRJC. According to the Dean of Instruction, he and the drafting instructor discussed ways to increase the drafting program enrollment. Since several graduates of the Vernon drafting program could not obtain suitable employment without CAD skills, the Dean of Instruction and the drafting instructor determined that implementing this new technology was the best method of enhancing enrollment. As the Dean of Instruction related: "I discussed the problem of low enrollments in the drafting program with the drafting instructor. He understood the problem and proposed that we implement Computer Aided Design as a means of attracting more students into the program as well as teaching a skill area that is in demand by industry" (Interview, May 2, 1984).
There was some urgency felt by the drafting instructor and the Dean of Instruction to address the declining enrollment in drafting. The Dean of Instruction was concerned about meeting the mission of the college in training students with marketable skills and solving the budgetary problem associated with declining enrollments. He was also concerned about the continued viability of the drafting program in the face of declining enrollments. The Dean of Instruction asked the drafting instructor to investigate CAD programs at other institutions (Interview, May 2, 1984). The drafting instructor initiated the planning process for CAD technology when he visited Amarillo College, South Plains College, Oklahoma City University, and Northeastern Oklahoma State University to investigate how CAD was used at these institutions (Interview, May 2, 1984).

Until the spring of 1983, there were four isolated areas--the registrar's office, data processing, the drafting program, and the Learning Center at Sheppard--that had decided they were not satisfied with their present state of computer technology (or lack of it in some instances) and wanted access to improved computer technology. The movement toward a consolidated effort began in the spring of 1983 when a formal request for purchase of microcomputers was made by the Learning Center at Sheppard to the Dean of Instruction. When the Dean of Instruction received the request from the Learning Center, he knew that as the chief officer of the instructional program he could not address their request without considering the computer requirements of the entire educational program. He had already made a preliminary
commitment to the drafting program (Interview, May 2, 1984). Thus, the administration felt compelled to examine the entire issue of computer technology in their educational services, instead of attempting to solve the problem on a fragmentary basis. In this manner, each area would be treated equitably in implementing new computer technology. However, several problems had to be overcome before implementation could take place.

Problems Associated With Implementation

The Dean of Business Services provided some background on what the problems were and how they were addressed to implement the microcomputer system. According to the dean, one problem that had to be addressed involved the type of computer technology (additional mainframe capacity or microcomputers) the institution should purchase. Dissatisfaction with the mainframe computer instilled a desire to, in some way, create a system that could meet the needs of all affected areas. Another problem was finding financial resources available to fund the implementation of an enhanced computer system. These two key problems had to be resolved in order to implement an enhanced computer system (Interview, May 2, 1984).

The first step to resolve the financial problems relating to the implementation of a microcomputer system was taken in late spring of 1983. The college applied for and received approval for a three-year Title VI federal grant distributed by the Texas Education Agency for the improvement of vocational equipment. This effort was done independently of the institution's move toward a campus-wide
computer system because, at the time the institution applied for and received these federal funds, there was no comprehensive plan to develop a computer system. However, these funds, which were external to the normal operating budget, became part of the solution later in the implementation process as these funds became an important source of revenue for the purchase of microcomputers (Interview, May 2, 1984).

Once VRJC received the grant funds a stalemate developed. Despite the presence of funds, no action was taken by the Dean of Instruction regarding the expenditure of federal grant funds that had been allocated. In retrospect, it was probably fortunate that these funds were not immediately expended for equipment in the vocational area as these funds later became the funding source to acquire an institutional microcomputer system. As the institution entered the fall semester of 1983, there was still no action regarding the expenditure of funds. The fall semester brought large enrollments in the data processing classes which proved to be a serious problem, since the computer equipment available was inadequate to meet the program's requirements. During this time in which the implementation was not moving forward, frustration by the students and instructors was beginning to build. Students and instructors alike needed additional computer assistance for their classes, but the administration was not responding to this need. Through informal channels of communication, the Director of the Learning Resource Center/Associate Dean of Instruction became aware of the building frustration by the faculty and
responded by calling for a committee to address the issue (Interview, May 2, 1984).

This was a critical point in the implementation process. A long delay in implementing the microcomputer system might have allowed frustrations to surface, which could have led to a reexamination of the entire project. The registrar and drafting instructor credited the Director of the Learning Resource Center/Associate Dean of Instruction with salvaging the entire effort of improving computer technology at VRJC. As the drafting instructor stated: "All the credit belongs to [her]. She interjected herself into the process at a critical point. A number of faculty were anxious to see some movement in this area. Without her we may not have gotten the system implemented." The registrar echoed the position of the drafting instructor: "She assumed responsibility to get the project moving again" (Interviews, May 2, 1984).

The Study Committee

In October 1983, the Dean of Instruction responded to increasing pressures for action by forming a Study Committee to make recommendations regarding the funding and type of technology and equipment to be purchased for the institution (Interview, June 19, 1984). In short, the movement toward implementing computer technology at VRJC was precipitated by pressure placed on the administration by a frustrated faculty. The objectives for change sought by the faculty was communicated through informal channels by the Learning Resource Director/Associate Dean of Instruction to the administration. Once
there was a clear understanding of the desire for change the administration responded by forming a Study Committee. This new committee replaced an older campus committee. According to the Dean of Business Services, there had been a Data Processing Committee (a standing committee) which made recommendations regarding the purchase of the mainframe computer, but it had ceased to function after the mainframe was installed. Since there was some sense of urgency to respond to pressures for change and the needs were different from the time the mainframe computer was purchased, the administration decided to form a new committee instead of attempting to reconstitute the Data Processing Committee. The Study Committee was headed by the Dean of Instruction, and included the drafting instructor, the data processing instructor, an office occupations instructor, the registrar, and the Learning Resource Center Director/Associate Dean of Instruction (Interview, May 2, 1984). It is important to note that the composition of the Study Committee included representatives from the administration, academic support, faculty, and student services. In addition, all individuals who had expressed interest in developing new computer technology were appointed by the Dean of Instruction to the committee.

Some institutions might have simply allowed each department to purchase the type of equipment they wanted. VRJC established a committee with representatives from all affected areas to address the computer requirements of the institution. According to the Director of the Learning Resource Center/Associate Dean of Instruction: "The
philosophy at VRJC has been that any equipment purchased must be compatible with other equipment on campus. So, any equipment purchased for a department must be compatible with overall campus needs. Consequently, all the software is compatible and better bids are obtained when larger orders are placed." (Interview, June 19, 1984).

The Study Committee held three formal meetings during the fall semester of 1983. One of the major questions before this committee was whether to add another mainframe computer with additional terminals or purchase microcomputers. The data processing instructor advocated microcomputers (Interview, May 2, 1984). Some of the other committee members were not convinced as to which type of system would be more advantageous to VRJC. The registrar stated: "Computer technology is a very complex area, and I was not sure whether our institution would be better served by another mainframe or microcomputers" (Interview, May 2, 1984). To help resolve this question, vendors were invited to make presentations to the committee. Several members of the committee, including the registrar, Director of the Learning Resource Center, and Dean of Instruction made several trips to Wichita Falls in late 1983 to learn more about computer systems from various vendors. As indicated above, recent technological developments had suggested that microcomputers would be more cost-effective than mainframe computers in relation to the intended use at VRJC. The committee became convinced after discussions with vendors that the college would be better served with microcomputers rather than attempting to upgrade the mainframe computer. This decision accomplished the goal of determining what type
of computer equipment would be best suited for Vernon Regional Junior College (Interviews, May 2, 1984).

The second major decision to be determined by the Study Committee involved funding. VRJC did not have a surplus of funding available for the microcomputer project. The committee decided to use the previously obtained three-year Title VI federal grant, distributed by the Texas Education Agency, to fund the implementation. The major disadvantage of using this source of funds was that it would take three years to fully implement the microcomputer system. However, it was the only viable option as the college had no other source of funds. The committee also decided which areas would receive microcomputers. The committee decided to enlarge the computer lab and place computers in drafting (creating Computer Aided Design), data processing, office occupations, word processing, the registrar's office, and the Career Development Center at Sheppard (Interviews, May 2, 1984). Once the matter of funding had been resolved, the committee had completed its objectives and turned their recommendations over to the administration (Interviews, May 2, 1984 and January 25, 1985).

There was evidently little or no disagreement among the Study Committee members and no resistance from the rest of the campus to the action being taken by the committee (Interviews, May 2, June 19, October 17, and October 19, 1984). As the Director of the Learning Resource Center/Associate Dean of Instruction explained: "Everyone who wanted microcomputer equipment not only received what they needed, but they had input into developing the total package. Everyone felt that
it was their idea." (Interview, June 19, 1984). Each area that had expressed interest in obtaining computer technology was represented on the committee and helped shape the final recommendation. Each area obtained the type of equipment that it wanted. As an instructor from office occupations explained: "I could not have been more pleased with the committee. I got exactly what I wanted" (Interview, October 19, 1984).

It is important to note there was no evidence of resistance to the implementation of a microcomputer system. The manner in which the system was implemented aided in the elimination of resistance. If some areas within the institution had wanted enhanced computer technology, but were left out of the process this might have given rise to some resistance problems. By incorporating all areas that wanted newer computer technology into the process, resistance was eliminated.

Final Approval

After the Study Committee finalized its recommendations, the Dean of Instruction presented them to the Administrative Council. They supported the microcomputer system and forwarded the proposal to the Board of Trustees. The Dean of Instruction presented the proposal for a microcomputer system to the Board of Trustees at their December 1983 meeting. At the meeting there was a minimum of discussion about the value of the proposal among board members. As related by the registrar who attended the meeting: "There was really very little discussion among the board members. Everyone seemed to agree that improving our
computer technology was something that the college ought to do" (Interview, January 25, 1985). The Board of Trustees supported the plan, as they recognized that the college needed to enhance its computer technology. The board also wanted the college to immediately implement the purchase of the microcomputer system. Using federal funds would have required the purchase of the microcomputer over a period of three years, since the money would have been available through the Texas Education Agency over three years. Instead, the board moved that the college borrow the money from a local bank at favorable interest rates and purchase the entire system for immediate implementation. The Board stipulated that the college could repay the loan from Title VI funds over three years (Board minutes, December 1983). Since the chairman of the Board of Trustees was a local bank president, the loan could be arranged without any undue problems (Interviews, May 2, 1984 and January 25, 1985). The Dean of Instruction reported: "It was an extremely advantageous development for the college. We could obtain the computer technology we wanted without having to wait three years to complete the system. Not many colleges could obtain this type of support from their boards" (Interview, May 2, 1984).

The support that the administration of the college gave to the microcomputer system was an important component to its successful implementation. Once the recommendations were made by the Study Committee, the administration and board moved quickly to assure successful implementation. The financial arrangement developed by the
board was certainly a clear indication that they strongly supported the immediate implementation of a complete microcomputer system.

After the board had approved purchase of the microcomputer system the Director of the Learning Resource Center/Associate Dean of Instruction took the initiative and began the ordering process by taking on the role of mediator between the vendors and each affected area. In this way, each area had input as to what equipment features were best suited to their needs. The tailoring of microcomputer equipment and software expanded their capability within the instructional program. For example, the drafting program added Computer Aided Design to its curriculum. Office occupations expanded its offerings to include word processing. The data processing program broadened its instructional program to include microcomputers skills. The Learning Center at Sheppard augmented its instructional capability for individualized instruction through microcomputers (Study Committee documents 1984).

Once the various microcomputer feature requirements for each area were established, the Director of the Learning Resource Center/Associate Dean of Instruction formulated the bid specifications. She had previous experience in formulating bid specifications and therefore the college thought she would be the logical person to handle the details of purchasing the equipment. From that point it was simply a matter of the college awarding bids and the installation of microcomputers in the designated areas by the vendor. Purchase orders were issued during December 1983 and January 1984. The equipment was
installed in January 1984, thus completing the implementation process which began in earnest with the establishment of a Study Committee in October of the previous year (Interviews, May 2, 1984).

Consideration of Factors at Vernon Regional Junior College

In conducting this research regarding the implementation of a microcomputer system at VRJC, the goal was to identify factors and change agents associated with the implementation of the microcomputer system. The following section is divided into a discussion of: 1) external factors; 2) internal factors; 3) change agent; and 4) a brief summary. Several factors surfaced during the investigation. The analysis of factors will begin with a discussion of external factors associated with the implementation of a microcomputer system at Vernon Regional Junior College.

External Factors

The evidence suggests that external forces placed pressure on VRJC to move toward purchasing microcomputers. There was evidence that recent technological advances in the computer field made the purchase of microcomputers very attractive. Increased capacity and flexibility of microcomputers, coupled with decreasing cost, created an environment favorable toward the purchase of microcomputers. In addition, industry played an important role in the decision by VRJC to implement a microcomputer system. Community colleges maintain an awareness of skills demanded by industry through advisory boards and placement of graduates. Advisory boards are comprised of representatives from industry who interact with and advise instructors in various vocational
programs as to industry needs. It became apparent, through input by advisory boards and placement of graduates, that industrial employers were beginning to demand certain microcomputer skills of potential employees. One of the primary missions of a community college is to provide students in terminal degree programs with the skills necessary to obtain employment in their specialty. Some of the graduates from drafting and data processing were beginning to experience difficulty in obtaining suitable employment. Instructors in these areas began to lobby with the administration for the purchase of improved educational tools.

Another external factor that influenced VRJC was that other colleges were purchasing microcomputers. There was a desire by the personnel at VRJC to provide the same level of technology as other institutions. These forces influenced several individuals to decide in favor of improved computer technology.

The factors of technological developments in the computer field, advisory boards, and other colleges obtaining more advanced computer technology were present before the decisions were made to implement improved computer technology at Vernon Regional Junior College. Their presence before the decisions to implement means that these factors have to be considered as part of the initiation stage and not part of the implementation process that was the focus of this study.

One external factor that was part of the implementation process was the influence of journal articles. Several people cited the
distribution of journal articles among the faculty and staff at Vernon Regional Junior College as influencing the environment in a positive manner toward the acquisition of enhanced computer technology. The registrar circulated journal articles as a means of generating support in his effort in obtaining better computer assistance for his office.

Another external factor that influenced the acquisition of microcomputers was the ability of VRJC to obtain funding for the microcomputer project. The funds were obtained from outside the college operating budget. Since internal funds did not have to be shifted to purchase the microcomputer system, individual departments were not adversely affected. This point was critical in the implementation process, since at VRJC the federal funds made it possible to acquire the system without infringing upon the financial resources of any area, thereby eliminating one potential obstacle to the implementation process.

Internal Factors

One key internal factor at Vernon was the elimination of boundary disputes. In many cases of implementing innovations, one or more areas are adversely affected by reducing their area of responsibility and thereby increasing the potential for resistance to the innovation to develop. At VRJC the innovation benefited a number of areas across campus and did not adversely affect the activity of any other areas. The result was that a potential problem of resistance to the innovation was eliminated.
Another factor that paved the way for implementing the microcomputer system was that all affected parties had input into the development of the microcomputer system. This allowed all concerned areas to play a role in the development of the system and all these areas indicated that they were satisfied with the final system. Since everyone was satisfied, there was no resistance to the implementation of a microcomputer system.

The elimination of boundary disputes and allowing for input by all affected parties created another factor which aided in the implementation of a microcomputer system at Vernon Regional Junior College. That factor, which has already been referred to indirectly, is the minimization or elimination of resistance. Resistance is very detrimental to successful implementation. An institution that reduces or eliminates resistance will find that implementation proceeds in a smoother fashion. At Vernon Regional Junior College, resistance was eliminated through the elimination of boundary disputes and providing a structure (a Study Committee) which allowed input into the implementation process by all affected parties.

Several organizational characteristics at VRJC also seemed to enhance the implementation process. The relatively small size of the college encouraged communication among departments regarding their computer needs. Through informal channels of communication the Dean and Associate Dean of Instruction became aware of the campus-wide need for advanced computer technology. When the implementation process stalled, the Associate Dean of Instruction became cognizant of the
problem and took action to start the process moving again. On a larger campus, the problem might not have been addressed in such an efficient manner.

