INFORMATION TO USERS

The most advanced technology has been used to photograph and reproduce this manuscript from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.
Accepters and resisters to computer technology in education

Forsythe, Lois Kern, Ph.D.
The Ohio State University, 1989

Copyright ©1990 by Forsythe, Lois Kern. All rights reserved.
ACCEPTERS AND RESISTERS

TO

COMPUTER TECHNOLOGY IN EDUCATION

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

Lois K. Forsythe, B.S., M.A.

* * * * *

The Ohio State University

1989

Dissertation Committee:
Donald L. Haefele
John P. Klein
William W. Wayson

Approved by
William W. Wayson
Adviser
College of Education
Department of Educational Policy and Leadership
In Memory of My Father, Paul D. Kern

In Dedication to My Mother, Eleanor McC. Kern
ACKNOWLEDGMENTS

I express sincere appreciation to Dr. William W. Wayson for his guidance, insight, and patience throughout the research. Thanks go to the other members of my advisory committee, Drs. Donald Haefele and John Klein, for their suggestions and comments. Thanks goes to Robert Able, graduate student, for his assistance in helping to analyze the data. My gratitude goes to Laura Philabaum, J.D., who assisted with the editing of the document. Additional thanks goes to Dr. Dan Scott for helping to edit the final draft. To my husband, Dick, I offer sincere thanks for your support, faith in me, and willingness to endure with me the vicissitudes of my endeavors. To my children, Sharon, David, Timothy, and John, thanks for trying to understand my determination to reach my goal. To my grandchildren, Shannon, Shane, and Allison, my love and gratitude for understanding my absences at some of your very special occasions.
VITA

June 20, 1931

Born - Pittsburgh, Pennsylvania

1953

B.S. in Dietetics
Muskingum College
New Concord, Ohio

1953 - 1956

Dietitian - New Trier High School, Winnetka, Illinois

1954 - 1955

Dietitian - Summers
Garrett Biblical Institute
Evanston, Illinois

1963 - 1967

Dietitian and Department Head
Coshocton County Memorial Hospital, Coshocton, Ohio

1963 - 1982

Director of Youth
Presbyterian Church
Coshocton, Ohio

1970 - 1989

Coordinator/Teacher
Computer Education, Gifted Education, and Teacher of Sixth Grade
Coshocton City Schools
Coshocton, Ohio

1981

M.A. in Educational Administration
The Ohio State University
Columbus, Ohio

1984 - 1988

Adjunct Professor
Continuing Education Program
Branch Campus of Ashland College, Ashland, Ohio
FIELDS OF STUDY

Major Field: Educational Administration, Dr. William W. Wayson

Studies in: Staff Development
            Computer Education
            Curriculum and Development
            Gifted Education, and
            Personnel and Supervision
# TABLE OF CONTENTS

ACKNOWLEDGEMENTS .............................................................................. III
VITA ........................................................................................................ iv
LIST OF TABLES ................................................................................ lx
LIST OF FIGURES ............................................................................... xli

## CHAPTER

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>4</td>
</tr>
<tr>
<td>Central Research Question</td>
<td>6</td>
</tr>
<tr>
<td>Research Hypotheses</td>
<td>6</td>
</tr>
<tr>
<td>Background of the Study</td>
<td>8</td>
</tr>
<tr>
<td>Significance of the Study</td>
<td>11</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>16</td>
</tr>
<tr>
<td>II. REVIEW OF RELATED LITERATURE</td>
<td>18</td>
</tr>
<tr>
<td>The Change Process</td>
<td>19</td>
</tr>
<tr>
<td>Models for Planned Change</td>
<td>33</td>
</tr>
<tr>
<td>Characteristics of Accepters and Resisters</td>
<td>42</td>
</tr>
<tr>
<td>Anxiety</td>
<td>52</td>
</tr>
<tr>
<td>Computer Anxiety</td>
<td>57</td>
</tr>
<tr>
<td>Computer Phobia</td>
<td>64</td>
</tr>
<tr>
<td>Contextual Variables</td>
<td>67</td>
</tr>
<tr>
<td>Knowledge and Skills</td>
<td>69</td>
</tr>
<tr>
<td>Software and Hardware</td>
<td>70</td>
</tr>
<tr>
<td>Administrative Support</td>
<td>71</td>
</tr>
<tr>
<td>Opportunities for &quot;Hands-on&quot; Experiences</td>
<td>72</td>
</tr>
<tr>
<td>III. METHODOLOGY</td>
<td>PAGE</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Procedures for the Study</td>
<td>73</td>
</tr>
<tr>
<td>Study Design</td>
<td>73</td>
</tr>
<tr>
<td>Description of the Sample</td>
<td>74</td>
</tr>
<tr>
<td>Data Collection Process</td>
<td>78</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>80</td>
</tr>
<tr>
<td>The Computer Usage Questionnaire</td>
<td>81</td>
</tr>
<tr>
<td>Computer Acceptance Subscale</td>
<td>82</td>
</tr>
<tr>
<td>Computer Anxiety Subscale</td>
<td>84</td>
</tr>
<tr>
<td>Computer Confidence Subscale</td>
<td>84</td>
</tr>
<tr>
<td>Statistical Treatment of the Data</td>
<td>85</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>87</td>
</tr>
<tr>
<td>IV. RESULTS OF THE STUDY</td>
<td>89</td>
</tr>
<tr>
<td>Results for Acceptance Subscale</td>
<td>90</td>
</tr>
<tr>
<td>Attitudinal Variables</td>
<td>91</td>
</tr>
<tr>
<td>Hypothesis I</td>
<td>91</td>
</tr>
<tr>
<td>Hypothesis II</td>
<td>92</td>
</tr>
<tr>
<td>Hypothesis III</td>
<td>94</td>
</tr>
<tr>
<td>Open and Closed-Mindedness</td>
<td>96</td>
</tr>
<tr>
<td>Hypothesis IV</td>
<td>96</td>
</tr>
<tr>
<td>Hypothesis V</td>
<td>97</td>
</tr>
<tr>
<td>Contextual Variables</td>
<td>98</td>
</tr>
<tr>
<td>Hypothesis VI</td>
<td>98</td>
</tr>
<tr>
<td>Hypothesis VII</td>
<td>.100</td>
</tr>
<tr>
<td>Hypothesis VIII</td>
<td>.102</td>
</tr>
<tr>
<td>Hypothesis IX</td>
<td>.103</td>
</tr>
<tr>
<td>Hypothesis X</td>
<td>.105</td>
</tr>
<tr>
<td>Personal Variables</td>
<td>.107</td>
</tr>
<tr>
<td>Hypothesis XI</td>
<td>.107</td>
</tr>
<tr>
<td>Hypothesis XII</td>
<td>.109</td>
</tr>
<tr>
<td>Hypothesis XIII</td>
<td>.111</td>
</tr>
</tbody>
</table>
# Table of Contents

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Predictor Variables Considered</strong></td>
<td>.113</td>
</tr>
<tr>
<td>Hypothesis XIV</td>
<td>.113</td>
</tr>
<tr>
<td>Hypothesis XV</td>
<td>.115</td>
</tr>
<tr>
<td>Hypothesis XVI</td>
<td>.118</td>
</tr>
<tr>
<td>Hypothesis XVII</td>
<td>.121</td>
</tr>
<tr>
<td><strong>Summary</strong></td>
<td>.123</td>
</tr>
<tr>
<td><strong>V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS</strong></td>
<td>.127</td>
</tr>
<tr>
<td>Summary</td>
<td>.127</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>.127</td>
</tr>
<tr>
<td>The Hypotheses Reviewed</td>
<td>.128</td>
</tr>
<tr>
<td>Conclusions</td>
<td>.130</td>
</tr>
<tr>
<td>Results of the Analysis</td>
<td>.130</td>
</tr>
<tr>
<td>Discussion</td>
<td>.132</td>
</tr>
<tr>
<td>Recommendations</td>
<td>.136</td>
</tr>
<tr>
<td>Further Research</td>
<td>.138</td>
</tr>
<tr>
<td><strong>APPENDICES</strong></td>
<td></td>
</tr>
<tr>
<td>A. Cover Letter</td>
<td>.139</td>
</tr>
<tr>
<td>B. The Computer Usage Questionnaire</td>
<td>.141</td>
</tr>
<tr>
<td>C. The Rokeach Dogmatism Scale</td>
<td>.145</td>
</tr>
<tr>
<td><strong>LIST OF REFERENCES</strong></td>
<td>.149</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1: Personal Characteristic of Age for Respondents' Group</td>
<td>75</td>
</tr>
<tr>
<td>Table 2: The Number of Years of Teaching for Respondents' Group</td>
<td>76</td>
</tr>
<tr>
<td>Table 3: Distribution of Males and Females for Respondents' and Non-respondents' Groups</td>
<td>77</td>
</tr>
<tr>
<td>Table 4: Comparison of Number of Computer Education Classes Taken by Respondents and Non-respondents</td>
<td>79</td>
</tr>
<tr>
<td>Table 5: Distribution of Sample Sorted into Acceptor and Resister Groups</td>
<td>90</td>
</tr>
<tr>
<td>Table 6: Means and Standard Deviations for the Predictor Variable of Open-mindedness</td>
<td>91</td>
</tr>
<tr>
<td>Table 7: Results of the Analysis Testing the Relationship Between Computer Acceptance and Open-mindedness</td>
<td>92</td>
</tr>
<tr>
<td>Table 8: Means and Standard Deviations for the Predictor Variable of Computer Anxiety</td>
<td>93</td>
</tr>
<tr>
<td>Table 9: Results of the Analysis Testing the Relationship Between Computer Acceptance and Computer Anxiety</td>
<td>93</td>
</tr>
<tr>
<td>Table 10: Means and Standard Deviations for the Predictor Variable of Computer Confidence</td>
<td>95</td>
</tr>
<tr>
<td>Table 11: Results of the Analysis Testing the Relationship Between Computer Acceptance and Computer Confidence</td>
<td>95</td>
</tr>
<tr>
<td>Table</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>12</td>
<td>Results of the Analysis Testing the Relationship Between Open-mindedness and Computer Anxiety</td>
</tr>
<tr>
<td>13</td>
<td>Results of the Analysis Testing the Relationship Between Open-mindedness and Computer Confidence</td>
</tr>
<tr>
<td>14</td>
<td>Means and Standard Deviations for the Predictor Variable of Computer Knowledge and Skills</td>
</tr>
<tr>
<td>15</td>
<td>Results of the Analysis Testing the Relationship Between Computer Acceptance and Computer Knowledge and Skills</td>
</tr>
<tr>
<td>16</td>
<td>Means and Standard Deviations for the Predictor Variable of Software Availability</td>
</tr>
<tr>
<td>17</td>
<td>Results of the Analysis Testing the Relationship Between Computer Acceptance and Software Availability</td>
</tr>
<tr>
<td>18</td>
<td>Means and Standard Deviations for the Predictor Variable of Hardware Accessibility</td>
</tr>
<tr>
<td>19</td>
<td>Results of the Analysis Testing the Relationship Between Computer Acceptance and Hardware Accessibility</td>
</tr>
<tr>
<td>20*</td>
<td>Means and Standard Deviations for the Predictor Variable of Administrative Interest and Support</td>
</tr>
<tr>
<td>21</td>
<td>Results of the Analysis Testing the Relationship Between Computer Acceptance and Administrative Interest and Support</td>
</tr>
<tr>
<td>22</td>
<td>Means and Standard Deviations for the Predictor Variable of &quot;Hands-on&quot; Experience</td>
</tr>
</tbody>
</table>
Table 23: Results of the Analysis Testing the Relationship Between Computer Acceptance and "Hands-on" Experience..............................................107