One other aspect relating to institutional size was the declining enrollment in the drafting program. The impact of enrollment decline in a program affects a small college more adversely than it does a larger institution. At VRJC, the declining enrollment in the drafting program placed pressure on the drafting instructor and Dean of Instruction to look for ways to generate additional enrollment in the program. The drafting instructor viewed Computer Aided Design as a possible solution to the problem and advocated its implementation in the drafting program. The Study Committee responded to this need as they allocated microcomputers to various areas throughout the institution.

The implementation of microcomputers at VRJC was a decentralized effort. No single constituency orchestrated the change process. Instead, all the affected areas worked together to develop and implement the system. The Study Committee included representatives from the administration, academic support, faculty, and student services. Once the Study Committee articulated the campus needs, the administration supported the recommendations before the Board of Trustees, who assisted the implementation process with a unique financial arrangement. In general, all the constituencies involved in the implementation process saw the benefits of the proposed system and supported its implementation.
The decentralized effort in implementing a microcomputer system indirectly refers to the hierarchy involved in the approval process. There was a limited hierarchy consisting of four levels associated with the approval process. The first level in the hierarchy to approve implementation of a microcomputer system was the Study Committee. Their recommendations were forwarded to the Dean of Instruction, who carried the recommendations to the Academic Council and finally to the Board of Trustees. This smooth four-step hierarchy assisted in the implementation of a microcomputer system.

The implementation process received strong support from the administration of the college. Both the administration and the board supported the implementation of a microcomputer system. The board even assisted in developing a method of funding the projects. This administrative support was a contributing factor in the successful implementation of the project.

Change Agent

Several different constituencies had an effect on the change process. One cannot overlook the fact that the change might not have reached maturity without the facilitating role played by the Director of the Learning Resource Center/Associate Dean of Instruction. This individual rekindled the implementation process by calling for the formation of the Study Committee when the implementation process had stalled. She interacted with faculty to identify their needs and allowed them an opportunity to articulate their requirements. In this manner she nurtured the aspirations of the faculty and they in turn
moved the entire process toward implementation. Her actions were in response to faculty demands.

The faculty also influenced the change process. The mathematics instructor advocated the use of microcomputers in the instructional program. The drafting instructor and data processing instructor responded to enrollment pressures by urging the administration to address the problem with enhanced computer technology. It was the faculty who advocated change in computer technology to keep pace with industry demands. The faculty at Sheppard requested microcomputers for their instructional program. This request was the catalyst in the formation of the Study Committee. The majority of members on the Study Committee were faculty representatives. In general, the faculty played an advocacy role throughout the implementation process. The evidence suggest that the faculty has to be considered the primary change agent in the implementation of a microcomputer system at Vernon Regional Junior College.

In summary, a microcomputer system was implemented at Vernon Regional Junior College because: 1) there was significant pressure for change, such as declining enrollments in drafting and expanding enrollments in data processing; 2) the information about computer technology was disseminated through periodical articles; 3) the technology was appropriate since microcomputer capability and flexibility was expanding while cost was decreasing; 4) some traditional problems associated with the implementation process, such as boundary disputes and resistance, were eliminated; 5) the financial
resources for implementation became available through a federal grant and the cooperation of a local bank; 6) each affected area not only contributed to the development of a microcomputer system, but also benefited from the system; 7) the Director of the Learning Resource Center/Associate Dean of Instruction assumed responsibility for the finalization process; 8) the limited hierarchy associated with the approval process; 9) the administrative structure of the institution supported the innovation; and 10) the faculty, acting as the change agent, advocated the implementation of microcomputers as a means to improve instructional application of computer technology.

Implementation of Word Processing Curriculum and Technology at Dona Ana Branch Community College

The innovation investigated at Dona Ana Branch Community College was the implementation of new educational technology associated with the word processing curriculum within the Secretarial Administration Program. The word processing curriculum was developed to provide training to students wanting to learn word processing skills. Word processing is produced through computer technology. Computers with specially designed programs allow an individual to create, edit, store, update, and print documents with greater ease and flexibility than using a conventional typewriter.

Overview

In 1978 the Coordinator of the Secretarial Administration Program began urging the administration at Dona Ana Branch Community College to consider expanding her program into the new and rapidly
developing field of word processing. After a feasibility study and several on-site visits to organizations that were using word processing technology, the administration give final approval to add word processing to the curriculum. As the program grew, both in number of students and in equipment to support the curriculum, the need for additional space became apparent. A Word Processing Center was constructed in response to the needs of the growing program. This facility houses the equipment used to support the word processing curriculum.

To gain a better perspective of the development of the educational technology associated with the word processing curriculum, a chronology of equipment purchased for the Word Processing Center is as follows: 1) in 1981, two Lanier TE 3 and two CPT 8000 word processors were purchased; 2) in 1982, ten IBM 5520 word processors, three IBM Displaywriters, and two more Lanier TE 3 word processors were purchased; 3) in 1983, two more IBM Displaywriters were purchased; and 4) in 1984, two Lanier 8500 word processors were purchased to replace the older CPT equipment. This equipment was added to the three magnetic card typewriters and one IBM System 6 that were purchased before the development of the Word Processing Center. In all, over a quarter of a million dollars was spent in constructing the Word Processing Center, plus another quarter of a million dollars was expended in equipping the Word Processing Center with six different word processing systems (Interview, July 31, 1984). Students majoring in word processing receive training in operating one word processor
each semester and in the six different word processing systems before they graduate and enter the labor market (Interview, June 11, 1984).

The Word Processing Center was officially opened in February 1982. In October of the same year, the United States Department of Education awarded Dona Ana Branch Community College a Certificate of Merit: "For the Development and Successful Implementation of an Outstanding Vocational Education Program in Word Processing" (Certificate 1982). The Certificate of Merit was the culmination of an implementation process that began in 1978 when Dona Ann Branch Community College decided to develop a word processing program. The Word Processing Center represents the combined efforts of the administration, coordinator, and faculty of the Secretarial Administration Program to develop a comprehensive word processing program. These individuals worked together to not only implement a word processing curriculum but also to provide the educational technology on which the skills are taught as well as to develop a facility to house the program.

The Secretarial Administration Program could have developed like many other programs in secretarial administration that emphasize traditional typing skills and offer only a limited number of courses in word processing. Instead, the Secretarial Administration Program at Dona Ana Branch Community College was a forerunner in implementing a program in which students could major in word processing. Many of the nation's 1200 community colleges are now implementing word processing components in their secretarial programs; however, at this writing, the
program at Dona Ana Branch Community College is only one of sixty-two programs in the nation that offer a major in word processing (The College Blue Book 1983).

The development of a word processing curriculum and the purchasing of equipment necessary to support the curriculum are very closely associated. The curriculum could not function properly without the equipment, nor would the purchase of equipment make much sense without the curriculum in place. At Dona Ana Branch Community College a new facility was constructed to provide a modern environment in which to house both components of the program. There were in essence three program components that developed in close relationship to each other: the curriculum, the educational technology to support the curriculum, and the facility to house the program. Although this study focused on the implementation of new educational technology in the Secretarial Administration Program, some attention was given to the development of a word processing curriculum and the Word Processing Center. This was necessary because of the way these three areas interacted with each other.

Early Development

The Secretarial Administration Program was originally organized under the College of Business Administration and Economics at the main campus of New Mexico State University. With the establishment of Dona Ana Branch Community College in 1973, the program was transferred to the two-year campus (Interview, August 22, 1984). The first step in developing a word processing component in the Secretarial
Administration program was begun in 1975 when the college purchased two memory typewriters. These typewriters could store limited amounts of text that could be recalled and typed automatically. This was not true word processing as it is known today, but it did provide primitive elements of word processing. Until that point, training in secretarial skills was accomplished with a number of standard typewriters. Two years after the memory typewriters were purchased, the department added three magnetic card typewriters (Interviews, June 11 and July 31, 1984). These newer and more sophisticated typewriters added a new dimension to the program. They were forerunners of computer application to typing, which resulted in true word processing capabilities that were successfully developed in the Secretarial Administration Program at Dona Ana Branch Community College.

The Coordinator as an Advocate for Change

Why has this small community college been so innovative in providing training in a newly developing field while many other institutions have made less progress in this area? The major difference, according to both faculty and administrators interviewed, was the initiative and innovative perspective of the Coordinator of the Secretarial Administration Program. This individual had the foresight to recognize that employers would demand word processing skills of future graduates. The coordinator was willing to advocate changes necessary to implement the innovative curriculum and to upgrade the technological equipment necessary to support the new curriculum. The Director of the Dona Ana Branch Community College stated: "[The
[The coordinator] is, to a large degree, responsible for the development of the word processing program. She came to the administration with the proposal to develop a word processing program because she felt employers would need secretaries with this skill. She has worked along with [the word processing instructor] to see it carried-out" (Interview, June 11, 1984). An instructor in the Secretarial Administration Program supported this viewpoint. As she put it: "[The coordinator] is without doubt the individual responsible for the successful development of the word processing program. She pushed the concept before the faculty and administration. She has been able to get about everything she wanted" (Interview, June 11, 1984).

The Associate Director agreed with the others in identifying the coordinator as largely responsible for the development of the word processing program. However, he did so with some reservation in stating: "I don't want to take anything away from [the coordinator], because she has done a great job in developing her program. However, the administration is also responsible for some of the success she has experienced." As this administrator pointed out, the coordinator was fortunate the administration supported her innovative requests. The Associate Director emphasized the role of the administration: "In reading various journal articles, the administration was aware of the changing technology in secretarial administration and the necessity for this institution to respond by updating the equipment in that area. Therefore, when the coordinator requested word processing equipment, the administration was willing to support development in this area"
(Interview, August 22, 1984). The assessment by the Associate Director was that administrative support of the proposals by the Secretarial Administration Program was critical to their successful implementation.

The Associate Director related that the administration was not only willing, but able to support her because financial resources were available to the administration to make the implementation of a word processing program possible. The Director illustrated the role finances has played in the development of the word processing program: "This program was very expensive to implement. The Office System 6 cost $20,000. That was for one piece of equipment. Every time you buy [word processing] equipment, you buy obsolescence, because the field is changing so fast. Fortunately, we have had the resources to support the development of the program" (Interview, June 11, 1984). The coordinator may have been fortunate in receiving administrative support and funding for her proposals, but she is still the individual that recognized the need and showed the initiative in developing proposals that changed the training emphasis in the Secretarial Administration Program. However, implementing a word processing program was not easily accomplished.

In the implementing of innovation, there seems to be some condition or set of conditions which establish an environment conducive to change. In this case, one of the conditions that sparked the movement toward the implementation of a word processing curriculum with related equipment was professional literature in secretarial science. While reading professional journals, the coordinator noticed that many
articles emphasized that secretaries needed word processing skills in order to keep pace with technological developments in the secretarial field. She was candid in explaining her initial reaction to the thought of developing a word processing program that would fulfill this need: "At first, I just could not bear the thought of attempting to develop a word processing program. I am close to retirement and I just did not want to become involved in such an energy consuming project. However, when I considered the skills that our students would need to find suitable employment, I felt compelled to develop this technology in our program." (Interview, June 11, 1984).

The compulsion felt by the Coordinator of the Secretarial Administration Program to keep pace with technological developments becomes understandable in light of the role of a community college. As previously noted, one of the major missions of a community college is to provide graduates in vocational areas with employable skills. By maintaining good job placement with graduates that possess the latest technological skills, a community college maintains a positive image with employers. As long as a program is successful in placing graduates that program will continue to attract students. The desire by the coordinator to keep her program current with technological developments provided the motivation to develop a word processing curriculum, with related equipment, which later translated into the development of a Word Processing Center.

There also is evidence that the advisory board to the Secretarial Administration Program played a role in the development of
the word processing curriculum. The Director of the Dona Ana Branch Community College stated that the advisory board encouraged the development of a word processing program. As he put it: "A representative on the advisory board from Sandia Laboratories was especially emphatic in promoting development of a word processing program. She felt that demand from industry for graduates with word processing skills would justify our development of the program" (Interview, June 11, 1984). Advisory boards provide input from industry regarding vocational curriculum development. They are in a position to provide input, because they are usually aware of trends and technological developments within industry and can alert a vocational program about programmatic changes that are needed to keep pace with industry. The discussions by the advisory board augmented general literature on the subject of word processing and helped establish a favorable climate among administrators for approval of the request by the coordinator to begin purchasing equipment in this area (Interview, June 11, 1984).

Program Approval

The first step in initiating a word processing program began in 1978 when the coordinator discussed with the Associate Director of Dona Ana Branch Community College the need to develop a word processing curriculum. She argued that journals in the field of secretarial science predicted that future secretaries would need word processing skills as part of their repertoire. As an institution that prepares future secretaries for employment, they needed to begin offering word
processing as part of their curriculum (Interview, June 11, 1984). The Associate Director supported the addition to the curriculum and referred the project to the Director of the Dona Ana Branch Community College. While the Director was not opposed to development of a word processing curriculum, he did require the coordinator to conduct an extensive feasibility study of the need to provide this type of training at the Dona Ana Branch Community College (Interview, June 11, 1984). He required the Secretarial Administration Program to conduct a feasibility study which included: 1) an extensive review of literature; 2) community surveys; and 3) state and federal labor market projections. In interviews, both the Director and Associate Director stated that they were aware of the need for a word processing curriculum before they received the request from the Coordinator of the Secretarial Administration Program. The Director related: "When [the coordinator] came to us with her proposal to develop a word processing program, that was not the first time we had heard of that technology. We read journals also, so we knew of the growing demand in this field" (Interview, June 11, 1984). The Associate Director supported this perception: "The administration was aware of potential program development in word processing before [the coordinator] made her request" (Interview, August 22, 1984).

The fact that the administration was aware of the need to develop in this area did not mean that approval would automatically be given for program development. The Director explained that if a program requests additional funding, then he demands that requests from
departments for new developments be justified through documentation. He explained his position by stating: "Before we commit funds for program development, a program must be able to prove that there is a true demand in their area" (Interview, June 11, 1984). The results of the feasibility study, conducted by the faculty and Coordinator of the Secretarial Administration Program, established the need for a word processing curriculum. These findings did not signal an automatic approval to fund development of a word processing program. As the Director put it: "The feasibility study was simply the first phase. Before approving a new program, I wanted to know more about the implications of word processing" (Interview, June 11, 1984). Following the feasibility study, the administration gave approval for serious study of the development of a word processing curriculum.

Following the feasibility study, the Director, Associate Director, and representatives from the Secretarial Administration Program conducted on-site visits to a number of locations where word processing equipment was being used, including White Sands Missile Range and State National Bank of El Paso. During these tours of word processing installations in 1978, the administration became increasingly convinced that this new technology would be in high demand in the foreseeable future. The administration was keenly aware of the expense involved in purchasing the necessary equipment to support the development of a curriculum in word processing. Nevertheless, the administration strongly believed that the advantages of developing such a program outweighed the cost factor; thus, later in 1978 a final
decision was made by the administration to develop the word processing program (Interview, August 22, 1984). This approval represented the beginning of the implementation process which culminated in 1982 with the completion of the Word Processing Center.

Evidence suggests that the administration had a clear view of the goals for program development that were set by the coordinator. Both the Director and Associate Director noted that the coordinator was articulate in describing the objectives for program development in the Secretarial Administration Program, which facilitated in moving her proposals through the approval process. According to these administrators, the coordinator kept the administration informed about the program's goals. When the time came for the administration to decide on the request to develop a word processing program, the administration could see the need to develop in this new area (Interviews, June 11 and August 22, 1984). This suggests that clear channels of communication were a factor in the implementation process.