Table 24: Means and Standard Deviations for the Predictor Variable of Number of Years of Teaching.................................................................108

Table 25: Results of the Analysis Testing the Relationship Between Computer Acceptance and the Number of Years of Teaching........................108

Table 26: Means and Standard Deviations for the Predictor Variable of Age.................................................................110

Table 27: Results of the Analysis Testing the Relationship Between Computer Acceptance and Age.................................................................111

Table 28: Means and Standard Deviations for the Predictor Variable of Sex.................................................................112

Table 29: Results of the Analysis Testing the Relationship Between Computer Acceptance and Sex.................................................................113

Table 30: Means and Standard Deviations for the Predictor Variable of Grade Level Taught .................................................................114

Table 31: Results of the Analysis Testing the Relationship Between Computer Acceptance and Grade Level Taught.................................................................115

Table 32: Means and Standard Deviations for the Predictor Variable of Subject Taught.................................................................116

Table 33: Results of the Analysis Testing the Relationship Between Computer Acceptance and Subject Taught.................................................................118
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>Means and Standard Deviations for the Predictor Variable of Frequency of Computer Use</td>
<td>119</td>
</tr>
<tr>
<td>35</td>
<td>Results of the Analysis Testing the Relationship Between Computer Acceptance and Frequency of Computer Use</td>
<td>120</td>
</tr>
<tr>
<td>36</td>
<td>Means and Standard Deviations for the Predictor Variable of Hours of Computer Use</td>
<td>121</td>
</tr>
<tr>
<td>37</td>
<td>Results of the Analysis Testing the Relationship Between Computer Acceptance and Hours of Computer Use</td>
<td>123</td>
</tr>
<tr>
<td>38</td>
<td>Results of the Analyses for Predictor Variables Ranked by P-value</td>
<td>126</td>
</tr>
</tbody>
</table>
# List of Figures

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1: Model for Change Adoption</td>
<td>36</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

One of the most important innovations of the '60s, for both public schools and society, is computer technology. Weinberg and Fuerst (1964) write:

Hard as it may be to believe, it's possible that the computer revolution hasn't even begun yet. The real revolution may not be the silicon chips, microprocessors and home computers of today but new kinds of specialized software and superfast machines of tomorrow. This software may make computers "think" or simulate human thought process. Even the experts in this field aren't sure what kind of world they can build if their research succeeds. (p. 108)

"Like a stone plunging into a pond, the computer revolution has sent out shock waves of change. Its rings of influence have moved steadily outward, affecting more and more people" (Brod, 1984, p. 18). Because of the fast pace of computer technology and the impact it is having on our society, abandonment of the normal process of planning and structuring the implementation of an innovation into institutions and work places has changed as well (Weinberg and Fuerst, 1984). "...Rapid computerization has created an enormous and sudden need to adapt to new lifestyles, relationships, and routines" (Brod, 1984, p. 22).
Education is but one facet of our lives that will change due to the advent of the computer age (Evans, 1979). Teachers' roles as well as what and how they teach may change as new skills are needed to cope with the change. Teaching styles and curriculum materials may also change.

Weinberg and Fuerst are positive about the role of computers in education:

Schools should help students to use the computer as a tool. For example, if students learn about word processing, they'll soon see that the computer can be a nifty device to help them express themselves. A word processing program gives students the opportunity to write, rewrite and edit, all skills they rarely get to practice in an ordinary classroom. (1964, p. 124)

A choice faces each individual: to accept, to resist, or to be indifferent toward computer education. Some school administrators and teachers are caught up in "the wave" (Toffler, 1980); others are hesitant to accept computer technology as a tool to enhance learning (Weinberg and Fuerst, 1984). Educators who choose to be indifferent are quite often happy with the status quo. Change is easier for some educators than others. There are those who eagerly embrace change who may be called accepters or innovators. Others who may be termed resisters hesitate or actively resist change (Havelock, 1973).
Educators caught in "the wave" are looking toward tomorrow when there will be as many computers in our homes as television sets. In 1984, Weinberg and Fuerst wrote:

Predictions about computers are almost as numerous as computers themselves. Every market researcher seems to want to peer into his crystal ball for a look in the future. These experts tell us that all Americans will own a computer within the next ten years; that computers will become as commonplace as telephones and televisions.... (p. 97)

Another statement from the Weinberg and Fuerst book about computer ownership is:

Every thirteen minutes, a new VDT screen is installed somewhere in America. Eventually, eight out of ten homes and three quarters of all office workers in the country will have computers. (1984, p. 111)

If the above predictions prove to be true, teachers will need computer skills to stay relevant in a technological world.

However, some degree of caution seems warranted. Kelman, in the article "What If They Gave a Computer Revolution and Nobody Came?" (1982) writes:

Most educators lack the knowledge base and the inclination to become active in software and hardware development. In fact, many educators remain deeply skeptical about, if not hostile to, the prospect of computers in the schools. (p. 54)
Some resisters to computer education feel there is not enough evidence to prove the degree of effectiveness that computers have on the learning process. Sheingold, director of the Bank Street Center, offers some reassuring advice to the resisters: "People should try not to be frightened by computers or about computers (cited in Hassett, 1984, p. 28).

Statement of the Problem

The statement of the problem is: What personal and contextual characteristics differentiate accepters from resisters to computer technology within schools?

A consideration when working as a change agent charged with the task of implementing computer technology into schools is the identification of "accepters" and "resisters" within the group. Groups of people, depending on whether they are "accepters" or "resisters" of innovations (Havelock, 1973), or who hold attitudes that are "open" or "closed" may have particular identifiable characteristics indicative of their attitudes both in general and in regard to computers.

General attitudes are related to open and closed-mindedness (Rokeach, 1960). Theory, supported
by research, indicates that both open and closed-mindedness are related to the acceptance or resistance of an innovation. People who are closed-minded tend not to support innovations. Open-minded people usually support innovations (Rokeach, 1960).

Not all educators are amenable to change and not all educators are comfortable using computers, much less using the computer to teach. Describing the characteristics of educators who are accepters of change or of the context that promotes acceptance would help to implement efficient and successful staff development in computer use. In addition, describing the characteristics of open-minded educators would reinforce identification and the probability of success.

Educators taking an "accepters'" point of view toward computer education and demonstrating the characteristics of "open-mindedness" can improve the chances of success when selected to participate in a staff development program, change adoption process, planning for an innovation program, or in-service
training focusing on computer education. They could also act as mentors to help their peers who are more hesitant about using computers.

Central Research Question

The central research question of this investigation is: Do educators who are identified "accepters" of computer technology:

1. Score high in open-mindedness as defined by Rokeach (1960)?
2. Exhibit low anxiety toward computers?
3. Attribute computer acceptance to the presence of specific contextuels, and
4. Share common demographic characteristics?

Research Hypotheses

The hypotheses used in the study were:

Hypothesis I:

Accepting educators, as defined by scores on the Acceptance Subscale in the Computer Usage Questionnaire, tend to be open-minded as defined by scores on the Rokeach Dogmatism Scale: Resisting educators tend to be closed-minded.

Hypothesis II:

Accepting educators are less anxious than resisting educators about computer technology.
Hypothesis III:
Accepting educators are more confident than resisting educators about computer technology.

Hypothesis IV:
Open-minded educators are less anxious than closed-minded educators about computer technology.

Hypothesis V:
Open-minded educators are more confident than closed-minded educators about computer technology.

Hypothesis VI:
Computer knowledge and skills are related to the acceptance of computer technology.

Hypothesis VII:
Availability of software for teacher's use and teacher's subject area is related to the acceptance of computer technology.

Hypothesis VIII:
Accessibility to computer hardware is related to the acceptance of computer technology.

Hypothesis IX:
Administrative interest and support are related to the acceptance of computer technology.

Hypothesis X:
Opportunity for "hands-on" experience on the computer is related to the acceptance of computer technology.

Hypothesis XI:
The personal characteristic of the number of years of teaching is related to computer acceptance.
Hypothesis XII:

The personal characteristic of age is related to computer acceptance.

Hypothesis XIII:

The personal characteristic of sex is related to computer acceptance.

Background of the Study

Theory supports that dogmatism (closed-mindedness) is highly related to resistance and anxiety proneness (Rokeach, 1960). This can be carried one step further by suggesting that innovations (changes) are resisted by closed-minded or anxiety prone individuals.