The First Word Processors

The first step in implementing word processing equipment to support the curriculum was taken later in 1978 by the coordinator when she used institutional funds to purchase an IBM Office System 6 word processor. Even though this word processor represented advanced technology in word processing, the selection of the new word processor was not well received by the Secretarial Administration faculty. The reason given for this adverse reaction was the difficulty that faculty and students encountered in learning to operate the Office System 6.
As the coordinator explained: "I almost had to leave this school; that is how much the faculty resented the selection of the Office System 6. I learned that I should have involved the faculty that will have to use the equipment in the selection process." In 1981, a little more than two years after the introduction of the Office System 6, there was another opportunity to purchase word processing equipment. This time the coordinator involved the faculty in the selection process (Interview, June 11, 1984). The faculty and coordinator agreed upon the selection of two Lanier word processors. These word processors were purchased with severance tax bond money provided by the state of New Mexico. Both the faculty and students liked the ease of learning to operate the new equipment (Interviews, June 11, 1984). The difference was explained by an instructor in the Secretarial Administration Program: "No one liked the Office System 6. It was a beast to operate. We still have it but we don't use it much. All of the faculty were involved in the selection of the next word processors. The Laniers were a big improvement" (Interview, June 11, 1984). Later in 1981 the Secretarial Administration Program again tapped state severance tax bond funds to purchase two CPT 8000 word processors. As with the Lanier word processors, all the faculty were involved in the selection process (Interview, July 31, 1984). With the selection of new word processors, the Secretarial Administration Program provided students with a variety of word processing equipment to support the word processing curriculum. The amount and type of word processors in
the Secretarial Administration Program was growing, but the Word Processing Center had not yet been developed.

Development of a Word Processing Center

During the 1980-81 school year, the Secretarial Administration Program faculty and several administrators attended a number of workshops, seminars, and conferences, where it was reemphasized by personnel at these meetings that there was a need to develop secretaries with word processing skills. The faculty felt that the annual conference of the Association of Information Systems Professionals was especially influential in presenting this viewpoint. These meetings served as a springboard for discussions among the faculty and coordinator on how they might improve their program to better serve students needing word processing skills.

The Secretarial Administration Program was growing in the number of students served and the amount of equipment. The coordinator proposed to the faculty that the program needed newer word processing equipment and a Word Processing Center to house the growing program. This proposal for a Word Processing Center was discussed at weekly Secretarial Administration Program faculty meetings where a consensus was reached on the desirability of the project. As explained by one instructor: "The weekly faculty meetings were where we discussed the future direction of this program. These meetings were where [the coordinator] generated support for a Word Processing Center and where we [faculty] presented our views" (Interview, June 11, 1984). The coordinator sought the support of the faculty, because she had learned
from previous experience that implementation would be difficult without faculty support. The Coordinator of the Secretarial Administration Program, with the support of the faculty, began the approval process for the construction of a Word Processing Center with the knowledge that their own previous study supported the views of the personnel at the conferences and seminars they had attended.

All of the individuals interviewed agreed that the approval process for the development of a word processing curriculum, word processing equipment, and subsequent Word Processing Center was very centralized. As one instructor in the Secretarial Administration Program explained: "I would describe the decision-making process as very centralized. [The coordinator], the Associate Director, and the Director determine the direction of this program. But, I also feel that the faculty has input through [the coordinator]" (Interview, June 11, 1984). The Director agreed: "I guess I would classify our decision-making process as centralized. It seems to make sense in a small institution, especially when the decision only concerns one department" (Interview, June 11, 1984). In the situation involving approval of the developments in the word processing program, the decision only involved one department, so the Director's position was there was no justification for seeking input from other areas. The approval process consisted of the Coordinator of the Secretarial Administration Program recognizing the need to develop a word processing curriculum and subsequent Word Processing Center. The proposals were forwarded to the Associate Director, the Director, and
then to the Dean of Human and Community Services (Interviews, June 11, 1984). On a small campus there are a limited number of administrative levels associated with the approval process. This also means that there are a fewer number of opportunities for a proposal to encounter an adverse reaction. The evidence suggested that the proposals from the Coordinator of the Secretarial Administration Program moved smoothly through the decision-making process.

The first step in obtaining administrative approval for the Word Processing Center was to receive approval from the Associate Director. The Associate Director agreed that the growing department needed a Word Processing Center. In providing some insight into the administration's view of the program, the Associate Director related: "The administration's role in overseeing the development of the word processing program was to provide guidance as the Secretarial Administration Program carried out the details of implementing the technology associated with word processing." The Associate Director felt that the administration should not act as an obstructionist in any program's development plans, but to encourage justifiable growth (Interview, August 22, 1984). After receiving support of the Associate Director, the next step was to present the proposal to the Director of the Dona Ana Branch Community College. The Director also supported the proposal because he felt not only that the request was justified, but also that a Word Processing Center would give the program a greater sense of identity.
The final step in the approval process to develop a Word Processing Center was to present the recommendation to New Mexico State University Dean of the College of Human and Community Services. The Director declared: "We are fortunate that the Dean of the College of Human and Community Services is future oriented. We had no problem in receiving approval for the development of a Word Processing Center." With administrative approval, the Secretarial Administration Program was ready to embark upon the development of a comprehensive Word Processing Center. Ideally, the Word Processing Center would house the "state-of-the-art" in word processing equipment (Interview, June 11, 1984).

Evidently, there was little resistance to the development of a Word Processing Center or to the purchase of associated word processing equipment. Most of the people interviewed stated that they were not aware of any resistance (Interviews, June 11 and August 22, 1984). The Director of the Dona Ana Branch Community College stated that: "Everyone here understands that, with limited funds, if one program expands one year, another program will be given an opportunity the following year, if they can justify, through documentation, the rationale for expending funds in their program" (Interview, June 11, 1984). An instructor supported this view: "I was not aware of any resistance to the development of our program or Word Processing Center. We were not hurting any other program, so that might have been the reason no one else resisted our development" (Interview, June 11, 1984). One instructor did mention that there was no resistance at the
Dona Ana Branch Community College because the development of a Word Processing Center did not threaten anyone with loss of employment or advancement (Interview, June 11, 1984).

The approval to develop a Word Processing Center was an important step in the implementation of a Word Processing Center. Without funding to nourish its development, the Word Processing Center, complete with related equipment, would never have become a reality. Fortunately funding was available due to a set of unique circumstances. References have already been made to how the Secretarial Administration Program used severance tax bonds to purchase some word processing equipment. The state of New Mexico had authorized two severance tax bonds for two-year colleges. One severance tax bond was designated for capital improvements. A later severance tax bond was issued for the purchase of equipment (Interview, June 11, 1984). These two funding devices played an important role in the development of a Word Processing Center, as explained by the Associate Director: "The word processing program was an extremely expensive development. We could not have developed this program without [external] funds from the legislature and the Department of Vocational Education" (Interview, August 22, 1984). These funds referred to by the Associate Director were special legislative appropriations (House Bill 10) and federal funds distributed by the New Mexico Department of Vocational Education, which were available at the same time that the need for word processing skills had been established and the institution decided to address this concern. Thus, funds for acquiring word processing equipment and a
subsequent Word Processing Center were available without having to excessively tax the normal operating budget (Interviews, June 11 and August 22, 1984).

Another important aspect in the implementation process was the involvement of individuals in the development of the program and their input into its development. In the planning process for the Word Processing Center, the coordinator of the Secretarial Administration Program established a committee and delegated areas of responsibility to each Secretarial Administration faculty member (Interviews, June 11, 1984). In this manner, each instructor took part in planning the new facility. During the 1981–82 school year, the Dona Ana Branch Community College spent a quarter of a million dollars in expanding the facility containing the Secretarial Administration Program to house the Word Processing Center (Interview, June 11, 1984). Choosing equipment for the new Word Processing Center was also the responsibility of the faculty in the Secretarial Administration Program (Interview, June 11, 1984). This was amplified by one of the instructors in the Secretarial Administration Program. As she put it: "I have to give credit to [the coordinator] and the administration. The faculty had a great amount of input in the construction of the Word Processing Center. We were each given areas of responsibility to make decisions without undue interference from superiors" (Interview, June 11, 1984).

The major problem in purchasing equipment for the Word Processing Center was that the faculty knew of no similar facility in higher education. Thus, in conducting studies on what type of word
processing equipment to purchase, the coordinator sent the faculty to
visit various corporations to observe their use of word processing
equipment and to become informed on features that various manufacturers
offered in their models. In addition to visiting corporations, various
vendors were asked to make presentations to the faculty (Interview,
June 11, 1984). This process of accumulating vast amounts of
information regarding word processors created a need to systematically
compare the equipment of various vendors. In response to this need,
two members of the Secretarial Administration Program faculty developed
a comprehensive format to compare word processing equipment (Aldano and
Jones 1983). With the completion of the Word Processing Center, new
equipment was added to the facility in 1982. This equipment included
ten IBM 5520 word processors, three IBM Displaywriters, and two Lanier
TE 3 word processors (Interview, July 31, 1984).

Another problem surfaced in conjunction with the purchase of
the word processing equipment. When the equipment was purchased, word
processing was a relatively new technology; therefore, the instructors
found there were no appropriate textbooks or instructional manuals to
accompany the equipment. To solve this problem, the faculty had to
develop their own manuals, which required time after classes and on
weekends. To develop manuals, each instructor had to gain an expertise
with a particular word processing system. After becoming familiar with
one system, they then had to cross-train on the other systems so that
each instructor eventually could operate all six systems (Interviews,
June 11, 1984).
The role played by the faculty of the Secretarial Administration Program was critical to the implementation process. The faculty helped shape the new program. They selected the equipment, assisted in the design of the new Word Processing Center, developed instructional manuals for the new word processing equipment, and supported the coordinator when she approached the administration with new proposals. They were willing to devote a significant amount of energy to the program because they felt they were making an important contribution (Interviews, June 11, 1984). Indeed, the coordinator did delegate areas of responsibility to each member of the faculty, such as developing an expertise with a word processing system. The coordinator gave each faculty member a feeling of importance in their development of the program (Interview, June 11, 1984). As a result, the faculty became very loyal supporters of the coordinator and of her efforts to develop the program. The centralized decision-making process could have caused the faculty to feel isolated from the development of the program, but the coordinator involved the faculty at other levels of decision making responsibility. Thus, the faculty did become involved with the development of the program and felt they made a significant contribution to the program's development (Interviews, June 11 and July 31, 1984).

The Word Processing Center was opened in February 1982 and has become a showcase for the institution. Vendors who tour the nation claim that there is no other facility comparable to it in the Southwest (Interview, June 11, 1984). As stated before, the United States
Department of Education has awarded a Certificate of Merit to the Dona Ana Branch Community College for the implementation of the Word Processing Center. The Word Processing Center has also become a success for the Dona Ana Branch Community College in terms of enrollment. There are at present approximately 330 majors in the Secretarial Administration program, with most of them taking word processing courses. The instructor to student ratio is the highest of any program at the community college (Interview, June 11, 1984). This high ratio is obtained by arranging large sections of lecture classes to compensate for necessarily low enrollments in laboratory courses (Interview, August 22, 1984).

An instructor explained the reason students might be attracted to the Secretarial Administration Program. In two years, graduates from the Secretarial Administration Program majoring in word processing can obtain employment at salaries comparable to most bachelor degree graduates (Interview, June 11, 1984). There are currently twenty-three workstations at the Word Processing Center. Students majoring in word processing spend a total of six semesters, including two summer semesters, in the two year program. The six semesters provide an opportunity for students to devote each semester to learning one of the six different word processing systems (Interview, June 11, 1984). The Secretarial Administration Program has been successful in placing graduates in well-paying positions. The Secretarial Administration Program has been successful in implementing the educational technology that serves both the student and institution.
The purpose in conducting the research regarding the implementation of educational technology associated with the word processing curriculum at the Dona Ana Branch Community College was to identify the change agent and determine factors associated with the implementation of the word processing technology. In the study of implementing word processing technology at Dona Ana Branch Community College several factors surfaced during the investigation.

External Factors

One external factor to surface during the investigation was labor market conditions which motivated the Coordinator of the Secretarial Administration Program to advocate word processing as an addition to the curriculum. There were indications that there was a shortage of word processing skills in the labor pool. If a community college can train students in an area of high demand, not only will job placement be easier to accomplish, but prospective students can be more easily attracted to the program. An expanding enrollment has many positive benefits for a department, including larger budgets with which to accomplish departmental goals. These positive developments can encourage and motivate a vocational program to become innovative.

Both the Coordinator of the Secretarial Administration Program and the administration mentioned that professional journals influenced their decision to develop a word processing program. The professional literature alerted the coordinator and the administration to the need for word processing skills in the labor market. Their response was to
investigate the feasibility of developing a word processing program and as such was a factor in the decision to implement this innovative program.

Another external factor was the influence of the advisory board for the Secretarial Administration Program. This board encouraged the administration to seriously consider developing a word processing curriculum. The professional literature and the advisory board were two factors that came together to highlight a skill deficiency in the labor market. The feasibility study played an important role in the internal decision-making process, but it only documented what was a reality in the external environment of the community college. If a vocational program did not have to emphasize job placement for its existence, then external factors, like the labor market, might not play such an important role in developing educational technology. But job placement is very important to the viability of every vocational program and skills needed by the labor market often influence the direction of vocational programs. Thus, when the Secretarial Administration Program wanted to develop a new program, it simply conducted the necessary research to accurately document their claim that the trend in secretarial vocations was toward employing people with technological skills, such as word processing.

The external factors of the labor market, the influence of journal articles, and the advisory board were important in the development of a word processing program at Dona Ana Branch Community College. However, these factors were present before the decision was
made to implement a word processing program. Since this study deals with the implementation process, only factors that developed after the decision was made to implement an innovation can be considered as part of the implementation process. Therefore, these factors cannot be considered part of the implementation process.

One external factor that influenced the implementation process was the availability of funds from two severance tax bonds, special legislative appropriations, and funds from the New Mexico Department of Vocational Education. The funds from these sources provided the monies for the construction and equipping of the Word Processing Center. Without these funds it would certainly be questionable if the Word Processing Center would have been developed. It is difficult to see how a college with a small enrollment could have generated enough funds from local taxes to build and equip a half million dollar facility dedicated to word processing. Even if it could have been accomplished, it probably would have taken a longer period of time to complete the implementation process. A key advantage to obtaining funds from external sources was the fact that the operating budget of the college was not extensively involved in the funds used to build the facility or purchase word processing equipment for the new program. Because external funds were used in the development, other programs at Dona Ana Branch Community College were not adversely affected. This eliminated internal resistance to the implementation of the new word processing curriculum and made implementation easier to accomplish.
Internal Factors

In addition to the external factors that influenced the implementation process, several internal factors surfaced during the investigation. One internal factor was the minimization of resistance. The minimization of internal resistance was due to two conditions present at Dona Ana Branch Community College. The Director had established a policy that funds would be distributed fairly to programs that could document a need for program development. This policy created an environment in which each program director had confidence that funding was awarded on the basis of merit. Programs not receiving funds for expansion in one year might be funded in the future, since the college would attempt to meet all legitimate requests. With politics eliminated, denial of funds was more readily accepted and this helped reduce resistance to the funding of other programs. The second condition present at Dona Ana Branch Community College that helped reduce resistance was that the Word Processing Center was developed from funds external to the operating budget. Funding was found to be an external factor, but it also contributed to the elimination of resistance—an internal factor. As noted before, no area was adversely affected by the development of either the word processing curriculum or the Word Processing Center. This eliminated boundary disputes, since no area had to forfeit any of its financial resources.

Another internal factor leading to implementation was the centralization of the decision-making process. Once the coordinator began advocating the development of a word processing curriculum, the
implementation process consisted of obtaining approval from the Associate Director, the Director, and the Dean of Human and Community Services. None of these administrators opposed the implementation of a new word processing curriculum. There was evidence that good channels of communication, achieved through the articulation of the goals of the program, contributed to the approval of the implementation process. The Director did demand that a feasibility study be conducted. However, once the need was documented, the administration made the decision to proceed and supported the decision with the funds that made implementation a reality.

The evidence suggested that the administration supported the proposals submitted by the Coordinator of the Secretarial Administration Program for development of a word processing program. A major in word processing was established, along with a new facility housing the latest in word processing technology. All of these developments could not have become a reality without administrative support. This administrative support was important to the development of the program and has to be considered as one of the contributing internal factors.