In a similar manner, theory suggests that acceptance of innovations is positively related to open-mindedness (Rokeach, 1960). Oscarson and Finch (1979) support the theory that a relationship does exist between acceptance and open-mindedness, as defined by the scores on the Rokeach Dogmatism Scale. In a study of adoption-proneness of a drug-reduction program among industrial and trade teachers the data were found to support the theory (Oscarson and Finch, 1979). Both types of individuals, accepters and open-minded, are more open than resisters or
closed-minded individuals toward accepting an

Computer technology is an innovation being
introduced in schools across the country. Although the
research is not complete relative to the positive and
negative aspects of computers in the schools, some of
the research to date supports the use of computers in
schools as a positive asset to learning if used

Some teachers and administrators are not yet
convinced about the necessity for computers in the
school and may resist the implementation of computer
technology. Several authors and researchers have
suggested reasons why computer implementation is either
sluggish or non-existent in some school districts. A
synthesis of the reasons suggested by Bulkeley, (1988),
Maurer and Simonson (1984), Rohner and Simonson (1985),
Wayson, Mitchell, Pinnell, and Landis (1988), and
Weinberg and Fuerst (1984) follows:

1. Unwillingness by some administrations to
support the use of computers both as an
enhancement to the curriculum and an academic
subject in its own right,

2. Lack of planning for computer implementation
and curriculum,
3. Lack of understanding by administrators and teachers of the multifaceted uses of computers for educational applications,

4. Quick acquisition of hardware without plans for its use,

5. Lack of a person within the district who is qualified and skilled in computer technology,

6. Unwillingness of some administrators to recognize computer education as a verifiable academic course by relegating it to an "extra" or "luxury" status,

7. Lack of school personnel, both administrators and teachers, recognizing that the computer is more than a toy or extravagance,

8. Lack of enough good software to support and enhance the curriculum needs of the students,

9. Lack of funds for current textbooks in the field of computer technology,

10. Lack of acceptance by some administrators and teachers because computer technology is an innovation which does not seem to have enough research to support its use,

11. Lack of acceptance by some administrators and teachers because of computer anxiety,

12. Lack of acceptance by some administrators and teachers because they feel intimidated or obsolete because of the new technology,

13. Lack of acceptance because the faculty has not had enough "hands-on" experience or overall training to feel confident when working with computers, and

14. Placing computers in schools solely for the purpose of good public relations with no real intent to implement a computer curriculum.
Part of the study will address the problems related to resistance of computer technology. Recognizing the problems and finding some ways to reduce resistance could help in making computer implementation a smooth and more successful process.

**Significance of the Study**

Selecting educators who can ensure acceptance of computer education could be enhanced by taking into consideration the characteristics of individuals who would most likely be supportive of an innovation. Such information could provide a base for the successful introduction of computer technology within a school district.

Computer technology in education requires planned change for successful implementation. Havelock (1973) refers to the need for planned change as he relates the following anecdote.

On June 1, 1965, Robert Manry set out from Falmouth, Massachusetts, in a 13-foot sailboat to cross the Atlantic to Falmouth, England. Manry was confident that he could make it, not because he was fool hardy or exceptionally brave, but he had done a thorough job of resource retrieval. He had read accounts of past voyages; he knew the weather patterns, the currents, and the shipping traffic. He knew what food, navigational gear, emergency equipment, and clothing to provide for himself, and above all he knew his boat. He knew what it could take and how it would behave in various conditions.
Manry made a successful crossing largely because he had done such a complete job of resource acquisition. (p. 77)

An analogy may be seen between planning and preparing for a voyage and planning changes in education. Change agents, reflecting on this analogy, may set out to solve a problem that confronts many school systems at the present time: How can one successfully implement computer technology within the school environment?

This question is not easily answered. Weinberg and Fuerst (1984) address the problem in the following way:

Obviously, teachers must lead the way.
...teachers can gain a mastery over the computer and pass it along in ways that would be impossible in canned software. The computer literate teacher won’t have to be locked into one set of programs. He or she can experiment with different ways of delivering learning materials, creating specially tailored courses from a number of software packages.

Learning often involves a personal communication between student and teacher. The computer can’t replace the teacher, but, given the proper materials, the teacher can make the computer a powerful learning tool.... (Weinberg and Fuerst, 1984, p. 124)

Working with a group of educators who are accepters would be more efficient and effective than working through educators or teachers who are more resistant to change and possibly anxious about the use of computers as well.
Likert, 1964, recommended that a study of people involved in a change process could provide answers to questions regarding the process. It is important to identify "accepters" and "open-minded" educators because they are more open and ready to change. It is also important to identify resisters as well as accepters.

It is important, however, to try to identify resisters before they become vocal and committed on this (a) particular innovation. Resisters, like innovators, should be judged for relative sophistication and influence. (Havelock, 1973, p. 122)

If the natural leaders in the group aren't supportive of the innovation, they can jeopardize efforts by subtly swaying the group's attitude toward resistance (Weinberg and Fuerst, 1984).

A major cause for resistance may be computer anxiety. Many teachers exhibit anxiety when it comes to using the computer or engaging in activities that call for its use. A study of the relationships between teachers and computer anxiety and teachers and computer confidence, measured by using the Computer Usage Questionnaire, can provide guidelines on how to make the transition to computers in the classroom less traumatic, especially for the resisters. By identifying computer anxious resisters, change agents...
may provide a non-threatening environment and use activities and experiences to help decrease computer anxiety. In some cases, computer anxious educators may become computer accepters if the instruction is successful in reducing anxiety.

Rokeach has identified one of the major predictors for resistance, closed-mindedness. Determining open and closed-minded persons can help to predict their acceptance or resistance toward an innovation. The Rokeach Dogmatism Scale is used to determine whether an individual is open or closed-minded. Closed-minded individuals tend to be inflexible, conforming, and conservative (Rokeach, 1960). Generally closed-minded people prefer to stay at the status quo. Open-minded individuals are usually risk takers; they are willing to try out new things. The chances for success would be greater working with open-minded educators than closed-minded educators when introducing an innovation (Rokeach, 1960).

Havelock (1973) refers to the two groups as "accepters" and "resisters." Identifiable characteristics demonstrated by individuals may be used to sort a group into accepters and resisters. Resisters are generally willing to give up more quickly
than accepters. When something "new" is introduced "resisters" become "foot-draggers." When working with a group made up of resisters, chances for success are reduced when it comes to implementing an innovation (Havelock, 1973). Accepters are usually non-conformists. They are intelligent and have a keen sense for the "new." Accepters are highly motivated and enthusiastic about new ideas. The accepters are easier than the resisters to work with when introducing an innovation (Havelock, 1973). Identifying accepters is important because they will be more supportive of an innovation.

Studies in the area of computer anxiety, acceptance, and resistance provide research data that indicate some resistance can be changed to acceptance if certain conditions are met. Contextual variables studied to predict acceptance of computers were:

1. Computer knowledge and skills acquisition,
2. Availability of software for teacher's use and teacher's subject area, and
3. Accessibility to computer hardware,
4. Administrative interest and support,
Campbell (1981) studied a group of independent variables to see whether or not each variable had some relationship to acceptance of an innovation. The three independent variables tested to determine the predictor effect on acceptance were: (1) number of years of teaching, (2) age, and (3) sex. In Campbell's study the independent variables were found to have little or no effect on whether or not an innovation was accepted. Campbell called these independent variables "myths" (1981).

Definition of Terms

The terms used in the study are defined here for the purpose of clarification. In some cases, terms have been defined by the authors and are presented in the author's words.

**Accepter**: an individual who is familiar with the innovation and supports its use (Havelock, 1973).

**Closed-minded**: the mind-set of an individual who demonstrates a "closed belief system" characterized by intolerance toward those with opposing beliefs (Rokeach, 1960).

**Computer acceptance**: a person's ascribing value to the use of the computer for problem-solving,
instruction and learning, storing and retrieving records, and other management applications (Loyd and Gressard, 1984, 1985).

**Computer confidence:** a computer user feeling comfortable and knowledgeable about working with computers (Loyd and Gressard, 1984, 1985).

**Computer phobia:** a fear of computers that stands in the way of gaining knowledge and skill in the operation and understanding of computers (Weinberg and Fuerst, 1984).

**Hardware:** the computer itself and any input or output device; for example, disk drive, printer, and modem.

**Open-minded:** a mind-set which is the opposite of closed-minded. The individual respects authority, but determines "the authority's cognitive correctness, accuracy, and consistency with other information he has about the world" (Rokeach, 1960, p. 63).

**Resister:** an individual who is non-accepting of change or an innovation (Havelock, 1973).

**Software:** computer programs which are stored on magnetic media or punch cards that are read by the computer through an input device.
CHAPTER II

REVIEW OF RELATED LITERATURE

A review of the literature relating to the change process and planned change provides a background for understanding the nature of change as it relates to organizations. The literature review also includes a list of the characteristics, attitudes, and personality traits of educators that might relate to acceptance and resistance toward computer technology in education.

The literature review targets five topic areas:

1. The Change Process,
2. Models for Planned Change,
3. Characteristics of Accepters and Resisters,
4. Anxiety
   a. Computer Anxiety,
   b. Computer Phobia, and
5. Predictors of Acceptance.
The Change Process

"The pressures for educational change and reform are fundamental facts of life" (Baldridge and Deal, 1983, p. 89). According to Dyer:

Change will occur whether we like it, plan it, or try to ignore it. Perhaps the most constant process we know about is change: All individuals and organizations change. It may come slowly and subtly or be rapid and dramatic, but change will occur. The critical issue is: Can we plan the change so that it moves in the direction we desire and at a rate we control. ...Planned change is a fundamental goal for people and organizations. (Dyer, 1972, p. xiii)

Havelock (1973) defines innovation as:

Any change which represents something new to the people being changed. ...will also usually mean a change which benefits the people who are changed. (p. 4)

Havelock qualifies the definition with the words "will... usually mean... benefits." Many educators feel that education needs change. One of the changes that has come about in the last six years is the adoption of computer technology into the school curriculum (Becker, 1983, 1984, 1986). Future research will determine whether the innovation of computer technology in education is positive or negative (Sheingold, 1984).

Rogers, in the book, Diffusion of Innovations, writes:

It matters little whether or not an innovation has a great degree of advantage over the idea it is
replacing. What does matter is whether the individual perceives the relative advantage of the innovation. (1962, p. 124)

In the present study the innovation of computer technology has been considered as positive based on the research findings of Becker (1984, 1986), Billings (1983), Kulik (1983), and Levin (1980).