The faculty of the Secretarial Administration Program had input during the weekly departmental faculty meetings. Their role was one of formulating and supporting the departmental request for a new program. The input by the faculty gave them a sense that they were playing an important role in the development of the word processing program. Indeed, the faculty played a significant role in the design of the Word
Processing Center and the selection of equipment for the new facility.
The coordinator had learned an important lesson in successful implementation when the faculty opposed her selection of the first word processor. This incident happened early in the development of the program and the coordinator was wise enough to realize her mistake. After this incident, the faculty had a great amount of input into departmental decisions.

The feasibility study was critical to the approval process to implement a new program in word processing. Since the Director required documentation of the need for word processing, this step had to be completed before any other action would be approved. The wisdom of such a study can scarcely be questioned. A community college must allocate its resources to areas that will generate enrollment. Potential enrollment in the vocational area of a community college depends upon the needs of the labor market. It is then incumbent on the community college to translate the need in the labor market for employees with certain skills into actual enrollment.

Several institutional characteristics at Dona Ana Branch Community College played an important role in the implementation process. The small size of Dona Ana Branch Community College proved to be a positive factor in the implementation process. On a small campus there are more likely to be fewer levels of hierarchy and therefore fewer individuals in the formal authority structure that have an opportunity to hinder the implementation process. In the case of Dona Ana Branch Community College there were only three individuals involved
in the approval process—the Associate Director, the Director, and the
Dean of Human and Community Services. In addition, on a small campus
the personnel are more likely to know one another and this can be a
positive factor if the individual making the request is respected for
their sense of good judgment. The small size also contributes to the
centralized decision-making process. With fewer individuals involved
in operating the college there is less need to develop a decentralized
approval process. It is simply more efficient in time and energy to
get the few individuals together who are needed to approve a project.
If approval is granted, then the project can proceed. This is
especially true in situations when only one program is involved. If a
campus-wide project was under consideration, then a decentralized
decision-making process might have been appropriate. However, a
centralized decision-making process was used by Dona Ana Branch
Community College for the request by the Secretarial Administration
Program.

Change Agent

The seven faculty and administrators interviewed agreed that
the change agent responsible for developing the word processing
curriculum and Word Processing Center was the Coordinator of the
Secretarial Administration Program. This individual recognized the
need to develop a word processing curriculum, advocated the concept
before the administration, and supported the work necessary to bring
about the implementation of the program and Word Processing Center.
In summary, the implementation of the educational technology to support the word processing curriculum at the Dona Ana Branch Community College was a result of: 1) conditions in the labor market, which were documented through a feasibility study that was favorable to the development of a curriculum in word processing; 2) an advisory board, whose function is to keep a community college knowledgeable about skills needed by industry, reinforced upon the administration the need for development in this area; 3) literature in the field of secretarial science that notified the coordinator and administration that word processing skills would be required of future secretaries; 4) funding from state and federal sources external to the normal operating budget which was available for the purchase of the necessary equipment; 5) the fact that resistance to the development of a word processing program was virtually non-existent, because boundary contraction was eliminated; 6) a centralized decision-making process, reflecting a limited hierarchy, facilitated the approval of the program and purchase of related equipment; 7) clear channels of communication between the coordinator and the administration; 8) an administration that supported the development of the word processing program; 9) individuals directly involved with the program who were allowed to shape the program's development; 10) the small size of the institution contributed; and 11) the coordinator, acting as the change agent, who provided leadership throughout the entire process. These factors made possible the implementation of new educational technology at Dona Ana Branch Community College.
Implementation of Instructional Television
at New Mexico Junior College

Enrollment for selected courses through instructional
television is an educational service offered to students attending New
Mexico Junior College. In the fall of 1984, the following courses were
offered in this manner: Introduction to Psychology; Composition and
Rhetoric; Vietnam: A Contemporary History; American Government;
General Sociology; Principles of Management; and Introduction to
Computers (Fall Class Schedule 1984). New Mexico Junior College has
been offering this innovative approach to college credit instruction
since the fall semester of 1981. It was the implementation of
instructional television at New Mexico Junior College that was the
subject for this case study. The courses offered by New Mexico Junior
College were developed by the Annenberg/Corporation for Public
Broadcasting Project and are broadcast through the Public Broadcasting
Service (PBS). KENW-TV, a PBS station serving eastern New Mexico,
provides instructional television for New Mexico Junior College
(Telecollege - New Mexico Junior College n. d.).

Instructional Television

The idea of college instruction through television technology
has been advocated by various educators for almost as long as
television has existed. However, until the last few years,
instructional television has only infrequently been successfully
implemented (Telecollege New Mexico documents 1981). The most recent
try to develop a national distribution of college level courses is
currently being made by a joint effort of the Annenberg School of Communications (Pennsylvania) and the Corporation for Public Broadcasting. The Corporation for Public Broadcasting is a private, non-profit corporation, that provides financial support for PBS. This twin effort is usually referred to as the Annenberg/Corporation for Public Broadcasting Project.

The driving force behind the Annenberg/Corporation for Public Broadcasting Project is Walter H. Annenberg, former United States ambassador to Great Britain and publisher of TV Guide. In March 1981, he pledged $10 million dollars a year for fifteen years to provide "venture capital" to colleges and universities for the production of credit courses (Chronicle of Higher Education 1982, p. 10). The Corporation for Public Broadcasting administers the project to create "telecollege" courses for distribution through the PBS network (Scully 1981, p. 1). A number of colleges and universities, such as California Institute of Technology, Dallas County Community College, and Coast Community College, have produced courses for distribution though PBS. These telecollege courses are broadcast under the guidance of the PBS Adult Learning Service. As of the fall of 1983, over 750 colleges and universities were using telecollege programming to provide instruction to approximately 130,000 students (Adult Learning Service n. d.).

Overview

New Mexico Junior College has been prepared for years to move into instructional television, so when the opportunity was presented by PBS, the institution moved very quickly. In fact, the implementation
of the telecollege program at New Mexico Junior College developed in
just an eight-month period. The implementation process began in
February 1981 when the administration at New Mexico Junior College
decided to implement instructional television after attending a
teleconference at KENW-TV regarding the new instructional television
initiative by the Adult Learning Service of PBS. The contract to
participate in the telecollege program was signed in March and a few
months later the courses were offered to students as part of the Fall
1981 schedule. During this time, all the work to administrate the
program was completed so that by the fall semester students enrolled
with a minimum of difficulty (Telecollege New Mexico documents 1981).

Philosophical Environment Conducive for Innovation

The Vice President for Instructional and Student Services at
New Mexico Junior College related how the institution has
characteristically attempted to provide the latest technology in its
approach to education. He presented some background information about
NMJC's attitude toward instructional television: "New Mexico Junior
College has been interested in instructional television for the past
ten years. However, the vehicle for delivering quality video courses
has only recently been developed. When the institution became aware
that there was an opportunity to provide quality courses, the
appropriate steps were taken to enter the instructional television
market" (Interview, September 13, 1984).

This favorable attitude may have contributed to NMJC entering
the instructional television market, but there was more to this college
implementing instructional television than a generally favorable disposition. Someone had to advocate the implementation of this new and alternative form of instruction. Among those interviewed, there was a consensus of opinion that the leading advocate for the implementation of instructional television was the President of New Mexico Junior College (Interviews, September 13, 1984). The Coordinator of Non-Traditional Programs was one who supported this viewpoint: "Our president was very instrumental in advocating the development of instructional television on our campus. His approach to education is very non-traditional and innovative" (Interview, September 13, 1984). The Director of the Instructional Resources Center echoed the same position: "The president was, without question, the leading advocate of our entry into the telecollege program" (Interview, September 13, 1984).

A brief review of the background of the President of New Mexico Junior College provides insight into this individual's interest in advocating alternative instruction. The President of New Mexico Junior College had served previously at Northland Pioneer College, a decentralized institution with major centers and satellite units throughout northeastern Arizona. Providing educational opportunities within a large geographic area containing a sparse population, he established an educational environment that demanded innovative approaches to distance education. In becoming President of New Mexico Junior College in 1978, this individual brought with him both a philosophy and experience that supported alternative approaches to
instruction. When the Corporation for Public Broadcasting announced that it was going to offer college level courses through PBS facilities, the pronouncement reached an administrative leader who was very favorably disposed to this effort at distance education (Interviews, September 13, 1984).

The PBS Initiative

In December 1980, the Corporation for Public Broadcasting (CPB) made an announcement to their affiliate PBS stations that CPB would provide college level courses, which became known as telecollege courses, to local PBS stations for broadcast. According to the former Telecollege Coordinator, this was the first indication that a new type of instructional television was going to be available to interested colleges and universities (Interview, September 13, 1984). The idea of telecollege courses was very simple. The Public Broadcasting Service would distribute various high quality college level credit courses to local PBS stations for broadcast. If a college or university wanted to participate in the telecollege service, they would agree to pay the local PBS station a licensing fee, ranging from $300 to $450 per course, and a fee of $15 for each student enrolled in a course. The institution's responsibility would be to enroll students, assign faculty to monitor student progress, and issue credit. The role of the local PBS station would be to broadcast the agreed upon courses at specific times. The student's responsibility would be to study instructional materials provided and view each broadcast (Interview, September 13, 1984).
While the idea of telecollege was simple, the coordination of activities to make telecollege a reality was complex. The broadcasting of courses had to be coordinated with various demands from area colleges. In turn, the colleges had to determine how to administer the service. When the Corporation for Public Broadcasting announced its intention to broadcast telecollege courses through PBS stations, KENW-TV, the PBS station serving eastern New Mexico, decided to participate in this instructional service and thus became involved in offering telecollege courses. The personnel at KENW-TV, located on the campus of Eastern New Mexico University in Portales, received a closed-circuit teleconference from PBS on January 27, 1981 explaining the new service. Following this transmission, the personnel at KENW-TV contacted the president of each of the institutions of higher education within their broadcast area and invited them to send representatives to view another PBS teleconference on February 26 (Interviews, September 21, 1984; Telecollege New Mexico documents 1981). The February teleconference provided general information about the operation of the new service and courses to be offered.

Upon receiving the invitation from KENW-TV to attend the teleconference on the proposed telecollege service, the administration at New Mexico Junior College began making preparations to participate in the innovative service. The Vice-President forInstructional and Student Services explained the administration's position: "When we received information from [KENW-TV] about the proposed telecollege program, we were anxious to become involved in this service. We felt
that there was potential in this new form of delivering instruction" (Interview, September 13, 1984). The administration's first action was to send several representatives to the February 26 teleconference at Portales. Those attending the teleconference from NMJC were the Director of Community Development, Director of Instructional Resources, Director of Extended Services, and the Coordinator of Audio-visual Services.

One of the primary objectives of the February meeting in Portales was to investigate the willingness of institutions interested in telecollege to form a consortium. PBS, through its fee structure, encouraged the forming of consortia by granting reduced fees to institutions who were members of a telecollege consortium. Six area institutions, including NMJC, agreed to form the Telecollege New Mexico consortium which would govern the telecollege service originating from KENW-TV (Telecollege New Mexico documents 1981).

After the February teleconference, the administration at New Mexico Junior College made two key decisions about the telecollege program. They decided they would implement the telecollege program. This marked the beginning of implementation of instructional television at New Mexico Junior College. The administration also decided that, in order for telecollege courses to succeed, one individual would have to devote the time to promote and coordinate the service. In March 1981, NMJC hired a Telecollege Coordinator on a part-time basis to coordinate the institution's entry into the telecollege service and represent NMJC at future telecollege meetings (Interviews, August 29 and September 13,
1984). Representatives from New Mexico Junior College attended another teleconference that was held on March 9, 1981. The purpose of this teleconference was to give local colleges an opportunity to ask questions about any aspect of the telecollege program.

The manner in which New Mexico Junior College entered the telecollege market indicates the support by the administration for the program. The Vice President for Instructional and Student Services portrayed NMJC as anxious to enter the instructional television market under the proper conditions. This was probably an accurate assessment as the college's actions indicated that it was not only willing to join the telecollege program, but also hire the personnel to supervise the program operation. These actions provided evidence that the administration was supportive of the telecollege program.

New Mexico Junior College officially entered into the telecollege program on March 31 when NMJC and several other interested colleges in the area signed contracts with PBS to participate in the service offered by KENW-TV. (Telecollege New Mexico documents 1981). A series of consortium meetings were held during the spring and summer of 1981 to determine the administration of telecollege courses (Interview, September 13, 1984). Formal by-laws for the consortium were adopted in August 1981 (Telecollege New Mexico documents 1981). New Mexico Junior College commenced offering telecollege courses for credit in the fall of 1981 (Interview, September 13, 1984).
Problems Associated With Implementation

While the consortium dealt with the overall administration of telecollege courses, the administration at New Mexico Junior College became involved in solving institutional problems associated with instructional television. One issue, to be decided by the administration, was to determine the tuition fee for enrollment in telecollege courses. Since New Mexico Junior College receives generous funding though its tax base, the students are charged unusually low tuition in comparison to actual costs. The issue before the administration was whether to charge the normal $6.00 per credit hour tuition fee and subsidize telecollege courses due to their relatively higher cost or to charge more for telecollege courses than traditional courses. During the spring of 1981, the administration supported a proposal before the Institutional Council to charge the normal per credit hour fee. The Vice-President for Instructional and Student Services explained the administration's position: "We felt that since the telecollege program was to be a new method of instruction, that we needed to give it support so that it would have an opportunity to succeed. If we charged higher fees to telecollege courses than our other courses, it would have impacted negatively on the program." The Institutional Council, which is comprised of representatives from all areas of campus, approved the administrative proposal. This decision represented a concerted effort by NMJC to encourage enrollment in telecollege courses (Interview, September 13, 1984).
Another issue before the administration was the question of the number of hours students should be required to attend class on campus in addition to time spent viewing the broadcasts. The telecollege broadcasts usually consisted of approximately 16 hours of viewing time during the semester. The Vice-President for Instructional and Student Services argued that students enrolled in telecollege courses should spend an additional 32 hours in class. The rationale for this position was that this requirement would provide more formal structure to the telecollege format and would assist those students who felt uncomfortable with the independent telecollege format. He expanded on his position: "Most three credit hour classes require 48 hours of formal instruction. I did not feel comfortable in moving away from that format for the telecollege program. Although we are now experimenting with 'home study' courses, which require only a few hours on campus, with great success" (Interview, September 13, 1984). This argument was accepted by the Institutional Council and initially all telecollege courses at New Mexico Junior College were augmented with two hours of class time for each hour of broadcast (Interviews, September 13, 1984). Many other institutions involved in the telecollege program never required more than five on-campus classes (Adult Learning Service n. d.)

One problem encountered by the telecollege administrators was the orientation of the faculty in teaching through instructional television. The Coordinator for Non-Traditional Programs stated: "Our faculty knew how to teach in the classroom, but managing a telecollege
course requires a different approach. I spent one year trying to teach
the faculty to be course 'managers' instead of lecturers." Some
faculty adapted well to the new method of delivering instruction, while
others had problems. "It was difficult establishing a cadre of
instructors suited for this method of instruction" (Interview,
September 13, 1984).

The administration, with the support of the Institutional
Council, decided to offer telecollege courses under the generic heading
of "special topics" in the fall 1981 class schedule, instead of
attempting to assign a unique course number and title for each
telecollege course (Interviews, September 13, 1984). The rationale for
this approach was that since PBS would commence broadcast of
telecollege courses in the fall of 1981, there would not be enough time
to proceed through the administrative structure that a course normally
has to navigate in order to be listed in the catalog with its own
unique course number and title. The procedure for listing a unique
course in the college catalog requires the approval of the Curriculum
Committee and the Junior College Board. As a special topics course,
neither the Curriculum Committee nor the Junior College Board needed to
approve the course. Being experimental in nature, telecollege courses
did not have the degree of stability that is usually associated with
those courses entered in the college catalog with their own course
number and title. This was another justification for listing these
courses under the special topics heading. The Vice-President for
Instructional and Student Services admitted: "Under normal conditions,
we would not have circumvented the Curriculum Committee and the Board. But, we felt that the time frame was not sufficient to proceed through normal channels. So, with the support of the Institutional Council and the President, we took another route" (Interview, September 13, 1984). This illustrates how New Mexico Junior College handled the problem of a cumbersome hierarchy. The administration perceived the hierarchy involved in approving the telecollege program as consisting of too many steps to be time efficient, so the administration temporarily reduced the size of the hierarchy. While the administration did have to overcome some problems associated with the implementation of the telecollege program, there were also some factors that supported the implementation of this innovative method of delivering instruction.

**Contributing Factors to Successful Implementation**

An important ingredient in the successful implementation of the telecollege program was the extent to which New Mexico Junior College was willing to accommodate students taking telecollege courses (Interviews, September 13, 1984). The administration recognized that the appeal of these courses would be to potential students who could not attend class on campus due to distance or scheduling problems. The former chair for the Division of Arts, Business, and Humanities expounded upon this attitude: "New Mexico Junior College felt a need to serve the community, and telecollege courses provided an opportunity to serve students located far from campus and those with scheduling problems. It was the institution's position that everything possible should be done to assist these students, since they were
non-traditional students" (Interview, September 13, 1984). This administrative position was supported by a survey conducted in September 1982 which indicated that instructional television appealed to a different audience than students who attended classes on campus (Richardson, Leslie, and Dorr 1983). There was also a recognition that students would want to review broadcasts of various programs. As explained by the Coordinator of Audio-Visual Services: "Each broadcast is concentrated with information. Most students feel they need to review the broadcast to adequately learn the material. We provide that opportunity through our taping services" (Interview, September 13, 1984).

In order to serve this special clientele of students, the Director of the Instructional Resources Center and his Coordinator of Audio-Visual Services requested funding to purchase blank video tapes and establish "wet" carrels at Tatum High School library, Lovington Public Library, Eunice Public Library, Hobbs Public Library, the Woolworth Library at Jal, and the Learning Lab at New Mexico Junior College. A wet carrel is a study carrel that contains various audio-visual equipment. The college approved an annual expenditure of over $12,000 for the purchase of blank tapes and a one-time expenditure of over $51,000 to purchase wet carrels for the six locations. Each carrel purchased for telecollege contains a 3/4" video cassette recorder, a 1/2" video cassette recorder, a sound/slide projector, and a sound/filmstrip projector. Broadcasts from PBS were video taped at KENW-TV in Portales and sent to the Instructional Resources Center at
New Mexico Junior College where six duplicate copies of the video tapes were made for distribution to the carrels throughout the junior college district. Students at distant locations from Hobbs could view instructional programs when broadcast on KENW-TV or on tape at their convenience without traveling to Hobbs to attend class (Interviews, July 11, September 13, and November 7, 1984).

The financial support that New Mexico Junior College gave to the telecollege courses was crucial to the success of the program. Funds to support telecollege came from the operational budget and severance tax bonds. The severance tax bond money was made available by the New Mexico state legislature to two-year institutions for the purpose of improving instructional equipment. The wet carrels were purchased with these funds. The operational budget funded other aspects of the telecollege program, such as the licensing and headcount fees, promotion materials, blank tapes, and salaries of faculty and program coordinator.

The purchase of blank tapes provides an example of the financial commitment that New Mexico Junior College was willing to make in support of the telecollege program. When the telecollege program was being discussed in the spring of 1981, the Director of the Instructional Resources Center requested a budget of $13,000 for the purchase of blank tapes in support of the program. The Instructional Resources Center was allotted over $12,000 for the purchase of blank tapes, almost all the money originally requested (Interviews, September 13 and December 3, 1984).
Implementing a telecollege program expanded the area of responsibility for the Instructional Resources Center. They were responsible for the video component of the program. Because of the added responsibility they saw their budget increased to support their activities in the area of the telecollege program. Other areas also saw an increase in responsibility associated with the implementation of the telecollege program. Departments involved with providing faculty for the telecollege courses saw their responsibility increase. The Coordinator of Non-Traditional was a new position New Mexico Junior College created with the implementation of the telecollege program. All of these changes represented an expansion of boundaries (or a new boundary in the case of the position of Coordinator of Non-Traditional Programs). When boundaries expand there exists a potential that other boundaries will contract, especially if there are limited institutional funds. There was not any evidence that other areas experienced boundary contraction. The financial condition of New Mexico Junior College may explain why other areas were not adversely affected by the implementation of the telecollege program.

Those interviewed for this study indicated that funding for the telecollege program was not a significant problem at New Mexico Junior College. The former Telecollege Coordinator provided a typical response in relation to the financial support given the telecollege program. "One problem we did not encounter in implementing the telecollege program was funding. Every legitimate request for funds was supported by the administration" (Interview, September 13, 1984).
Another example of the financial support given by NMJC to the telecollege program was the funding of a new full-time position to administer the telecollege program. This position of Coordinator of Non-Traditional Programs was filled in August 1981. This person's duty was to administer telecollege courses as part of his total area of responsibility. This was an additional program expense, but one that New Mexico Junior College was willing to make in order to nurture the growth of the innovative telecollege program (Interviews, September 13, 1984).

Other institutions in the consortium did not make the financial investment or promote telecollege courses as adequately as New Mexico Junior College and, therefore, experienced only limited success (Interview, December 3, 1984). At New Mexico Junior College the courses have grown in popularity each year. The first semester telecollege courses were offered was the Fall of 1981. During that semester a total of 94 students enrolled in telecollege courses. By the Fall of 1982, enrollment had increased to 136 students. In the Fall of 1983 a total of 205 students were enrolled. Enrollment for the Fall semester of 1984 increased to 223 students (Weaver 1984; Interview, September 27, 1984). According to the Director of the Instructional Resources Center: "Once a student takes a telecollege course, they usually prefer it over traditional classes. The combination of course quality and convenience contribute to telecollege's growing popularity at New Mexico Junior College" (Interview, September 13, 1984). Another reason for the success of
telecollege courses at New Mexico Junior College is the close contact between instructor and student. One instructor involved in telecollege related: "Although I do not see students often, as we meet on campus only five times during the semester, I do telephone them often to check on their progress. Without this close contact some students would not be successful within this non-traditional format" (Interview, September 13, 1984).

The acceptance of the telecollege program by the faculty and division chairs has played an important role in the success of telecollege courses at New Mexico Junior College. Both the part-time Telecollege Coordinator and the Coordinator of Non-Traditional Programs stated that they worked closely with division chairs and faculty in implementing the innovative courses. In working with division chairs, they would first approach the division chair and inform them of their plans before conducting discussions with the faculty member (Interviews, September 13, 1984). By following the proper procedure, the individuals responsible for administering telecollege courses kept the division chairs informed about the program. This aided in building a cooperative working relationship among the administrators and division chairs and made for a smoother implementation process.

One area of continuing cooperation is in the area of instructional materials. The Adult Learning Service provides the recommended materials, but the instructor is free to select other materials. Alternate materials are selected with the approval of the telecollege administrator. The close contact maintained between
administrators and faculty gave the faculty opportunities to relate their concerns so they could be immediately addressed and to pose questions, such as the number of tests are required, or what provisions are to be made for students who do not progress through the program in a timely manner (Interviews, September 13, 1984). This interaction among administration, division chairs, and faculty gave everyone concerned with the development of the telecollege program an opportunity for input into the development and operation of the telecollege program (Interviews, September 13, 1984).

Resistance to Innovation

Despite these efforts aimed at cooperation, there was some resistance from the faculty in implementing the telecollege program. The Coordinator of Non-Traditional Programs indicated that some faculty and division chairs felt threatened by the telecollege program. "I don't think that some of our faculty, or for that matter even division chairs, understood the role of the telecollege program. They looked upon the program as competition to their efforts. Of course, this was not the role of the telecollege program" (Interview, September 13, 1984). This feeling by certain division chairs and faculty manifested itself as non-participatory behavior. They did not become involved in the telecollege effort. The Coordinator of Non-Traditional Programs overcame these fears among faculty and division chairs by direct and indirect contact with them. One direct method of overcoming resistance was to promote telecollege courses as courses reaching individuals who would not normally attend on-campus classes. This approach lessened
the resistance by faculty because their on-campus instruction was not threatened. However, he further related that: "In reality, most any lecture course now taught on campus could be taught through the telecollege program." He explained what he meant by indirect contact: "I had to build relationships with some people. So sometimes I would drop by their office and discuss nonsubstantive items with them, just to establish a relationship. Also, I kept my reports low key and non-threatening. In general, I used a number of indirect tactics to break down resistance" (Interview, September 13, 1984). While most of the resistance has been overcome, some faculty are still taking a wait-and-see attitude (Interviews, August 29 and September 13, 1984).

The Coordinator of Non-Traditional Programs had resistance problems that developed from a problem in communication. The faculty felt threatened because they did not fully understand the role of the telecollege program. They felt that the telecollege program threatened the viability of their traditional classes. The actual impact of the telecollege program was to attract people into courses who would not usually enroll in those courses if they were offered on campus (Interview, September 13, 1984). The efforts of the Coordinator of Non-Traditional Programs in overcoming this communication problem contributed to the acceptance of the telecollege program.

The administration also contributed to faculty acceptance of the telecollege program. When guidelines for telecollege were being discussed at the Institutional Council in the spring of 1981, it was decided that faculty with low enrollment would be encouraged to add a
telecollege course to their schedule. Thus, faculty who might be concerned with their continued employment found a method by which they could increase their student load. This was a benefit to some faculty, but it also had the effect of reducing the cost of the telecollege program. The cost factor was reduced by encouraging full-time faculty who did not have a full class load to teach a telecollege course as part of their normal class load. This aided in reducing the number of faculty who would teach a telecollege course as part of an overload and therefore receive remuneration beyond their normal contract (Interview, September 13, 1984).

Decision-Making Process

All seven individuals interviewed at New Mexico Junior College agreed that the decision-making process to implement the telecollege program was centralized, that is, the higher level administrators made the key decisions in relation to the telecollege program. Instructors and divisional chairs had input into the implementation process, but the administration determined whether New Mexico Junior College would offer the telecollege program and how the program would function. The Coordinator of Audio-visual Services stated his position about the decision-making process: "I think it would be fair to say that the administration made all the major decisions about the telecollege program. But, I don't think that it caused any problems. In fact it helped in getting the program started" (Interview, September 13, 1984).

The Institutional Council was the organization that officially approved the telecollege program. However, it was evident from discussions with
those interviewed that the higher level administrative officials controlled the decisions related to the telecollege program (Interviews, September 13, 1984). Administrators around the President of New Mexico Junior College were aware of how strongly he supported the telecollege program and they reacted accordingly. The directors of departments were also aware of these goals. The director of the Instructional Resources Center reported that he and others were aware of the president's interest in the telecollege program and they supported its development (Interview, September 13, 1984). These administrators and directors assured that both human and financial resources were made available to support the program, as evidenced by the taping services provided by the Instructional Resources Center. The only moderation in a complete program of off-campus instruction was the requirement, made by the Vice-President for Instructional and Student Services, that two hours of on-campus class be held for every one hour of televised instruction. This decision again supports the proposition that all key decisions were made by the top administrators. It was administrators who decided to offer the telecollege program, hire an administrator for the program, how much tuition to charge, and how many hours of on-campus instruction would be required. As a result of this tightly knit decision-making process, the implementation was able to progress rapidly.

Since the administration controlled the key decisions, it could be assumed that others involved in the telecollege program might feel isolated from the process; but, this was not the case. Everyone
involved in the telecollege program supported the administration's centralized decision-making process. Those involved in the telecollege program felt that a strong administrative role was necessary to support and guide the innovative program and that they had sufficient latitude within their own areas of responsibility (Interviews, September 13, 1984). For example, the Director of the Instructional Resources Center explained: "I felt that in order for the telecollege to really serve the people in distant locations, we had to provide wet carrels throughout the junior college district to supplement the PBS broadcasts. I proposed this to the administration and they supported my efforts to purchase and install the carrels" (Interview, October 24, 1984). This comment illustrates that the administration established the operating framework for the program, and others interested in the successful development of telecollege were given the flexibility and financial support to assist in its implementation. Individuals involved in the implementation of telecollege seem to have been satisfied with their role in the program, in spite of the centralized decision-making procedure. Passive resistance to the program came from individuals not directly involved with the functional aspects of telecollege courses. Since they were not directly involved with the project, their resistance did not influence the implementation process (Interviews, September 13, 1984).

The implementation process that began in January 1981 was completed in time for telecollege courses to be offered as part of the
Consideration of Factors at New Mexico Junior College

When investigating the implementation of a telecollege program at New Mexico Junior College, the objective was to identify the change agent(s) and factors associated with the implementation process. There were a number of factors associated with implementation that were discovered during the investigation. The purpose of this section is to discuss the factors and change agent found to be associated with successful implementation.

Preliminary to a discussion of factors, one question that needs to be answered is: Why did New Mexico Junior College decide to participate in a telecollege program? This question is important because, as the case study was conducted, it became evident that without strong institutional motivation the telecollege program may not have been successfully implemented. While the motivation could not be classified as a direct factor, it did influence the program. The evidence indicated that as a result of low tuition fees, the program was not self-supporting. With financial gain eliminated as a motive, another possible motivation to join the telecollege program was a desire to fulfill the community college mission of serving all potential students. In this case, it was a desire to serve potential students in the junior college district who could not attend traditional on-campus classes due to scheduling or distance problems.
There was a strong desire to serve these students even though instructional television could not be justified by the amount of revenue it generated. The development of off-campus carrels is evidence that New Mexico Junior College made a strong commitment to serve telecollege students. The motivation could be attributed to a philosophical approach to education that was nurtured by the president. As long as the financial resources were available, the institution wanted to meet the needs of the citizens of the junior college district. This philosophical approach established the foundation on which the entire implementation process operated. The commitment to instructional television was made long before PBS entered the field. In short, when a viable vehicle became available, New Mexico Junior College moved quickly to implement this mode of instruction. Obstacles that threatened to slow the implementation process were quickly resolved. One example was the classification of telecollege courses as special topics. Another example was hiring a coordinator for the program to assume responsibility and ensure that implementation did take place.

External Factors

As indicated above, New Mexico Junior College has been fortunate as it receives very generous financial support from citizens and industry located in the junior college district. NMJC has had the financial resources to provide the type of education that is beyond the reach of many other community colleges. The implementation of the telecollege program is one example of New Mexico Junior College's
ability to fund priority projects. Those interviewed at New Mexico Junior College agreed that lack of funding for the telecollege program was not an issue during the implementation process. When the Instructional Resources Center requested additional funds to purchase blank video tapes, the Instructional Resources Center received the funds they requested. Another example that shows the presence of ample funds available for the telecollege program was the hiring of a part-time Telecollege Coordinator, and later, a full-time Coordinator of Non-Traditional Programs. While it is true that the Coordinator of Non-Traditional Programs has responsibilities in addition to telecollege, the fact that a position was created to monitor this program is an indication of the ability and willingness of New Mexico Junior College to fund the innovative project. The funding for tapes, fees, salaries, and promotional materials were derived from the operational budget, but the funding for the wet carrels that the Instructional Resources Center purchased was available through special severance tax bond funds that were external to the operational budget. The New Mexico legislature had authorized severance tax bonds for two-year institutions for the purchase of instructional equipment. The operational budget could have absorbed this cost, but the availability of funds external to the normal operating budget eased the implementation process. The Instructional Resources Center did not have to divert funds from other budget areas to purchase the wet carrels. Instead, it was simply a process of generating a purchase order with an account number indicating that the carrels and
accompanying audio-visual equipment were to be paid with severance tax bond funds.

Internal Factors

The decision-making process was centralized and efficient. This was evident when the administration at New Mexico Junior College decided to take part in the PBS teleconference explaining the instructional television program in late February 1981, and NMJC signed a contract with PBS to participate in the program one month later. A Telecollege Coordinator also was hired in March. Thus, in a few short weeks the decision was made to participate in the program and an individual was hired to handle the implementation process. Additional evidence of a centralized decision-making process was the classification of telecollege courses as special topics, so that neither the Curriculum Committee nor the Board would have to approve the courses. In addition, there would be no delay in listing these courses among those offered in the 1981 Fall schedule.