Terms often used relative to the introduction and implementation of a new concept are: (1) innovation, (2) diffusion of an innovation, and (3) change adoption. In a book edited by Per Dalin (1973), innovation is defined as an attempt which is deliberate to improve educational practice. Everett M. Rogers addressed the subject of innovation by writing the book, Diffusion of Innovations (1962). Havelock wrote concerning the role of diffusion of an innovation:

Diffusion of an innovation begins with the acceptance of the idea by a few key members of a community. From there on it begins to spread more rapidly, usually through word-of-mouth contacts between friends, neighbors, and relatives. This person-to-person process is very effective; once it has started and there are clusters of people who accept the idea and are "talking it up," it gathers momentum. (1973, p. 119)

Diffusion of an innovation is more or less a "trial balloon" approach to change. The innovation is introduced and used to some degree, an evaluation of the innovation is made, and based on the findings the
decision to adopt or not to adopt the change (innovation) is made. The adoption process of an innovation is called "change adoption." Havelock wrote: "In the 'adoption' stage, the results of the trial are weighed and considered and, on the basis of this post-trial evaluation, the decision is made to adopt (or reject) the innovation" (1973, p. 114).

Public school systems have been notoriously slow to adopt changes in education primarily due to:
(a) absence of a change agent, (b) weak knowledge base by schools about new educational practices, and (c) lack of control over the selection of their client base (Carlson, 1965). These three forces slow change particularly in the case of computer technology.

Computer technology in the schools has been a change that is unique in two ways, its all-encompassing scope and its rapid introduction into the realm of education. Computer technology can be used as a multi-dimensional tool for learning; it encroaches on every academic discipline; it can be used as a means to facilitate and enhance creative writing; it has the versatility of being used in school and business applications, and it seems to have unlimited potential as a diagnostic and problem-solving tool (Papert, 1980;
Turkle, 1984). Public schools were ill-prepared for the entry of computers. Many school administrators bought computers quickly without the usual advance planning necessary for positive changes in the curriculum. The normal process of implementation was by-passed in some cases (Weinberg and Fuerst, 1984). In-service training on computers, curriculum integration and development, and lack of coordinated efforts within school districts were often compromised in order to meet the societal demand of having computer education in evidence within the schools (Weinberg and Fuerst, 1984).

Society has exerted pressure on the schools in the wake of the technological revolution. Because of the extreme amount of pressure to educate students to live and work in a technological society, schools were faced with a change they were not prepared to implement, computer technology.

Because change is occurring so rapidly, new and improved methods need to be developed to deal with such change.... Technological and culture change are inevitable. The amount of technological change in the last 20 years has exceeded that of the 200,000 years before. (Huse, 1980, p. 18)

Toffler states a convincing argument supporting Huse's statement. Toffler argues that the next few decades
will bring about an avalanche of change, and most people and organizations will not be prepared for the accelerated pace of change (1980).

Pressure to change comes from four different sources: (a) outside pressure (directed at the entire organization), (b) organization development (such as: team development and goal setting to improve the effectiveness of the whole organization), (c) people change (directed toward individuals within an organization), and (d) analysis from the top echelon of an organization with emphasis on the acceptance of change by managers or executives (Tichy and Hornstein, 1976).

The change in schools to computer technology is supported by all four pressures. Outside pressure stems from parents and community members who want to make sure their children will have the skills and knowledge needed in a technological society. Students feel they need computer skills in order to stay abreast of a fast-paced society where they will enter the job market and become part of the technological revolution. Managers and executives are paying consultants and
in-service people to help in the implementation of computer technology within their organizations, including schools (Huse, 1980).

Woods (1967) describes innovation as being slow in regard to acceptance. In 1966, according to Woods, the introduction and acceptance of an innovation could take as long as 20 to 30 years before it was fully accepted by society. However, organization development has accelerated in the past 30 years because of new knowledge and technology. "This growth has come about primarily as a response to tremendously accelerated changes in Western culture" (Huse, 1980, p. 18).

Lundberg (1974) has pointed out:

The present has to be characterized as a truly revolutionary period, with multiple revolutions occurring in the technological, communications, political, scientific and institutional dimensions of our society. (p. 1)

With computer technology, change occurs more quickly than ever before in history (Crichton, 1983; Evans, 1979; Toffler, 1980; Weinberg and Fuerst, 1984). Today, according to Brod (1984) and Weinberg and Fuerst (1984), it takes about one year to gain acceptance of an innovation within a school or school district if in-service and training are provided for the educators.
Whether educators choose to accept or resist computer technology, it is working its way into the schools. Originally, computer technology’s introduction was fast-paced; however, according to a recent (June 6, 1988) article, "Computers Falling as Teaching Aids," its progress has slowed a little (Bulkeley). William M. Bulkeley describes the computer revolution as falling short due to the lack of machines and the failure to adequately train teachers. The slowed-pace might be interpreted as the lack of planning or preparing of the schools for the innovation of computer technology. Even so, computer technology’s impact on education cannot be denied (Brod, 1984; Crichton, 1983; Weinberg and Fuerst, 1984). Few people in the United States remain untouched by computer technology (Crichton, 1983; Weinberg and Fuerst, 1984). For education, computer technology must be successfully implemented to prepare students for society’s computer demands (Papert, 1980; Turkle, 1984; Weinberg and Fuerst, 1984). The need for education to stay current is best expressed by Huse.

We have seen...a tremendous acceleration in the development of knowledge. As an example, for thousands of years the wheel was the most advanced invention in transportation. During those thousands of years, little improvement was made to the wheel—it evolved from being solid to having spokes and then, a
few years ago, the tubeless rubber tire was invented. Yet in 80 years, transportation progressed from the horse-drawn carriage to rockets to the moon and back. We have become so blasé about change that few people bothered to watch the descent of the scientists from the Sky Labs in 1974.

As new knowledge is acquired, old knowledge and products quickly becomes obsolete. ...One firm built a new plant to make transistors and moved in a work force from another location, but was forced to close the plant six months later because the "bottom had fallen out" of the transistor market due to newly developed microminiature circuitry. (Huse, 1980, pp. 18, 19)

The question of whether or not computer technology can be considered as a viable addition to the curriculum is a decision each school system faces. However, the societal trend to computer technology actually removes the change option for school districts. The issue for most is "How to successfully implement computer technology into a district's curriculum?"

The adoption of an innovation involves risk-taking. Change comes easily for some individuals; others are reluctant to accept change. Some people prefer the stability that comes with accepting the status quo (Huse, 1980). When implementing a change in a traditional setting such as schools, it is difficult to change the status quo; therefore, working with educators who will most likely be open or accepting of
change would improve the success rate for an innovation (Havelock, 1973; Rokeach, 1960; Sarason, 1972).

Failure is common when implementing change in education.

The literature that focuses on the implementation of innovative programs in schools abounds with descriptions of unsuccessful attempts to institute changes and reforms in either instructional or structural facets of schools. (Davis and Stackhouse, 1983, p. 322).

The change agent must assess all organizational areas to be affected by the change. Strategies must be tailored specifically to each organization to facilitate a successful change (Louis, 1978). Louis (1978) cautions change agents and others involved in the change process to use a "cultural approach to educational change" (p. 2). Knowing the environment as well as the attitudes and values of individuals within a certain setting can aid the change agent when planning to implement change (Havelock, 1973; Louis, 1978; Sarason, 1972).

Two entities related to the outcome of the change process need to be dealt with when considering the process of change. One is the organization's setting, and the other is the role of the change agent (Miles, 1965; Sarason, 1972).
The organization's setting includes the people who work for the organization. These people can be divided into two groups, accepters and resisters to change.

A person working with an organization to bring about change is referred to as a "change agent" (Havelock, 1973; Huse, 1980). The role of the change agent is to help bring about the acceptance of an innovation within an organization with little or no negative consequences (Havelock, 1973). Negativity is reduced by focusing on the groups of accepters and open-minded members within the group (Havelock, 1973; Rokeach, 1960).

Huse advocates a change process that gains participation from group members who prove to be accepting and open to the change.

The first important consideration is the difference between change, which appears to be inevitable, and managed change. Change is something that happens to an organization, a group, or an individual. Managed change, on the other hand, involves the active participation of the organization, group, or individual in making things happen that are in the best interest of both the individual and the organization. OD (organization development) efforts are directed at bringing about planned, organization change to increase organization competence. (1980, p. 83)

Louis discovered, through research concerning change in education, that literature supports two sets
of culture variables important to the outcome of the change process. One set is morale of the staff; the other set is cohesiveness of the staff as a work group. Louis's theory lends support to Miles (1965) concept of a "healthy" organization.

Miles (1965) indicates that an educational organization must be healthy or heading toward organizational health before trying to implement innovations or bring about change. Miles states "Genuine productiveness—in organizations as in persons—rests on a clear sense of identity, an adequate connection with reality, on a lively problem-solving stance, and on many other things..." (1965, p. 13). Miles (1965) lists some of the characteristics of "healthy" schools. Schools are healthy if they have: (1) Goal appropriateness, (2) Communication adequacy and power equalization, (3) Resource utilization, (4) Innovativeness, (5) Autonomy, (6) Adaptation, and (7) Problem-solving adequacy. If these things are present, the organization can be viewed as having some degree of "health."

Many things listed as facilitating organizational health are either directly or indirectly related to
staff morale. Open lines of communication help to pave the path to a cohesive relationship among staff members. The willingness to adapt, problem-solve and create an environment open to innovation provides the nurturing necessary for health and growth in an organization (Miles, 1965).

Louis addresses the need for a supportive school culture and discusses the consequences if support is lacking.

Unless there is a supportive school culture, planned innovations may be isolated in a limited number of classrooms, or involve a very small percentage of the normal school day. The innovations will not necessarily disappear, but they will be confined to those individual teachers who are willing to use them, or will be minimized in terms of their impact upon the total teaching environment. (Louis, 1978, p. 26)

In a sense Louis's statement seems to describe where computer technology is in some school systems.

The failure to plan change reduces the effectiveness of the innovation (Carlson, 1965). The failure to recognize that the educational organization has unique properties when compared to other organizations, for example, corporations, will likewise reduce the effectiveness of the innovation.

Some organization development concepts are common to all groups, including schools, yet an educational
organization has some special properties of its own. Commonalities of groups or organizations might include:

(1) common interests, (2) common backgrounds, (3) common values, (4) common circumstances, (5) common needs, (6) common goals, and (7) a rational approach to change (Havelock, 1973). However, educational organizations tend to have their own set of idiosyncrasies.

Conventional approaches to the study of schools as organizations have generally attempted to explain innovative programs and activities in schools as rational adaptive responses to environmental demands or structural or technological imperative. ...Yet recent literature on complex organizations includes repeated notations to the effect that the formal structure of the school—that is, its formally designated system of roles, relationships, policies, and procedures—and the nature of the environment of the school are of limited utility in explaining actual activities of organizational participants.

The literature that focuses on the implementation of innovative programs in schools abounds with descriptions of unsuccessful attempts to institute changes and reforms in either instructional or structural facets of schools. ...there are many reports of idiosyncratic instructional programs in schools, which appear to be direct responses to neither educational needs or external demands, and there is also much programmatic variance among schools, which is not explained by conventional lines of reasoning. The lack of correspondence between structure and activity has led writers to describe schools as loosely coupled systems. (Davis and Stackhouse, 1983, p. 322)

Along with the loosely coupled systems approach to solving school problems, another problem stems from the perception of those working in the field of educational
administration that the school is not a typical organization (Miles, 1965). Schools would have a difficult time operating by using the objectives and goals of industry. The products of the schools are educated students who have been taught to reason, think, and problem solve. Products of industry are merely materials molded to specification with their value being determined by the market's demand.

Some of the properties that Miles lists as unique to educational organizations are: a) goal ambiguity, b) input variability, c) role performance invisibility, d) low interdependence, e) vulnerability, f) lay-professional control problems, and g) low technological investment. These properties have an impact on the effectiveness or lack of effectiveness of the school (Miles, 1965).

As an antidote to the above ills, Miles (1965) suggests six interventions that can help to make an organization "healthy." Four of these interventions, with little adaptation, would be appropriate for a change agent to use in the process of implementing computer technology into the schools. The following list is a synthesis of Miles' suggestions for interventions that could help to bring about organizational "health" in educational institutions:
1. Determine the attitudes of the individuals within the group before working with the group. Gathering data relative to general attitudes and attitudes toward the innovation will help the change agent plan for a successful implementation. Havelock supports knowing the characteristics of members of group: There are "accepters" and "resisters" within a group. Knowing the members of each group helps the change agent in planning activities and experiences to help in the process of acceptance of an innovation.

2. Provide a base for support of the innovation by using activities designed to demonstrate the effectiveness of the innovation and to help in goal-setting. The change agent pays considerable attention to show relevancy of the innovation to the group members' work.

3. Have the members of the organization become involved in the diagnosis of the organization and problem-solve to define the uses and applications of the innovation in the context of improving the organization.

4. Move decision-making responsibilities downward by the consent of the administration giving subordinates more decision-making responsibilities in regard to the innovation. This would also increase the subordinates' autonomy and would consequently help raise the morale of the organization's members.

**Models for Planned Change**

The change agent or innovator, whether superintendent, educator, in-service leader, or technological consultant, may choose a planned change approach for successful implementation of an innovation (Huse, 1980; Lewin, 1951; Lippitt, Watson, and Wesley, 1958; Miles, 1965; Woods, 1967).
Lippitt et al. (1958) presented one of the first models for planned change. Lippitt's model requires dividing the planned change into seven distinct steps. The steps are to be followed by the change agent as he or she works with an organization to successfully bring about change. The seven steps contained in Lippitt's basic plan for change are modified and listed as:

Step 1: **Scouting** - The change agent and the client system explore the planned change together.

Step 2: **Developing a Plan for the Change** - The change agent and the client develop a mutual plan and determine the scope of the contract along with a projected outcome.

Step 3: **Diagnosis** - The change agent and the client develop specific goals.

Step 4: **Planning** - The change agent and the client develop a set of action steps which will aid the process of acceptance. An identification of resistance factors is defined at this step.

Step 5: **Action Steps are Implemented** - The planned steps in Step 4 are now put into action.

Step 6: **Stabilization and Evaluation** - The success of the implementation is evaluated to determine if more action may be needed.

Step 7: **Leaving the Organization** - When change has been determined to be successful, the change agent will terminate service or start work on another project. (Huse, 1980)

The model developed by Lippitt et al. (1958) is based on two underlying premises; one, exchange of information must be open and free between the client
system and the change agent; and two, the information is only helpful if it can be translated into action. However, the model developers warned of possible failure if the change agent and the client system have not placed everything in the open when making a diagnosis relative to change adoption.

Often the client system holds well-established, not to say hidebound views of itself; these views are hard to change, yet they must be changed if any lasting improvement is to occur. Thus much of the change process may consist of interaction between the change agent and the client system, directed toward a questioning of the client's self-image and an acceptance of some of the diagnostic insights offered by the change agent. (Lippitt et al., 1958, p. 63)

Huse (1980) suggests that Lewin's (1951) original three-stage plan for change, (a) unfreezing, (b) change, and (c) refreezing, can be used successfully. Figure 1 shows Huse's (1980) version of Lewin's and Lippitt's et al. plans by superimposing one plan on the other.

The plan for implementing a change in education to include computer technology would best be served by using the organization development theory that supports the need for mutual contact and mutual expectations (shown as the second stage of the Figure 1). Educators working together to bring about change through mutual goal-setting could develop plans for computer technology that would more likely be accepted because they were established by group process. If the members
Figure 1. Huse's Version of Lippitt's et al. Seven Stage Model for Change Superimposed on Lewin's Three Stage Model for Change (Huse, 1980)

Note: Reprinted by permission from page 21 of Organizational Development and Change, Third Edition by Huse and Cummings. Copyright © 1985 by West Publishing Company. All rights reserved.
of the original adoption group are both accepters and open-minded, the potential for success increases (Havelock, 1973; Rokeach, 1960).

Both the Lipplitt and Lewin planned change theories have drawbacks. The seven-step program looks neat and clear, but seldom is it followed without some modification either by the client, change agent, or both. Modification, through re-evaluation of the program by both the clients and the change agent, may bring the original program to a close and the process will start anew. This can delay the implementation of an innovation; it may also change the focus as well (Huse, 1980). Another area which is unclear is Step 3, Diagnosis. Identification of the relevant variables is often forfeited for expediency. Following the steps, including the evaluation process, to measure the degree of success of the innovation on the client system before going further provides higher success rates (Hornstein, Calder, and Schlavo, 1971; Miles, 1964).

The process of change and innovation acceptance has been studied by Havelock (1973) who feels that everyone develops some sort of process for problem-solving. One of the strategies is the simple strategy of "do nothing" and it will pass eventually. "If we ignore them they will go away" (Havelock, 1973, p. 3). These are not unfamiliar responses in the
educational community (Havelock, 1973). The other strategy is to work through the process by using problem-solving. The two strategies are called: a) Change by Simple Reflex, and b) Change by Rational Problem-Solving (Havelock, 1973).

Havelock developed a six-stage model for change which bears similarities to the Lippitt (1958) seven-stage model and the Lewin (1951) model. Havelock (1973) calls his model "Stages of Planned Change." Using problem-solving to gain acceptance is an important part of the process. Working with accepters and open-minded educators would help to bring about the greatest degree of acceptance of the innovation because the barriers to innovation are few or non-existent to members of an accepters' group. The stages modified based on Havelock's discussion of planned change are:

**Stage 1:** Building Relationship - This is done from one of the following vantage points: a) insider or outsider, b) line or staff, c) change agent working from above or below.

**Stage 2:** Diagnosis - The change agent determines if client is aware of his or her needs and if the client can articulate his or her problems-at-hand.

**Stage 3:** Acquiring Relevant Resources - The client system needs to be able to identify and obtain resources which will be relevant to the solution of the identified problem.
Stage 4: **Choosing the Solution** - The client needs to be able to propose possible solutions to the problem, derive implications from the possible solutions, and then settle on one solution which will be reshaped and adapted for the target client system.

Stage 5: **Gaining Acceptance** - The solution having been developed needs to be moved to a point where the possibility of the largest acceptance of the innovation will take place.

Stage 6: **Stabilization and Self-Renewal** - The desired solution, having been adopted by the client will then be moved by the leadership to the rest of the client system in a manner which will result in acceptance by the largest possible group of members within the client system. (Havelock, 1973)

Argyris developed a theory for change entitled "Intervention Theory." The theory has three basic requirements (Argyris, 1970; Huse, 1980):

1. The person intervening must help the client system gather reliable and specific information relative to the client system as a whole.

2. After a study of the client system, the client system has the option to select and decide what change adoption program to follow. The "interventionist" is only involved in assisting in the process of data gathering, decision-making within the client system, and information flow. (Argyris prefers the term "interventionist" in this case. Change agents make suggestions for improvement, while the interventionist works to alter the processes involved in the initiation of a change.)

3. The client system must be involved and committed to the change in order to gain individual support from within the group. The objectives of the client system are more likely to become the objectives of each individual within the system if the individual feels that the change is accepted and supported by his or her administration.
Referring to the third requirement in the Argyris's "Intervention Theory," the change agent will find support for identifying accepters of the innovation in order to ensure implementation. Support for the innovation would be strong and the natural enthusiasm and motivation indicative of accepters can be used as impetus for implementation. In addition to strong support from accepters, acceptance of the innovation by the administration is needed as demonstrated by the following practices: (a) providing resources for acquisition of equipment or materials necessary to implement the innovation, (b) providing a means to acquaint the staff with the new practice as well as opportunities for additional training, and (c) giving administrative approval through recognition of the innovations' strengths and openly supporting the innovation.

Ditzler (1983) suggests that the success of a school's curriculum program is directly related to administrative leadership. The administrator who is knowledgeable about computers can help with the process of developing a computer program for his or her school (Ditzler, 1983).

In addition to administrative interest and support, some researchers feel that other variables seem to have a positive effect in predicting accepters
of computer technology (Bulkeley, 1988; Ditzler, 1983). These variables include:

1. Confidence based on knowledge and personal skills in using the computer,

2. Opportunities to use the computer, first-hand, by having the placement of the hardware where the user can practice and improve his or her own computer skills through "hands-on" experiences, and

3. Opportunities to review and use software relevant to the teacher's subject along with available management-type software helping to cut down and speed up routinious tasks required of educators.