The action by the administration to eliminate the Curriculum Committee and the Board from the approval process provided evidence that a conscious effort was made to reduce the size of the hierarchy involved in the approval process. The administration perceived the hierarchy as cumbersome and acted to overcome this potential problem. This administrative response did reduce the time required to approve the telecollege program by reducing the steps involved in the approval process. The reduced size of the hierarchy contributed to the implementation of the program.
While such actions as quickly establishing the telecollege program and hiring a Telecollege Coordinator describes a centralized decision-making process, it also describes an administration strongly supporting the telecollege program. This administrative support manifested itself in more than one area. Certainly, the financial support for the program was an indication of administrative support. The manner in which the administration maneuvered the telecollege program through the approval process was another indication of administrative support for the program. The administrative support for the telecollege program was a factor in the successful implementation of the innovation.

Despite the centralized governance of the administration, all of the individuals involved with the telecollege program felt that they had input into the process. The faculty and division chairs were given the opportunity to determine how they could interact with the telecollege program. For example, only faculty that wanted to participate were involved in the program. Faculty with low enrollment were encouraged to offer telecollege courses, but there was no requirement mandated by the administration. Another example of faculty input was the opportunity the telecollege faculty had to select materials to be used with the course. Obviously, this type of input was relatively minor, but it gave the faculty a sense of influence in relation to telecollege courses.

Another factor influencing the implementation of the telecollege program was the elimination of boundary contraction.
Several areas experienced boundary expansion including the Instructional Resources Center, various divisions, and the Non-Traditional Program. While these areas expanded, there was not any evidence of corresponding contraction of boundaries in other areas around campus. The elimination of boundary contraction contributed to a reduction in resistance to the implementation of the telecollege program.

Despite efforts to reduce resistance, there was some evidence of resistance to the telecollege program at New Mexico Junior College through a lack of communication about the nature of the program. Further, some faculty and division chairs felt threatened by this new method of instruction. However, these individuals did not influence the implementation process, because NMJC minimized resistance to the telecollege program. The manner in which NMJC joined the telecollege service had the effect of minimizing resistance. New Mexico Junior College moved so rapidly in agreeing to participate with PBS that the faculty did not have time to generate any real opposition. After telecollege became a reality, resistance took the form of non-participation by certain faculty. Most of the opposition was overcome through efforts by the Coordinator of Non-Traditional Programs. Still, there were some faculty that were dubious about the program. However, since New Mexico Junior College is one of New Mexico's more successful telecollege programs in terms of student participation, it is evident that some faculty resistance has not genuinely hindered the program's growth.
A contributing factor in the implementation process was the relatively small institutional size of New Mexico Junior College. The people involved in the implementation of the telecollege program were aware of the philosophy of the president in relation to non-traditional programs. On a larger campus, the philosophy might not have been as well known. Also, the coordinator of telecollege was able to work with division chairs and faculty on a personal basis, which assisted in overcoming problems, such as resistance to the program. This method of operation may not have been possible in a large institution. Various individuals in key positions on campus, such as the Director of the Instructional Resources Center, were aware of the administration's interest in implementing telecollege and assisted where possible. On a larger campus, individuals outside the administration may not have been as cognizant of the administration's interest in instructional television.

Change Agent

The President of New Mexico Junior College was identified as the major change agent in the implementation process. His basic philosophy and experience with non-traditional instruction established the environment that supported New Mexico Junior College's entry into instructional television. One provocative aspect was that the implementation process was conducted without the president as an active participant. He did not, for example, attend teleconference meetings. Yet, there was little doubt that he was the motivating force behind the implementation process.
In general, the telecollege program was implemented at New Mexico Junior College because of these key factors: 1) the institution wanted to serve citizens with scheduling or distance problems; 2) funds were available from sources outside the normal operating budget and an external source; 3) the administration used a centralized decision-making process which moved efficiently to implement the innovation; 4) the administration reduced the size of the hierarchy involved in the approval process; 5) individuals involved with the innovation were allowed input; 6) the administration provided support for the innovation; 7) boundary contraction was eliminated; 8) faculty resistance to the program was either overcome or isolated to the degree that it did not threaten the process; 9) the institution was small enough that its size contributed to a clear, although informal, communication process; and 10) the president espoused a philosophy in support of non-traditional instruction that permeated the institution and cast him in the role as change agent. All of these factors were operating in favor of implementation, while no major negative influence was found. The final result was that the telecollege program was implemented quickly and efficiently.
CHAPTER 5

ANALYSIS OF FACTORS AND CONCLUSION

In the previous chapter, findings of three individual case studies were presented. Each case study discussed how the institution implemented an innovation involving new educational technology. In addition, each case study concluded with a section that contained an analysis of factors and the identification of the change agent providing the catalyst for change. In this chapter, the factors and change agents across all three case studies are compared and contrasted in order to address the two research questions: 1) What are the factors associated with the implementation of new educational technology in community colleges? 2) Who are the change agents associated with the implementation of new educational technology in community colleges?

This concluding chapter begins with a discussion of external factors influencing the implementation of innovation. Next it examines internal factors. The discussion of factors includes factors found to be common to all three case studies as well as a brief discussion of factors that failed to surface at all three case studies. Following the discussion of factors the focus then shifts to a consideration of change agents. After these analyses, a summary of common factors associated with implementing innovation involving new educational
technology in community colleges is presented. The chapter then compares the findings of the three case studies to the four frameworks that have guided research involving the change process. The chapter concludes with a discussion of the implications of this study for higher education and some recommendations for future research.

Since the purpose of this study was to identify common factors associated with successful implementation of innovation, it was essential to define the criteria used to identify common factors. That is, in how many of the three case studies would the factor need to be present for it to be considered a common factor? In establishing a rule of evidence for common factors, it was arbitrarily decided to define such a factor as one that surfaced at all three institutions. Using this strict standard, seven factors were identified as associated with the implementation of new educational technology—one external factor and six internal factors.

**External Factors**

External factors are defined as factors that develop beyond the control and outside the confines of an institution. In analyzing the three case studies, only one external factor emerged as contributing to the implementation process at all three institutions. Before considering that factor, a brief discussion of one external factor that failed to meet the strict rule of evidence seems warranted because it influenced the implementation process at two of the institutions.

Journal articles were a factor in the implementation process at Vernon Regional Junior College and Dona Ana Branch Community College.
At Vernon Regional Junior College the registrar circulated journal articles relating to computer technology to individuals on campus as a vehicle for encouraging the purchase of more advanced computer technology at the institution. Similarly, the Coordinator of the Secretarial Administration Program and the administration at Dona Ana Branch Community College found journal articles to be instrumental in promoting the development of a word processing program. These articles suggested that there would be a demand for people with word processing skills. This factor failed to emerge at New Mexico Junior College.

Funding was the only external factor that surfaced at all three institutions. The findings indicated that each institution implemented the innovation under study with greater ease because funds external to the normal operating budget were used. In obtaining funds external to the normal operating budget, each institution assisted the implementation process in two ways. External funds lessened the financial burden associated with implementing innovation, because each institution used fewer of its internal financial resources than would have otherwise been possible. External funds also minimized financial boundary conflicts, because the institutions did not have to reduce the financial resources of any area to implement the innovation. The contribution of external financial resources is illustrated by a brief review of the evidence from each case study.

A factor in the implementation of a microcomputer system at Vernon Regional Junior College was the availability of funds from an external source. Vernon Regional Junior College did not have the
resources for innovative projects. This was illustrated when the drafting instructor initially requested the purchase of Computer Aided Design equipment. The Dean of Instruction lacked the internal funds to purchase a microcomputer for the implementation of Computer Aided Design in the drafting program. When federal Title VI funds became available, the college responded by beginning the process to implement a microcomputer system. It probably would have been difficult for Vernon Regional Junior College to implement a microcomputer system without federal Title VI funds. Any attempt to redistribute limited internal funds to purchase a microcomputer system may have caused financial boundary contraction in some areas, which might have developed into resistance to the innovation. The findings in this case study indicated that external funds provided the financial resources to make the implementation possible without boundary contraction and allowed the implementation to proceed without resistance.

External funding also was a factor in the implementation of a word processing program at Dona Ana Branch Community College. The college did purchase some initial equipment, such as the Office System 6, through internal funds. The vast majority of equipment, however, was purchased with external funds. Approximately a quarter of a million dollars of external funds were expended for word processing equipment. These funds were obtained from two New Mexico severance tax bonds, special state legislative appropriations, and funds from the New Mexico Department of Vocational Education. As at Vernon Regional Junior College, it is doubtful if the word processing program could
have developed to its present level of technological sophistication without external funding.

At New Mexico Junior College external funds also aided the implementation process involving a telecollege program. The junior college did not use external funds as extensively as other colleges in the case studies. However, external funds were used to purchase wet carrels that were installed at several off-campus locations as well as at the Instructional Resources Center. As was the case at Dona Ana Branch Community College, these funds were obtained from a New Mexico severance tax bond. In addition to the use of external funds, New Mexico Junior College had sufficient internal financial resources to implement the telecollege program without taxing the operating budget of any program. Through a combination of external funds and the use of internal funds outside the normal operating budget, the telecollege program was implemented without financial stress to any program. As at the two other institutions, the finding at New Mexico Junior College indicated that the use of funds outside the normal operating budget contributed to a smoother implementation process.

While external funds proved to be a contributing factor in the implementation of innovation at all three case studies, it is important to carry the analysis beyond the fact that external funds were available to all three institutions. Funding for innovative projects in the case studies came from two sources--external funds and internal funds outside the normal operating budget. Thus, the important finding of this study was that successful implementation of new educational
technology was achieved by each institution using funds outside the normal operating budget.

The conclusion that can be drawn from these case studies is there seems to be a close relationship between the availability of funds external to the normal operating budget and successful implementation of innovation. The reason external funds may be important to the implementation process is that systems of new educational technology are expensive to purchase and implement. They benefit only certain sectors within the institution. If an institution infringes upon the normal operational budget in attempting to implement an innovation, then areas that are not expected to benefit from the innovation may object to their budget being used to fund the project. To reduce this potential resistance problem, which can threaten the implementation process, an institution may consider using funds external to the normal operating budget. The key advantage gained in using funds external to the normal operating budget is that by doing so an institution can avoid financial boundary contraction, which can generate resistance to implementing the innovation.

**Internal Factors**

Internal factors are defined as factors that develop within an organization and are controlled by an institution. In an analysis of internal factors at each institution, six were found to be common factors associated with the implementation of new educational technology. Before considering the common factors, a brief discussion of two internal, but non-common, factors that failed to meet the strict
rule of evidence is warranted. These two factors were the demand factor for a subject area and the decision-making process.

The demand factor is defined as the willingness of potential students to enroll in a particular course or program. At Vernon Regional Junior College the demand factor materialized in the form of declining demand for drafting. The declining enrollment motivated the instructor to search for ways to increase enrollment in his area. He and the Dean of Instruction decided to enhance the program with new educational technology in an effort to increase demand for the subject area. This resulted in implementing Computer Aided Design in the drafting program.

The demand factor at Dona Ana Branch Community College was associated with the implementation of the word processing program. A feasibility study, conducted by the Secretarial Administration Program, provided the documentation the administration required before approving implementation. That study verified that there was a demand for graduates with word processing skills. With this knowledge, the administration approved the implementation of the new program.

The second non-common factor associated with the implementation of new educational technology was the decision-making process. Administrations in higher education often use a decision-making process that can be classified as one of two styles of governance. When an institution involves a large and diverse group in making a decision, it is considered a decentralized decision-making process. If an institution involves only a limited number of higher level
administrators in making a decision, the decision-making process can be classified as centralized.

There was a consensus among the individuals interviewed at Vernon Regional Junior College that the decision to implement a microcomputer system was decentralized. The decision to implement a microcomputer system was made through a series of individual decisions involving a diverse group of people. The registrar, drafting instructor and others within the institution decided they wanted to enhance the institution's computer capability. Once the administration became aware that various areas needed to improve their computer technology, it responded by forming a Study Committee to investigate the method by which the institution could implement advanced computer technology. The Study Committee was composed of representatives from a wide variety of areas within the institution. This committee determined the direction the college would follow in enhancing its computer technology. The administration supported the recommendations of the Study Committee. Thus, the microcomputer system was implemented without any one level of authority controlling the decision-making process and can be accurately described as decentralized.

In contrast to Vernon Regional Junior College, the decision-making process at both Dona Ana Branch Community College and New Mexico Junior College was highly centralized. The decision-making process at Dona Ana Branch Community College involved the Associate Director, the Director of Dona Ana Branch Community College, and the Dean of the College of Human and Community Services at New Mexico State
University. When the Coordinator wanted to implement word processing technology, she approached the Associate Director with her proposal. With his approval, the request was sent to the Director for his approval, and finally to the Dean. These three individuals controlled the decision-making process. Since the decision-making process involved only three administrators, the process could be accurately described as centralized.

The decision-making process at New Mexico Junior College also was centralized. The president wanted to develop non-traditional programs at the junior college. Other administrators were aware of the president's goal and reacted accordingly. The findings at New Mexico Junior College indicated that top level administrators controlled the implementation process. The advantage to this method of decision-making was that the telecollege program was implemented in a short period of time, despite minor resistance from some of the faculty. The administration circumvented the Curriculum Committee and the Junior College Board in order to implement the telecollege program in time for the fall semester. Since all key decisions relating to the implementation of the telecollege program were made by top-level administrators, the decision-making process was in effect centralized.

To sum up: the decision-making process at Dona Ana Branch Community College and New Mexico Junior College was centralized. In contrast to these institutions, the decision-making process at Vernon Regional Junior College was decentralized because several levels were involved in the implementation of a microcomputer system.
The first internal factor that was common to all three case studies was that of boundary expansion in some areas without boundary contraction in any other areas. Boundary contraction may be defined as the reduction of responsibility, resources, or authority in a given area. An institution consists of a multitude of areas, each with an established boundary. When a new element is added to an institution there exists a possibility that some area or areas will expand their sphere of responsibility. In other words, they expand their boundary. An expansion of a boundary might infringe upon other boundaries and cause them to contract their financial resources or area of responsibility. Any area undergoing this boundary contraction may resist the element that is causing them to contract their boundary. When an institution tries to implement an innovation there exists a possibility that some other area might view the innovation as a threat to their boundary and resist the implementation process.

The discussion of external factors illustrated how the use of financial resources outside the normal operating budget aided in the minimization of potential resistance, because no area had to undergo financial boundary contraction. That was an examination of boundary expansion in some areas without contraction in other areas in relation to financial resources. The following is an examination of boundary expansion, without a related contraction, in a more general sense and not limited to financial resources.

At Vernon Regional Junior College, all areas affected by the implementation of a microcomputer system benefited by its
implementation through enhanced capabilities; each affected area experienced boundary expansion. The drafting program added Computer Aided Design to its curriculum, which expanded the drafting program's boundary. In office occupations, microcomputers were added to broaden the instructional capabilities within that program. The same was true for all other instructional areas that received microcomputer technology. Since these areas broadened their capabilities, they expanded their boundary. While a number of boundaries expanded no other area within the institution had to undergo boundary contraction. With the elimination of boundary contraction, the implementation of a microcomputer system proceeded smoothly.

At Dona Ana Branch Community College, the Director had established a policy stipulating that funds for program development would be distributed on the basis of documented need. This policy helped establish an environment in which a program could expand with minimal resistance from other areas on campus because all programs had the same opportunity to expand. The Secretarial Administration Program did expand, but not to the detriment of any other program. The boundary expansion in the Secretarial Administration Program did not cause any other area to contract its boundary. As a result, there was no evidence that resistance surfaced in relation to developments in the Secretarial Administration Program.

Introduction of the telecollege program at New Mexico Junior College did cause some resistance. Several instructors felt threatened by the new method of instruction. However, the Coordinator of
Non-Traditional Programs advertised the program as reaching students who would not normally enroll for on-campus instruction. This tactic, along with his efforts at building a rapport with faculty, assisted in limiting resistance to the telecollege program. In reality the telecollege program expanded the boundaries of various areas on campus without threaten contraction of any other established boundary. As a result the implementation process proceeded smoothly with only limited resistance.

To sum up: all three case studies showed evidence of implementing an innovation without contracting established boundaries. This minimized potential resistance to the innovation and was a common factor in the implementation process at all three institutions. The conclusion that can be drawn from these three case studies suggests that there may be a close relationship between eliminating boundary contraction and the implementation of new educational technology. The explanation for this seems to be that any unit having to undergo a contraction of an established boundary is likely to resist the implementation of the innovation. If individuals on campus perceive the innovation as non-threatening to their boundary, they have less motivation to resist the innovation.

The second common factor to be considered for analysis is that of an institution providing a method of allowing individuals affected by an innovation to have input as to how the innovation would be implemented. The findings indicated that all three institutions allowed, even encouraged, people directly affected by the innovation to
have a voice in the method of implementing the innovation. For example, at Vernon Regional Junior College campus personnel directly affected by the implementation of a microcomputer system had an opportunity to provide input into its implementation. A Study Committee was formed consisting of representatives from all areas interested in obtaining enhanced computer technology. These representatives were allowed to modify elements within the system to meet their individual requirements. In this manner, everyone selected and received the type of microcomputer system they desired. This had the effect of minimizing potential resistance to the implementation of a microcomputer system and eased the implementation process because all affected parties had effective input during the implementation process.

At Dona Ana Branch Community College, the Coordinator of the Secretarial Administration Program recognized early in the implementation process that input by the faculty was critical in reducing resistance. The coordinator had selected the first word processor without input from the faculty. This caused resentment among the faculty because they did not have a voice in the selection of the word processor. She saw the need from this experience to involve the faculty in decisions that directly affect them. During the rest of the implementation process she delegated responsibilities to the faculty so they could have input in the development of the program. The selection of word processing equipment and the design of the Word Processing Center were areas in which the faculty had effective input. The
faculty felt a part of the program's development and supported the coordinator in her efforts to obtain a Word Processing Center.

New Mexico Junior College also encouraged input from the faculty during the implementation of the telecollege program. All faculty involved in the telecollege program were given latitude in the selection of materials and a voice in the management of the course they taught. Department heads also were consulted during the implementation of the telecollege program and limited resistance that did form was from faculty not directly involved with the program.

In summary, all three case studies strongly suggested that input from individuals directly affected by the implementation of an innovation is a common factor contributing to the implementation of new educational technology. The reason there may be a close relationship between input and successful implementation seems to be that input allows for greater consideration of a multitude of viewpoints. If only one person has input, then only that person's considerations will be voiced. When everyone affected by the innovation has input, then ramifications and other considerations that might not emerge have the opportunity to be voiced. People that are affected by an innovation may resist its implementation if their concerns are not addressed during the implementation process. To reduce resistance and to instill a sense of ownership in the innovation, it may be important to encourage input by all affected parties. Encouraging input may have the effect of encouraging a sense of ownership and minimizing
resistance, which provides a better environment to facilitate the implementation process.

A third factor identified in this study concerns clear or good channels of communication. Clear or good channels of communication may be defined as an understanding by all concerned parties of the plans for change and objectives sought in relation to the change. The findings from all three case studies indicated that clear channels of communication were a contributing factor in the implementation process. Clear channels of communication were achieved through an openness on the part of all parties to interact informally as a means of gaining greater understanding of the plans for change. At Dona Ana Branch Community College there were clear channels of communication. The relatively small campus seemed to encourage enhanced communication among individuals involved in the implementation process. The Coordinator of the Secretarial Administration Program had direct access to the administration and was able to effectively articulate the direction and goals of her program. The result was that implementation of the word processing program and equipment proceeded very smoothly.

Communication also was good at Vernon Regional Junior College. To be sure, the faculty did have some problems in communicating through informal channels to the administration their desire to implement enhanced computer technology. However, when the implementation process became stalled, the Director of the Learning Resource Center/Associate Dean of Instruction became aware of the problem because of the open channels of communication she had built with the faculty. She
responded by calling for movement in the implementation process. After a brief interlude, the implementation process did move forward with the formation of a Study Committee. The Study Committee was able to effectively communicate the need for microcomputers to the administration and board.

The largest institution represented in the three case studies was New Mexico Junior College. There was evidence that communication was not as good at this institution as it was at the other two institutions. The Coordinator of Non-Traditional Programs commented that he spent a year working with the faculty in trying to articulate the benefits and goals of the telecollege program. Minor resistance to the program surfaced as some faculty felt threatened by the new method of instruction. Neither of these problems seriously threatened the implementation process, but considerable time and effort was required on the part of the Coordinator of Non-Traditional Programs in overcoming them. These problems might have been prevented through better communication. An articulation of the impact and goals of the telecollege program might have contributed to better communication. At the same time, the president's goal of developing non-traditional instruction was well communicated. Various areas around campus, such as personnel at the Instructional Resources Center, were aware of the president's goal and this contributed to successful implementation of the telecollege program.

In general, all three institutions tried to maintain clear and open channels of communication. Dona Ana Branch Community College, the
smallest institution, had very good communications. This was a contributing factor in implementing word processing technology. At Vernon Regional Junior College, the implementation process stalled because of communication problems between the faculty and administration. However, the microcomputer system was finally implemented because effective channels of communication existed among other areas on campus. New Mexico Junior College, the largest institution represented by the three case studies, was the only institution to experience actual resistance problems. Resistance developed because some of the faculty felt the telecollege program threatened the viability of their traditional classes. If the college had more effectively articulated the benefits and non-threatening nature of the telecollege program, this might have overcome some of the unfounded fears among the faculty and minimized resistance to the program. Nevertheless, communication was still relatively good at this campus as the presidents goals for the program were clearly communicated.

In summary, all three institutions communicated well enough to successfully implement the innovation under study. Therefore, clear channels of communication were considered a common factor in the implementation process. One explanation for the relationship between good communication and successful implementation may be that when everyone understands how the innovation will benefit the institution, the motivation to object to the innovation is reduced and in turn, the potential for resistance is reduced. This understanding will likely
develop only when the benefits to the institution are clearly articulated. Otherwise, negative perceptions about the innovation can develop and generate into a source of resistance.

Another inference that may be drawn from the common factor of good channels of communication is that a relationship may exist between increased size and poorer communications within an institution. The smallest institution, Dona Ana Branch Community College, reported no communication problems. Vernon Regional Junior College had minor problems in this area. The largest institution, New Mexico Junior College, did experience some problems. Evidence suggests that the smaller the organizational unit, the fewer the potential communication problems that are likely to be encountered.

A fourth factor found to be common to all institutions was the existence of a limited hierarchy involved in the approval process at all three institutions. In other words, at each institution there were a relatively small number of authority levels involved in the approval process. For example, at Dona Ana Branch Community College there were only three levels of hierarchy involved in the approval process—the Associate Director, the Director, and the Dean of the College of Human and Community Services. The hierarchy at Vernon Regional Junior College was more complex than at Dona Ana Branch Community College. The hierarchy at Vernon Regional Junior College consisted of four levels, any one of which could have hindered the implementation process. The approval process began with the Study Committee, which made recommendations for a microcomputer system. These recommendations
were forwarded to the Dean of Instruction, then to the president, and finally to the board. While four levels was one greater than at Dona Ana Branch Community College, it still did not represent a highly complex administrative structure. The recommendations for final implementation proceeded smoothly though this limited hierarchy.

Under normal circumstances, the approval process for the telecollege program at New Mexico Junior College would have had to go through five levels of hierarchy consisting of the Curriculum Committee, Institutional Council, Vice President for Instructional and Student Services, president, and the Junior College Board. In the case of implementing the telecollege program, the administration circumvented the Curriculum Committee and the Board. This reduced the number of hierarchical levels to only three—the Institutional Council, the Vice President for Instructional and Student Services, and the president. Limiting potential resistance by reducing the levels of hierarchy in the approval process expedited the implementation process.

In brief, all three institutions implemented the innovation under study with only a few levels of hierarchy associated with the approval process. There are at least two possible explanations for a relationship between limiting the hierarchy involved in the approval process and successful implementation of new educational technology. One reason for this relationship may be that a reduction of approval levels also reduces the impediments associated with the approval process. In other words, there are fewer opportunities for the administrative structure to hinder, or slow down the implementation
process. A second reason may be that the potential for any one level of the hierarchy to terminate the implementation process is reduced. The result of limiting the hierarchy has the effect of increasing the probability for approval to implement the innovation.

A fifth common factor was that of administrative support for the innovation. In each of the three case studies, the administration provided the necessary support to nurture the innovation to successful implementation. At Vernon Regional Jun._or College, the administration and board approved the recommendations of the Study Committee. Even the board assisted in developing a financial arrangement that negated a three year implementation plan and made immediate implementation possible. Action of this nature was a clear indication of support for the implementation of a microcomputer system at this institution.

At Dona Ana Branch Community College the administration was aware of the needs in the Secretarial Administration Program and supported development of a word processing program. The administration approved the development of a word processing program curriculum, the purchase of educational technology in support of the program, and allocated funds to ensure successful implementation. These actions indicated administrative support for development of a word processing program.

The administration, and in particular the president, at New Mexico Junior College supported implementation of the telecollege program. The president assumed the role of leading advocate for development in instructional television. He communicated his position
to others in the administration. These administrators ministered to the needs of the program during the implementation process. One example was that funds were provided to hire a full-time telecollege coordinator. Evidence indicated that administrative support contributed to the successful implementation of the telecollege program.

A sixth factor, minimization of resistance, relates indirectly to the previous factors. Minimization of resistance merits consideration as a separate factor because it also affects the implementation process. The less resistance to an innovation, the smoother the implementation process. The minimization of resistance was very important in the consideration of factors related to eliminating boundary contraction and providing an opportunity for input from everyone affected by the innovation, but it also influenced other factors. Funding the innovation from sources outside the normal operating budget assisted in minimizing resistance. Resistance also was reduced through clear channels of communication. Promoting the positive aspects of the innovation through clear channels of communication assisted in minimizing resistance. Fewer levels of hierarchy at the institutions provided fewer opportunities for resistance to develop in the approval process. Administrative support for innovation also contributed to the minimization of resistance in the implementation process. As the above factors indicate, there was evidence that each institution took measures to minimize resistance. Since minimization of resistance contributed to successful
implementation of new educational technology, it is appropriate that it be identified as a separate factor in the implementation process.

In conclusion, six internal factors surfaced as common factors in the implementation of new educational technology. One factor that was considered an influence in the implementation process was the elimination of boundary contraction. Another common factor was that of an institution providing a method of allowing individuals affected by an innovation to have input as to how the innovation would be implemented. This factor was beneficial in that everyone's concerns had an opportunity to be addressed. The third factor, clear channels of communication, assisted in implementing innovation by indicating the positive benefits of the innovation. In addition, there was an indication of a relationship between clear channels of communication and institutional size. That is, the smaller the institution, the greater the probability of improved communication. The fourth common factor revolved around an institutional effort in limiting the levels of hierarchy involved in the approval process. Evidence suggested that a limited hierarchy, regardless of institutional size, assisted the implementation process. A fifth factor, administrative support of the innovation, indicated that administrators play an important role in the successful implementation of innovation. Minimization of resistance was the sixth factor identified.

**Change Agents**

Change agents are an important subject to study when investigating the implementation process. Change agents are the
catalyst in the implementation process. They provide the spark that motivates an organization to move toward change. Change agents also are the human element in the change process. An institution will implement a change, in part, because an individual, or group, assumes responsibility to advocate change throughout the implementation process. Change agents are not necessarily decision-makers, but they influence the people who make decisions. Without the advocacy role played by the change agent, an institution would not be motivated to implement change. Therefore, the change agent assumes a vital role in the implementation of innovation.

Another important aspect about change agents is that they can emerge from any area or level of governance within an institution. A change agent can be any individual or constituency within the institution. Occasionally, change agents emerge from outside the institution. There seems to be no restrictions on where change agents surface. The findings in these case studies illustrated this point.

It was found that change agents were common to all three institutions as they implemented new educational technology. This was not surprising. As stated above change agents are a necessary ingredient to the change process. What was surprising was the various levels of institutional governance from which the change agents emerged. It was found that change agents surfaced from three different levels of governance at the three institutions. The following change agents were identified as the individual, or group, most responsible for moving the implementation process toward successful completion.
The change agent at Vernon Regional Junior College was difficult to identify. A number of areas were moving toward implementation at the same time. This diffused the implementation process and blurred the role of the change agent to some degree. In the final analysis, the change agent identified at Vernon Regional Junior College was the faculty. A group of concerned faculty wanted to develop enhanced computer technology. This group was frustrated at one point in the implementation process, but when they placed pressure on the administration, the administration responded by forming a Study Committee which eventually led to successful implementation of a microcomputer system.

At Dona Ana Branch Community College, everyone pointed to the Coordinator of the Secretarial Administration Program as the change agent. She was responsible for developing the word processing curriculum and the Word Processing Center as well as enabling the program to purchase the equipment associated with the program. She initiated the requests for these developments and worked with her faculty and administration to see that these changes were successfully implemented.

At New Mexico Junior College there was a consensus of opinion that the change agent was the president. He was considered the leading advocate of the college's entry into the telecollege program. He had a philosophy and complementary experience that supported alternative approaches to instruction. He communicated his goal for
non-traditional instruction, which became the driving force behind the implementation of the telecollege program.

In summary, change agents at the three institutions emerged from three different levels of institutional governance. At Vernon Regional Junior College the faculty was the change agent. At Dona Ana Branch Community College the Coordinator of the Secretarial Administration Program was the change agent. The position held by the coordinator could be considered as mid-level governance in the educational scheme of management. Finally, at New Mexico Junior College, the change agent emerged from the top level of administration. The conclusion that can be drawn from these three case studies is that change agents are an important ingredient in the implementation of innovation, and they may emerge from any institutional level of governance—from faculty to top level administrators.

Case Studies and Frameworks

The purpose of this section is to compare the findings of this study with Gamson's (1974) typology of frameworks that have guided research associated with the change process. Gamson's typology of frameworks was discussed in detail in the second chapter. To briefly review, the typology identified four frameworks for viewing the change process: 1) complex organization; 2) diffusion; 3) conflict; and 4) planned change. The findings of the case studies presented in this study will be compared to each of these frameworks and to the research described under each framework.
The first framework to be examined is the "complex organization." This framework has been described by Dill and Friedman (1979) as one that "attempts to correlate innovativeness in social systems with variables which characterize the system as a whole" (p. 415). Typical variables include institutional age, complexity, size, stratification, affluence, and centralization of authority. The analysis of innovation in the complex organization framework is usually related to the rate at which an organization adds new and different innovations.

There are some factors that emerged across the case studies that lend support to the complex organization framework. Two of the variables in the complex organization framework were found to be common factors in the implementation of new educational technology. These variables were size and affluence. Although size did not emerge as a direct factor in the case studies, it did influence the factor of clear channels of communication. Smaller institutions presented evidence that they possessed better channels of communication. Dona Ana Branch Community College, the smallest institution of the three case studies, exhibited excellent channels of communication. The mid-sized institution, Vernon Regional Junior College, did have a brief instance of poor communication. New Mexico Junior College, the largest of the three institutions, demonstrated a few problems in communication. This provided evidence of a possible relationship between size and clear channels of communication.
The issue of size was in another work involving the complex organization framework. Glover (1980) found that smaller colleges were more likely to implement change. This was verified in the case studies, as Dona Ana Branch Community College, the smallest institution studied, implemented change more readily than the larger institutions. For example, Dona Ana Branch Community College experienced no resistance and exhibited clearer channels of communication than the other institutions.

The second variable, affluence, surfaced as availability of funds external to the normal operating budget. Affluence has been linked to the complex organization framework by a number of researchers. For example, the research conducted by Hefferlin (1969) found that financial resources were a key element in the change process. The evidence from all three case studies indicated that innovations at all three institutions were implemented with external funds from the state or federal levels of government, or with surplus institutional funds as at New Mexico Junior College. Since the case studies found a positive relationship between the availability of funds and the implementation of innovation, this factor clearly influenced the implementation process at all three institutions.