Theories about the change process have been discussed to give background for those planning to provide a positive implementation experience in the field of computer technology in the schools. Planned change fits the criterion for the introduction of a curriculum addition or innovation such as Computer Literacy, Computer Education, Computer Assisted Instruction, Computer Applications, Computer Management, or Computer Programming. Without having some form of structure in the planning process, the possibility that educators may not realize the full potential of the computer as an Instructional tool or learning aid, may deny students the advantage of being able to grow with a techno-centered society (Bulkeley, 1988).
Characteristics of Accepters and Resistors

The presence of accepters when implementing an innovation increases the probability of success (Havelock, 1973). The presence of resistors when implementing an innovation tends to reduce the probability of success (Havelock, 1973; Rokeach, 1960).

**ACCEPTER CHARACTERISTICS**

1. High self esteem
2. Degree of confidence or demonstrates competence
3. Risk taker
4. High degree of curiosity
5. Willing to make mistakes
6. Aware of own weaknesses
7. Lower level of fear
8. Dissatisfied with current state
9. Ready and willing to change
10. Perceives outside resources as potentially useful
11. Listens, gives and receives feedback
12. Seeks new information
13. Flexibility
14. Modern outlook
15. Accepts success
16. Nonconformist
17. Intelligent
18. Travels a lot
19. Reads a lot
20. Often viewed as "odd balls" or "mavericks"
21. Usually do not have direct power or influence
22. Committed to new ideas
23. Willing to "stand up and be counted"

**RESISTER CHARACTERISTICS**

1. Low self esteem
2. Self distrust
3. Feeling of impotence
4. Fear of failure
5. Reluctance to admit weakness
6. Higher level of fear
7. Inflexible
8. Accepts failure*
9. Usually conservative
10. Conformist
11. Satisfied with status quo
12. Uncritical acceptance of authority
13. Uninhibited expression when with peers
14. Rejection of those who disagree
15. Willing to give up the idea with very little protest.

Accepters of change usually show enthusiasm, are motivated, and are open to new ideas. Educator accepters are willing to learn as much as possible
about the innovation by attending workshops, in-services, and taking continuing education classes. The accepter is willing to share knowledge of the innovation with others, and in the case of computer technology, helps as others work on the computer. If an accepter perceives he is lacking knowledge or skills, he or she will work to improve the weakness through reading, study, and research (Havelock, R. and Havelock, M., 1972; Havelock, 1973; Weinberg and Fuerst, 1984).

Havelock (1972) contends that a change agent can identify "resisters" in a group both by their actions and words. For instance, a resister may come to the change agent with objections about the innovation or try to slow down an innovation by reacting unfavorably toward outsider change agents. A familiar resister phrase might be "the innovation was 'not invented here'" (Watson and Glaser, 1965, p. 36). Other negative clues shown by resisters might include obvious boredom or lack of response to activities or questions introduced by the change agent. Phrases commonly heard from resisters are: (1) "It costs too much," (2) "we tried it once," or (3) "you'll never convince the board" (Cedoline, 1982, p. 35).

Rogers (1965) wrote about innovators in regard to change adoption. Innovators are accepters but
accepters are not always innovators. The innovator differs from the accepter by being able to develop an innovation and apply his or her ideas to solve a problem. Rogers refers to innovators as "cultural Advant-garde" (1965, p. 56). The accepter is willing to try the innovation and adopt it because he or she has found it to be useful. Whether innovator or accepter, according to Rogers (1965), they generally have the following characteristics:

1. Venturesome,
2. Young,
3. Hold a relatively high social status,
   a. Income
   b. Amount of education
   c. Prestige
4. Cosmopolite,
5. Exert opinion leadership,
6. Viewed as deviants by themselves and their peers, and
7. Both innovators and adopters are embedded within the same network.

Some of Rogers' (1965) characteristics have been tested by other researchers with a variety of results. Oscarson and Finch (1979) used predictor variables to determine the personal characteristics of adoption-prone teachers and found that a positive relationship existed between age and adoption-proneness. However, Campbell (1981) found that age did not have a predictor effect on the acceptance of an innovation.

Personal characteristics of the sample studied for this investigation were: (a) number of years of
teaching, (b) age, and (c) sex. These characteristics have been studied by other researchers in an effort to dispel some of the "myths" surrounding their relationship to acceptance of an innovation (Campbell, 1981; Oscarson and Finch, 1979; Rogers, 1965). The researchers tested personal characteristics as variables to determine the predictor effect they had on acceptance.

Campbell (1981) studied teachers who chose to accept or reject the implementation of a drug abuse program. Campbell tested a theory that commonly accepted ideas about the demographic characteristics of accepting teachers were "myths." Campbell defines a "myth" as an untested belief (1981). Rogers (1965) had reported that young teachers will usually accept an innovation. Oscarson and Finch (1979) also found that age was related to acceptance of an innovation. Campbell's findings were contrary to Roger's (1965) and Oscarson's and Finch's (1979) findings.

Three "myths" that Campbell tested were:

1. Age Myth: Younger teachers are more likely to implement new programs.

   Findings: The general trend in the control group was opposite. Many teachers in their 50's were energetically supporting an anti-drug curriculum.
2. Experience Myth: More experienced teachers will be more likely to support new programs.

Findings: The control group had one more year of experience. There was no significant difference in their acceptance rate. However, one year's difference is too small to really make a difference in the research findings.

3. Knowledge Myth: Teachers must be taught new material before they will implement it.

Findings: On the pre-tests, both the control and experimental groups had similar levels of knowledge. After one group was given in-service training, the experimental group had higher levels of knowledge than the control group. However, there was no significant difference between the groups when it came to implementing the new information.

It takes more than additional knowledge to make the implementation of an innovation successful. (Campbell, 1981)

Enthusiastic accepters of computer technology have sometimes been referred to as "computerphrenics." Mild computerphrenics are found in all occupations and have attitudes about the computer and the computer's impact on our society that are positive. Knowing the characteristics of mild computerphrenics may serve to provide better understanding of those who choose to accept computer technology:

1. Enthusiasm toward computers and the potential for their use in many areas,
2. Often prefers the company of a computer over going to a cocktail party,
3. Views working with a computer as an opportunity and a challenge,
4. Enjoys working with the computer to see what he or she can make it do,
5. Feels that he or she is in control of the computer,
6. Regards the computer as a means to autonomy,
7. Views the computer as an object to think with,
8. Futuristically oriented,
9. Motivated by new ideas,
10. Open to learning the new and unusual,
11. Keen minded,
12. Enjoys talking with others about computers, and

As Campbell's study indicated, more than knowledge of the program was needed to successfully implement a new program. This gives support to the idea that the presence of specific conditions affect the acceptance of an innovation.

Researchers in the area of computer innovation and acceptance have suggested that several conditions may have a positive impact on the acceptance of computer technology (Bulkeley, 1988; Ditzler, 1983; Hassett, 1984; Olds, 1983; Simonson, 1979; Vokell and Rivers, 1983; Weinberg and Fuerst, 1984). The conditions can be called "contextual variables." Conditions that tend to affect adoption of computers in schools are:
(1) Knowledge and skills acquisition, (2) Availability of computer software, (3) Accessibility to computer hardware, (4) Administrative interest and support, (5) Relationship between computer technology and an
educator's subject area, (6) Availability of management software for teacher's use, and (7) Opportunity for "hands-on" experiences (Brod, 1984; Ditzler, 1983; Nalman, 1982; Papert, 1980; Weinberg and Fuerst, 1984).

Recent studies by Loyd and Gressard (1984, 1985) and Maurer and Simonson (1984) focused on the effects of attitude on the process of implementing computer technology. Some attitudes related to an individual's perception of computers in education have an effect on the acceptance of computer technology. The attitude that most affected the acceptance of computers was caused by fear of computers and was referred to as "computer anxiety." Three attitude subscales from the Loyd and Gressard Instrument, CAS, were used to study computer attitudes.

The three subscales were: (1) computer acceptance (liking), (2) computer anxiety, and (3) computer confidence. The responses by the sample to the Computer Acceptance Subscale were studied to determine whether a person was an "accepter" or "resister" of computer technology. The other two subscales, Computer Anxiety and Computer Confidence, were used to see if anxiety and confidence were related to the acceptance of computer technology.
Two other characteristics studied were open and closed-mindedness. Open-mindedness is important in predicting whether a person would be likely to accept change and support an innovation. Rokeach (1960) researched the topic of belief-disbelief systems to determine the characteristics of open and closed-minded persons. Simply put, a person's belief-disbelief system is what controls an individual's actions, attitudes, and personality type (Rokeach, 1960). Beliefs provide the basis for acceptance or resistance of an idea, concept, or theory. Rokeach and Restle (1960) suggest that the characteristics of a particular belief-disbelief system are related to open and closed-mindedness. This concept is important to understand when working with people in groups that contain members from both mind-sets, open and closed-minded. The theory of open and closed mindedness is best explained in the authors' own words:

...In any situation in which a person must act, there are certain characteristics of the situation that point to the appropriate action to be taken. If the person reacts in terms of such relevant characteristics, his response should be correct or appropriate. The same situation also contains irrelevant factors, not related to the inner structure or requirement of the situation. To the extent that the response depends on such irrelevant factors, it should be unintelligent or inappropriate. Every person, then, must be able to evaluate adequately both the relevant and irrelevant information he receives from every situation. ...The more open one's belief
system, the more should evaluation and acting on information proceed independently on its own merits.... Also the more open the belief system, the more should the person be governed in his actions by internal self-actualizing forces and the less by irrational inner forces. ...One important implication here is that the more open the person's belief system, the more strength should he have to resist external imposed reinforcements, or rewards and punishments. (Rokeach and Restle, 1960 pp. 57, 58)

According to Rokeach (1960), the opposite of open-mindedness is closed-mindedness. A closed-minded system tends to mix up what the external source says about the world and what the external source wants the individual to believe is true. The closed-minded system often cannot distinguish between the information received and therefore is not free to receive, evaluate, or act on the information in "terms of inner requiredness" (Rokeach, 1960, p. 58).

Rokeach continues to explain his theory of open and closed belief systems in the following passage.

...all belief-disbelief systems serve two powerful and conflicting sets of motives at the same time: the need for a cognitive framework to know and to understand and the need to ward off threatening aspects of reality. To the extent that the cognitive need to know is predominant and the need to ward off threat absent, open systems should result. In the service of the cognitive need to know, external pressures and irrational internal drives will often be pushed aside, so that information received from outside will be discriminated, assessed, and acted on according to the objective requirements of the situation. But as the need to ward off threat becomes stronger, the cognitive need to know should become weaker, resulting in more closed belief systems. (Rokeach, 1960, pp. 67, 68)
Frymler (1968) suggests that some teachers might be willing to change but find they cannot. Frymler's theory supports the findings of Rokeach (1960) which relate the lack of acceptance to a person's mind-set, open or closed-mindedness.

...Even though many changes in education are legally possible, economically practical, administratively feasible, publicly acceptable, and experimentally defensible, they are not admissible, psychologically, into certain teachers' minds. And no matter what the weight of evidence or argument along the other lines, unless teachers both can and do receive the new idea into their own experiential field and give it meaning in terms of their own knowledge and feelings and skills, they cannot implement an innovation thoughtfully or effectively in any truly professional way. (Frymler, 1968, p. 2)

In order to implement an innovation successfully, teachers who are part of the implementation process must be "psychologically able" to entertain an innovation. If open-minded educators are not involved in the change process, the change cannot occur (Frymler, 1968).

Frymler continues to emphasize that measuring open and closed-mindedness within an educator can serve to predict whether or not the educator will be accepting of an innovation.

New concepts, techniques, and media are only useful to those who are psychologically capable of perceiving the proposed educational changes. If they are defensive, closed, inadequate, and fearful, they will not be able to get the new idea "inside" their central nervous system to give it new meaning for
them. Unless they can do this, the innovation can
only be utilized mechanically and unthinkingly, or not
at all. (Frymler, 1968, p. 2)

Characteristics of teachers supporting change are:

1. Flexibility and Adaptability,
2. Openness,
3. Perceptiveness,
4. Capable of further growth,
5. Open to new experiences,
6. Able to perceive and receive suggestions
   relative to change,
7. Personally secure,
8. Psychologically adequate,
9. Competent, and
10. Mentally or academically astute.
   (Frymler, 1968)

Anxiety

Maurer and Simonson (1984) discovered that
resistance to computer technology was related to
anxiety. Other writers concur with this (Loyd and
Gressard, 1984, 1985). The researchers studied anxiety
and related it to computer anxiety and computer phobia.

Anxiety is a very powerful influence in today's
world. As long ago as 1961 anxiety was recognized as a
type of societal ill. The following words appeared in
a March, 1961, issue of Time magazine:

...It (anxiety) shouts in the headlines, laughs
nervously at cocktail parties, nags from
advertisements, speaks suavely in the board room,
whines from the stage, clatters from the Wall Street
ticker, jokes with fake youthfulness on the golf
course and whispers in privacy each day before the
shaving mirror and the dressing table. Not merely the
black statistics of murder, suicide, alcoholism and
divorce betray anxiety (or that special form of anxiety which is guilt), but almost any innocent, everyday act: the limp or overenthusiastic handshake, the second pack of cigarettes or the third martini, the forgotten appointment, the stammer in mid-sentence, the wasted hour before the TV set, the spanked child, and new car unpaid for. (p. 44)

Spielberger notes that the ancient Egyptians held "a conception of fear or anxiety" (Spielberger, 1970, p. 3). Kritzeck of Princeton found reference to anxiety in the works of a medieval Arab philosopher, Ali Ibn Hazm of Cordova. The treatise of Hazm was entitled "A philosophy of character and conduct" and was written in the 11th century A.D..

I have constantly tried to single out one end in human actions which all men unanimously hold as good, which they all seek. I have found only this: The aim of escaping anxiety. Not only have I discovered that all humanity considers this end good and desirable but also that no one is moved to act, or resolves to speak a single word, who does not hope by means to (of) this action or word to release anxiety from his spirit. (Kritzeck, 1956, p. 573)

Freud (1894) attempted to define anxiety within the framework of psychoanalysis. Freud suggested that anxiety is "something felt" and became more definitive by suggesting that anxiety is an unpleasant emotional state or condition (Freud, 1924). Today, as in the time of Freud, the characteristic symptoms for anxiety are specified as: (a) heart palpitations, (b) changes in respiration, (c) tremors, (d) shuddering, (e) sweating, and (f) dizziness.
The conceptual analysis of anxiety has been greatly enhanced through the studies of Cattell and Scheler (1961), Cattell (1966, 1972), and Spielberger (1966, 1971, 1972). Spielberger's distinction between "state" and "trait" anxiety indicates the difference between the degree of anxiety a person is feeling "here and now" and "anxiety proneness." Other writers followed Spielberger's concepts of "state" and "trait" but also pointed out more understandable definitions to the abstract concepts.

McReynolds (1972) writes:

...distinction between current is essentially the same as "state," but "characteristic," like "trait," refers to one's general, typical level of anxiety; and the distinction between specific areas of anxiety (i.e., test anxiety, separation anxiety, etc.) and overall anxiety. (McReynolds, 1972, p. 2)

Spielberger (1971) notes that confusion and ambiguity surround the definitions of the words "anxiety" and "stress," and the stress stimulate, "threat," because they are often used interchangeably. Simply stated, stress can be caused by a certain set of circumstances or a particular situation. Threat becomes a part of the stress if the individual feels that the situation will harm him or her in some way. Under these circumstances, the word "threat" becomes a part of stress and is defined by Spielberger (1972) as follows:
Where stress refers to the objective stimulus properties of a situation, threat refers to an individual’s perception of the situation as more or less dangerous or threatening for him. A situation that is objectively stressful is likely to be perceived as threatening by most people, but whether or not such circumstances are interpreted as threatening by a particular person will depend upon that person’s subjective idiosyncratic appraisal of the situation (state anxiety). Moreover, objectively non-stressful situations may be appraised as threatening by individuals who, for some reason, perceive them as dangerous (trait anxiety). It is apparent, then, that the appraisal of a particular situation as stressful and/or threatening will be determined by an individual’s past experience with similar situations as well as by the objective stimulus characteristics of the situation. (pp. 5, 6)

Spielberger continues:

Anxiety, or more specifically state anxiety (A-State), refers to a complex emotional reaction that is evoked in an individual who interprets a specific situation as dangerous or threatening. If a situation is perceived as threatening, irrespective of the presence of real or objective danger (stress), the person who perceives the situation as threatening will experience an elevation in A-State. (1972, p. 6)

Two types of anxiety, state and trait, determine whether an individual’s reaction to the stimuli causing the anxiety is situational or innate. State anxiety is the result of external conditions which affect the perception of the individual and in turn have an effect on an individual’s coping response. Trait anxiety, on the other hand, is the result of an individual’s internal coping response (Spielberger, 1972).

Hodges (1972) and Goulet (1972) provide further interpretations of Spielberger’s concepts:
... Spielberger defines state anxiety as consisting of subjective feelings of apprehension and tension along with heightened autonomic nervous system activity, and trait anxiety as anxiety-proneness, or individual predisposition to respond with heightened levels of state anxiety under stressful circumstances. (Hodges, 1972, p. 2)

State anxiety, according to Spielberger, refers to the complex emotional reactions to a situation perceived as threatening. The reactions are characterized by feelings of tension and heightened autonomic nervous system activity, but are transitory in nature, vary in intensity, and can fluctuate over time. Trait anxiety, on the other hand, is characteristic, and likely a susceptibility to "anxiety proneness." (Goulet, 1972, p. 4)

The type of anxiety in the case of computer anxiety or computer stress tends to be "state anxiety." An individual feeling anxious about computers develops more stress when discussing computers or when placed in an environment where computers are present (Brod, 1984; Loyd and Gressard, 1984; Weinberg and Fuerst, 1984). According to Spielberger (1972), state anxiety is precipitated by a particular situation or series of events which the sufferer perceives as threatening. In the case of computer anxiety, the individual perceives the computer as a threatening device and reacts accordingly (Loyd and Gressard, 1984, 1985; Maurer and Simonson, 1984; Weinberg and Fuerst, 1984).
Some educators feel comfortable using the computer as an integral part of the curriculum they teach. Others feel anxious about the computer and may never use it. Educators who are non-users are generally experiencing computer anxiety. Computer anxiety seems to be related to the individual's perception of the degree of control the computer is having on his or her life (Brod, 1984; Loyd and Gressard, 1984; Weinberg and Fuerst, 1984).

Maurer and Simonson define computer anxiety as:

...The fear or apprehension felt by an individual when using computers, or when considering the possibility of computer utilization. To further clarify the construct...although there are rational fears related to computer utilization, (e.g. job displacement, increased exposure to radiation from terminal screens) the fears that were being addressed...were fears that could be called "irrational" fears (e.g. impending doom or sure calamity because of contact with computers). (1984, p. 4)

Honeyman and White (1987) describe computer anxiety as:

The fear that accompanies an individual's perception that one's life is being affected by events they cannot control, coupled with a generalized fear of technology, can result in high levels of frustration and anxiety. (pp. 129, 130)
Baumgarte (1984) discusses the perception of a computer anxious person in regard to computers: "...a powerful, inhuman, controlling entity which serves only to complicate his (her) work efforts" (p. 2).

Several causes for anxiety related to computer use may occur. The works of Loyd and Gressard (1984), Maurer and Simonson (1984), and Weinberg and Fuerst (1984) list factors that produce anxiety toward computer usage:

(a) Fear of not being able to adapt to computer technology

(b) Fear of being placed in the position where the computer is in control instead of the individual

(c) Fear of becoming obsolete in a computer oriented society

(d) Fear of losing a job due to the introduction of the computer causing staff reduction

(e) Forced change in teaching techniques and styles causing resentment in the teacher toward computer technology

(f) Development of self-doubt because of frustration or lack of skills to use the computer efficiently and effectively

(h) Fear of negative side effects in health of the individual due to computer usage

(i) Administrative pressure either negative or positive related to teachers' use of computers in the school environment
Morris (1985) contends that computer-fearing individuals tend to influence the success or lack of success of others working with computers. Morris conducted a study on computer anxiety and its effects: "The bottom line was that our computer was crashing in the presence of people inclined to be anxious using it" (p. 148).