The above discussion illustrates that several of the factors associated with the case studies presented in this study, namely size and affluence, do lend support to the complex organization framework. However, the case studies do not provide compelling empirical support for this framework. The complex organization framework examines the
rate at which an institution adds different innovations. The three institutions presented in this study examined the implementation of only one innovation at each institution. Based on this divergence between the complex organization framework and the case studies, this framework offers only a partial explanation for the implementation process.

The second framework to be analyzed in relation to the three case studies is the "diffusion framework." The diffusion framework explains the manner in which an innovation is adopted by one unit within the organization and then the concept (and later the innovation itself) is adopted, or diffused, throughout the organization. One characteristic of the diffusion framework is communication. Several researchers have linked the factor of communication to the diffusion framework. Rogers (1962), Rogers and Shoemaker (1971), and Pugh (1974) found that the ease with which an innovation could be clearly and accurately described (communication) was a factor in the adoption of an innovation. This same factor surfaced in the three case studies. Despite some minor communication problems, all three institutions exhibited evidence of clear channels of communication.

Another characteristic of the diffusion process is that higher echelons in the organization support the innovation under consideration. This characteristic was emphasized as part of the diffusion framework when Winstead (1982) related that successful implementation of innovation required a strong commitment to the innovation by the higher echelons of the administration. Again, all
three case studies displayed evidence that their administrations supported the innovation. The Board of Trustees for Vernon Regional Junior College even assisted the institution in devising a funding plan for the microcomputer system. The administrations of the two other institutions also were very supportive of the innovation under consideration. The President of New Mexico Junior College was the leading advocate of the telecollege program for that campus. The administration at Dona Ana Branch Community College provided considerable financial support for the word processing program. The factors of communication and support for the innovation by the administration do lend support that the diffusion framework.

The diffusion of a concept was also in evidence at the institutions. At Vernon Regional Junior College, the mathematics instructor discussed the idea of microcomputers among various people at the Vernon campus. The Coordinator of the Secretarial Administration Program diffused the concept of a word processing program to her faculty and administration. Also, the President of New Mexico Junior College advocated the idea of non-traditional instruction at that junior college campus. These types of activities are more examples of the diffusion process.

In examining the implementation of innovation at each of the institutions, there was not enough evidence to suggest that the innovations were implemented through the diffusion process even though there was some evidence of its existence at the institutions studied. For example, at Dona Ana Branch Community College no other subunit
adopted word processing beyond the targeted Secretarial Administration Program. The same can be stated for the microcomputer system at Vernon Regional Junior College and the telecollege program at New Mexico Junior College. At each of these institutions the innovation was adopted by a variety of areas, but not beyond the intended targeted area or through a diffusion process. Therefore, the implementation of innovation described in the three case studies do not strongly support the diffusion framework.

The third framework in Gamson's typology is the "conflict framework." The underlying theme of this framework is that during the change process interest groups form and put pressure in the direction of change, or they resist the proposed change. Levine (1980) in his study of why innovations fail found that institutions have established boundaries which are protected by interest groups. Innovations tend to threaten the status quo of established boundaries and can generate conflict. If an innovation is to be successfully implemented, then conflict needs to be minimized as much as possible. One factor that surfaced at all three case studies was that the institutions avoided threatening the status quo of any established boundary and were able to avoid conflict. The innovations implemented expanded some boundaries without contacting established boundaries.

The implementation of a microcomputer system at Vernon Regional Junior College expanded the capabilities of several programs without reducing the responsibility of any other area. At Dona Ana Branch Community College, the Secretarial Administration Program was expanded,
but not to the detriment of any other program. The telecollege program at New Mexico Junior College became an added responsibility of the Director of Non-Traditional Programs and the Instructional Resources Center, but no area underwent a reduction of responsibility as a result of the new instructional program.

In short, there is evidence of boundary expansion at the three institutions, which supports the conflict framework. Nevertheless, when the three case studies are viewed in totality, one of the prevailing themes is that there was a lack of conflict during the implementation process. At Dona Ana Branch Community College, the Director established a policy of funding only requests that could exhibit documented need. This policy eliminated conspicuous politics and conflict from the decision-making process and placed the implementation process in a relatively conflict-free environment. At Vernon Regional Junior College there was not any evidence of conflict during the implementation process. Minor resistance from some of the faculty at New Mexico Junior College could be described as limited conflict; but this conflict did not become a factor during the implementation process. In brief, the conflict framework does not accurately describe the implementation process at the three institutions.

The final framework is that of "planned change," which is defined as an intentional effort of an organization to make a change. One of the reoccurring themes associated with research under this framework is the critical role played by the change agent (Lippitt,
Watson, and Westley 1958; Lewin 1962; Havelock 1973; Zaltman, Duncan, and Holbek 1973; and Lindquist 1978). The successful implementation of innovation at the three case studies reaffirmed the important role played by a change agent. The faculty at Vernon Regional Junior College were cast as the change agent as they nudged the institution toward enhanced computer technology. The Coordinator of the Secretarial Administration Program was the leading advocate for the development of a word processing program at Dona Ana Branch Community College. Finally, the President of New Mexico Junior College was instrumental in affecting the implementation of a telecollege program at that campus. At all three campuses, the change agent played an important role in implementing innovation.

Another factor associated with the planned change framework is administrative support for implementing the innovation. Gross, Giacquinta, and Berstein (1971) emphasized that administrative financial and organizational support for change was a major factor in implementing innovation. All three case studies displayed evidence that administrative support was present at each institution. At Dona Ana Branch Community College, the administration gave its full support to developments in the Secretarial Administration Program after completion of the feasibility study and on-site visits to organizations that were using word processing technology. The administration at Vernon Regional Junior College also gave its full support once it became cognizant of the needs of the faculty. The President of New
Mexico Junior College was the leading advocate of the telecollege program at that institution.

The problem of resistance is also examined in the planned change framework. Zander (1961) analyzed the problem of resistance and found that it can be minimized if there was a degree of awareness, understanding, and acceptance among participants. The minimization of resistance was a common factor in the three case studies. One method all three institutions used in reducing resistance to the innovation was tapping funds from resources outside the normal operating budget. Another method of reducing resistance was eliminating boundary contraction. Allowing all individuals affected by the proposed innovation to have input into the development of the innovation also minimized resistance. Finally, there was evidence that clear channels of communication contributed to resolving the problem of resistance. In short, a number of techniques were used to minimize resistance to the implementation process.

Lindquist (1978) defined planned change as "a local development which is stimulated and guided by the adoption of external innovations rather than the invention of new ones" (p. 223). He further stated that external concepts are modified to meet the needs at the local level. This accurately describes the innovations implemented at each of the three institutions. Each innovation was developed external to the institution and modified to satisfy campus requirements. Each area at Vernon Regional Junior College modified the microcomputer system to their own specifications. A variety of word
processors were installed at the Word Processing Center to provide the type of training stipulated by the Secretarial Administration faculty. The faculty involved in the telecollege program at New Mexico Junior College modified the curriculum materials to suit their own standards.

There is evidence from the three case studies to support the planned change framework. The above discussion illustrates that components typically associated with the planned change framework were present at all three institutions. Moving to a more generalized analysis, it can be stated with some confidence that at each institution the implementation process was a planned event. At Vernon Regional Junior College, a Study Committee was formed to plan the implementation of a microcomputer system. The decision by the administration at Dona Ana Branch Community College to approve implementation of a word processing program, in effect, gave the Secretarial Administration Program approval to plan the full development of word processing curriculum and equipment. Even before the development of the Annenberg/CPB Project, New Mexico Junior College had planned to implement instructional television, which meant that implementation of the telecollege program was certainly a planned event.

In summation, the implementation of innovation at all three institutions lends support to the planned change framework. As illustrated above, this framework relates well to the events described at all three case studies. While it is true that certain aspects of other frameworks surface in the case studies, none of the other
frameworks can explain the implementation process as well as the planned change framework.

Implications for Higher Education

One reason that research is conducted is so that others may benefit from the knowledge gained through the investigative process. This research may be of particular benefit to administrators in higher education considering implementing new educational technology. There may even be some situations in the case studies that are analogous to circumstances in other institutions which are contemplating the implementation of innovations. Regardless of the similarities that can be drawn, the case studies may benefit all of higher education by expanding our knowledge of the implementation process. The following discussion will illustrate how factors drawn from the case studies may have implications for higher education.

The case studies displayed evidence that the existence of funds external to the normal operating budget was critical to the implementation process. There was some evidence that implementation may not have taken place at several institutions without external funds. The implication from the case studies is that the innovations were implemented with greater ease because external funds were used. An institution contemplating implementing an innovation may want to consider using external funds. Given that there is a clearly established need, how can an institution with limited financial resources implement new systems of educational technology? Not all institutions can tap external financial resources with ease.
Nevertheless, as technology moves forward, many institutions will feel compelled to implement systems of educational technology to keep their graduates competitive in our increasingly technologically oriented work environment. At one time, the federal government was a reliable source of funds for innovative projects. While an institution can still obtain federal funds, it certainly has become a less dependable source. Private foundations are another source for funds. However, these sources are not always reliable. Private foundations may provide funding one year and not the next, or for one type of project and not another. An institution may find internal funding to be the most reliable source. To provide a source of internal funds, external to the normal operating budget, an institution may want to consider setting aside a small percentage of their normal operating budget to fund innovative projects. With a reliable source of funds, an institution will have access to the financial resources necessary to assist in the implementation of new educational technology.

The case studies also illustrated the importance of providing the opportunity for individuals affected by an innovation to have input into its implementation. An institution considering implementing innovation may want to consider all affected parties and solicit their input. However, the larger and more complex the institution, the more difficult this becomes as the input of more groups need to be considered in the implementation process. Generally speaking, the greater the number of inputs, the longer it will take to complete the implementation process. This decreases the speed and ease in which an
institution can respond to needed change. This problem can arise in institutions of any size, but larger institutions usually have a larger array of groups that may want input in the development of an innovation. The question becomes: How can an institution, especially a large institution, provide an opportunity for all individuals affected by an innovation to have input into its implementation without unduly hindering the process? One method in resolving this problem may lie in restructuring the organization. An organization that is restructured into smaller autonomous sub-units or a flatter structure will allow individuals within the organization to have more influence in decisions that are made. There must also be a willingness among administrators to listen to input provided by individuals affected by the innovation.

Another issue, related to that of input, involves the number of hierarchical levels within an institution. The number of hierarchical levels within an institution is usually related to institutional size. Again, large institutions usually have a greater number of levels involved in the approval process than smaller institutions. The three case studies were conducted at relatively small institutions that exhibited a limited number of levels associated with the approval process. This was found to be a positive factor in the implementation process. Larger institutions may not be as fortunate. Usually large institutions, and even some smaller institutions, have many layers of hierarchy that must agree to change and any one unit within the hierarchy can sabotage the entire effort. To solve the problems
related to hierarchy and the previous discussion on input, institutions with a cumbersome organizational structure may consider changing their organizational structure so they are organized into smaller autonomous sub-units. For example, the typical organizational structure is composed of various layers of department chairs, standing committees, deans, provosts, vice-presidents, presidents, and boards. Implementing an innovation can require the approval of each of these hierarchical levels. An autonomous sub-unit would have the authority to implement an innovation without the approval of higher echelons in the organization. Another approach to the issue would be to flatten the organizational structure. That is, streamline the organizational structure so as to reduce the number of levels that must give approval. This is what New Mexico Junior College did when they circumvented the Curriculum Committee and the Junior College Board. Either technique, autonomous sub-units or a flattened organizational structure, would result in fewer steps associated with the approval process. This could result in greater input from individuals affected by the innovation and the approval time could be reduced. An institution that takes steps to simplify the approval process and encourage input from all parties affected by the innovation may find it easier to implement new educational technology.

The findings also indicated that support from administrators is important in the implementation of new educational technology. This places a large share of the responsibility for implementing innovation at the administrative level. When an institution implements innovation
there is some inherent risk of failure associated with the project. It is not easy for administrators to risk failure by supporting an innovative project. If innovative projects are to receive support from the administration, then administrators must be willing to take risks and exercise good judgment about the merits of proposed innovative projects. The implication for higher education is that administrators need to be aware of their vital role in implementing systems of new educational technology and willing to support meritorious projects.

The case studies illustrated that change agents can emerge from any level of institutional management. This is not a new finding, but it does emphasize the importance of an individual, or group, advocating change. They need not be administrators in order to affect change. For example, a faculty member can influence an entire institution if the faculty member is willing to devote the time and energy to advocate change.

In summary, there are implications from the case studies for higher education. Beyond the stated implications there is an overall generalization that can be made. To implement new educational technology an institution must provide an environment conducive to the implementation of innovation. In each of the case studies it was shown how the institution either had or established an environment that supported the implementation of new educational technology. Other institutions must be willing to provide an environment that supports the implementation of innovation.
Recommendations for Future Research

It was stated early in this study that research on the implementation stage of the change process has been limited. More research needs to be conducted on the implementation stage to provide greater insight into the complex nature of implementation. Research involving the implementation stage should provide fertile ground for the future researcher, because there are so many avenues open for investigation. It is clear that the case studies presented in this document were limited in scope. Institutions selected for this case study research were limited to three community colleges in the southwestern United States. Future research could expand upon this sample by conducting parallel studies to see if the findings are supported in different settings. A possibility for expanding this research would be to go beyond the type of institution and geographic boundary represented by this study. For example, case study research could be conducted at four-year institutions to see if findings at these institutions differ from the findings in this study. Also, the same type of research could be used at institutions outside of the southwestern United States to see if geographic area influences the findings. Another approach to expanding this research would be to select one or more large community colleges and study the common factors found at larger institutions.

Future research also could examine the role of the three factors found in this research that did not meet the criteria for being defined as common factors. Journal articles influenced two of the
three institutions. The decision-making process was a factor that was found at each of the case studies, but was not consistent. Two case studies showed evidence that a centralized decision-making process contributed to the implementation process, while the opposite was true at a third institution. Further study might help clarify this issue. The demand for a subject area was a factor that surfaced at two of the institutions. Future research might investigate the role of this factor in the implementation of innovation. While case study research was appropriate for this study, other types of research may be valid in certain situations. For example, a cross-sectional survey may provide information about types of institutions that are successfully implementing certain types of new educational technology.

In summary, several suggestions for future research have been made. But these suggestions do not encompass all possible means of expanding this study. There are numerous areas involving the implementation stage of the change process that could be the subject for future research. The knowledge base in this area is limited and provides an array of opportunities of study for the future researcher.
APPENDIX A

LIST OF INTERVIEWS

Vernon Regional Junior College

Administrator. Director of the Learning Resource Center/Associate Dean of Instruction. Interviewed May 2, June 19, June 21, and October 19, 1984.

Faculty member. Instructor in Drafting and Computer Aided Design. Interviewed April 24, May 2, and November 28, 1984.

Administrator. Dean of Instruction. Interviewed May 2, and November 27, 1984.


Faculty member. Instructor in Data Processing and Programming. Interviewed May 2, 1984.

Faculty member. Instructor in Business. Interviewed October 17, 1984.

Faculty member. Instructor in Office Occupations. Interviewed October 19, 1984.

Administration. Secretary to the President. Interviewed November 27, 1984.

Dona Ana Branch Community College


Faculty member. Instructor in the Secretarial Administration Program. Interviewed June 11, 1984.

218
Faculty member. Instructor in the Secretarial Administration Program. Interviewed June 11, 1984.


Faculty member. Instructor in the Secretarial Administration Program. Interviewed June 11, 1984.

Faculty member. Instructor in the Secretarial Administration Program. Interviewed July 31, 1984.


New Mexico Junior College

Administrator. Vice-President for Instructional and Student Services. Interviewed September 13, 1984.

Faculty member. Former Divisional Chair for Arts, Business, and Humanities. Interviewed September 13, 1984.

Faculty member. Instructor in Computer Science for the Telecollege Program. Interviewed September 13, 1984.

Administrator. Director of the Instructional Resources Center. Interviewed July 11, September 13, October 24, and November 7, 1984.


Administrator. Coordinator of Non-Traditional Programs. Interviewed September 13, and September 27, 1984.


Administrator. Former Dean of Continuing Education at Eastern New Mexico University. Interviewed September 21, 1984.
APPENDIX B

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221


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