Kelman (1982) writes:

...most teachers are fearful, suspicious, and rightfully skeptical about the use of computers in schools. ...they have been the recipients of worrisome, conflicting and familiar hype about computers. (p. 54)

Computers bring on stress in some individuals and this can be related to anxiety. Risk, as well as fear, are present when an individual first starts learning to use the computer. The person learning to use the computer takes a "risk." Learning anything new has an element of risk just because the individual lacks experience and skill to control the situation. Many individuals feel they do not have control over the computer; the computer seems to be controlling them (Brod, 1984; Weinberg & Fuerst, 1984). Other individuals hesitate to become involved because they fear that they may not learn enough to be intelligent about the computer's uses. These individuals recognize
that there is a lot to learn about the computer as well as learning new skills to work with and on a computer. Another cause for anxiousness that occurs is the individual's feeling he or she may look ignorant or slow in the eyes of "computer users" (Loyd and Gressard, 1984; Maurer and Simonson, 1984; Weinberg and Fuerst, 1984). Some teachers fear their students because the students seem to use the computer with little effort. Again, this could lower the threatened teacher's self-esteem. Self-doubt diminishes the ability to take risks. A typical response to this type of anxiety is a choice to remain illiterate in the area of computer technology (Brod, 1984, p. 37).

Brod suggests that obsolescence is a fear plaguing many people in the computer age because computers may threaten job security. If computers make recordkeeping and teacher-related tasks easier and quicker, fewer teachers may be needed. The result of this fear may cause some people to fantasize about rising up to smash the computer (Brod, 1984).

The use of computers has produced some "horror" stories about the introduction of computers in the workplace. Brod gives the following illustration to demonstrate the extremes to which individuals might go to get out of using or accepting the computer.
Michelle works for a law firm as a paralegal secretary. She prides herself on her fast and accurate work, and sees the firm's recently installed word-processing system as a threat to her arduously acquired skills. Her terminal sits at her desk, unused and ignored, as she continues to use her electric typewriter. She has used the word processor only when her employer insists.

The replacement of a typewriter with a letter-quality computer printer can be a traumatic experience. After years on a job, office workers begin to regard their workspaces as their own; like a carpenter's hammer, the typewriter becomes a part of their lives and an extension of their bodies. Computerization can feel like an invasion of personal turf; sometimes the emotional reaction to this trauma can be quite severe, and rejection turns into sabotage.

Bonnie, for instance, was a secretary at an educational research center in California's Silicon Valley. When computers were installed in the office and training sessions held for the staff, she was conspicuous in her refusal to learn how to use them. When her terminal later broke down, a repair technician found that coffee had apparently been poured into it. Bonnie was subsequently fired. (1984, pp. 37, 38).

A few educators wonder whether using a computer can be a health hazard. Though studies have indicated that there is no specific health hazard related to the operation of a computer, Brod compares computers to any other technology that is new: "There is nothing inherently hazardous to our health about most new technologies. What is hazardous is (its) use or abuse" (1984, p. 22). However, Brod, Weinberg, and Fuerst agree that health problems are brought on by overuse. Eye strain and back pain may be brought on by long
Anxiety is often evidenced in the form of stress related illnesses. Stress has become an integral part of living. For some individuals it is the driving force behind successful undertakings, and for others it is the cause of their failures. "Stress is unique in that it affects people in a personal manner. An event which causes great stress for one person may be just another minor happening to another" (Alley, 1980, p. 6, 7). Therefore, an individual's perceptions and attitudes toward stressors determines the physical and emotional responses his or her body exhibits as a result of the stress. In addition, recent research indicates that an individual's perceptions are responsible for transforming potential situational stressors into actual ones (Fielding and Gall, 1982). Often, the inability to control these real or imagined stressors constitutes a significant threat to one's career. The ultimate, tragic response of a teacher, unable to cope well with stress and battling recurring physical or mental illness, is termed teacher burnout (Eskridge and Coker, 1985, p. 367).

Teacher stress is not a new phenomenon in our society. It has been studied over the last few decades
In an effort to better understand the causes of stress and to find ways of decreasing stress. Some of the minor symptoms of stress in teachers are: (1) constant fatigue, (2) frequent headaches, (3) unexplained weight loss, (4) gastrointestinal problems, and (5) skin rashes. There are more serious physical aspects of stress as well. These include: (1) high blood pressure, (2) cardiovascular problems, (3) shortness of breath, (4) colitis, and (5) gastrointestinal disturbances (Eskridge and Coker, 1985).

Behavioral symptoms that can be stress induced are: (1) lowered tolerance for frustration, (2) abrupt mood swings, (3) increased irritability, (4) loss of caring for people, (5) feelings of helplessness or lack of control, (6) paranoia, and (7) suspiciousness (Brod, 1984; Eskridge and Coker, 1985; Weinberg and Fuerst, 1984). These symptoms have been obvious to those involved with the instruction of computer courses for classroom teachers (Kelman, 1982; Morris, 1985).

Computer anxiety is a force to be "reckoned with" by the change agent or innovator working to successfully implement computer education into a building or school district. Care must be given to address the needs of the resisters or anxious educators.
to help them recognize the value and the potential of the computer as an instructional tool and educational resource.

**Computer Phobia**

Many people have adapted to the new technology and accept it as part of the American way of life. Others, approximately one third of the population, may be casualties of the computer revolution (Weinberg and Fuerst, 1984). The casualty group is suffering from an extreme reaction to computers. The group feels that the computer is threatening and consequently the less they have to do with computers, the better they feel they will be (Weinberg and Fuerst, 1984).

Crichton (1983) realized that "attitude" was the most important ingredient in becoming a successful computer "user." Crichton writes: "Computers really are unprecedented machines in everyday life, and they do demand a whole set of new attitudes. This leaves people feeling helpless and lost" (1983, p. 12). Some of the helpless and lost are "resisters" and others are frustrated "accepters." The difference between the two groups of people is the degree of perceived fear toward the computer and the computer's impact on society.
Crichton asks, "Afraid of computers?" and then answers the question with "Everybody is" (1983, p. 17). However, resistance to computers has been so severe in some cases that the word "phobia" has been used to describe an anxious individual's extreme reaction to the new technology. Weinberg and Fuerst named this type of reaction "computer phobia."

According to Webster's New World Dictionary of the American Language, the definition for phobia is "an irrational, excessive, and persistent fear of some particular thing or situation" (1980, p. 1070). A discussion of phobias is found in the book, Fears and Phobias, written by psychiatrist Isaac M. Marks. Marks (1969) writes:

Phobias do not occur randomly with respect to all situations and people. Rather, phobias tend to occur in particular situations, at certain ages, with a sex bias, with other clusters of psychiatric symptoms and in selected personality backgrounds.

Certain classes of stimuli are more likely than others to trigger off phobias, given that these different stimuli are all encountered quite frequently. ....It is not surprising that some stimuli have a prepotent ability to trigger phobias, since we have seen the same phenomenon in the normal fears of animals and man, and phobias are simply fears which are unusually intense. (Marks, 1969, pp. 72,73)

Weinberg and Fuerst (1984) describe people who fear computers as follows:

When it comes to computers, their hearts race, their palms sweat and their mouths become dry. ...For
people with computer phobia, it’s as if a fierce, fire-breathing dragon is confronting them, a dragon that protects a valuable treasure hidden within the computer. They won’t risk going near a computer for fear of somehow being burned. (p. 14)

Researchers have studied the people in the resisters’ group to find reasons why they perceive the computer to be a threat. A list of the ten most common reasons for resisting computers due to anxiety, or even extreme anxiety which is called computer phobia, consists of:

1. Fear of losing control to the computer
2. Having a bad experience with computers
3. Computer professionals intimidating the new "user" because of the professional’s vast amount of computer knowledge
4. Fear of losing a job because computers have been brought into the workplace
5. Fear of technology due to the lack of information and understanding of computer processes
6. Fear of accidentally breaking the equipment
7. Fear the computer may be smarter than the new "user"
8. Fear the computer will find the "user’s" inadequacies and show the person up
9. Fear that the computer will respond in an unfriendly manner if a mistake is made

Computer phobics who have a severe reaction to computers can experience both physical discomfort and mental anxiety just by thinking about computers.

Individuals that have only a mild case of computer phobia simply experience butterflies in the stomach or feel a sense of inferiority and natural skepticism.
This computer phobic can overcome such reactions by increasing hands-on activities, self-pacing computer learning, and by being open to learning something new to bring about computer confidence (Weinberg and Fuerst, 1984).

Computer phobics can range from the maintenance man to the company president. "Computer phobia comes from being frustrated with failure, from sensing a loss of control and independence, and from feeling anxious about losing a job or satisfaction on the job" (Weinberg and Fuerst, 1984, p. 27). If the computer phobic is to succeed in overcoming computer phobia, it is necessary for companies and other workplaces to address the fears of the computer phobic.

Ways to help decrease the fears of the computer anxious and the computer phobic are to provide opportunities or conditions which may decrease the degree of resistance to computers. These conditions are called contextual variables in the study.

**Contextual Variables**

Researchers have studied several conditions to determine the degree of effect they have on predicting acceptance of computers. These may be called "contextual" variables; they may affect anxiety and acceptance.
Contextual variables that seem to affect acceptance are: (1) Computer knowledge and skills, (2) Availability of software for teacher's use and teacher's subject area, (3) Accessibility to computer hardware, (4) Administrative interest and support, and (5) Opportunity for "hands-on" experiences (Ditzler, 1983; Weinberg and Fuerst, 1984).

Honeyman and White (1967) hypothesized that the contextual variables of age, sex, previous computer experience, and time in contact with the computer influenced levels of anxiety experienced by teachers and administrators learning to use the computer. However, the study results indicated no significant difference between the levels of anxiety for the predictor variables of gender and age. Honeyman and White addressed the problem of computer anxiety by postulating that without adequate time in contact with the computer, states of anxiety will not become lower, and the fear of working with computers will continue to grow.

...If it is our intent to have the computer become an integral part of the educational process in today's schools, teachers must be given enough time to learn the appropriate uses of the machine. Without adequate time to learn to use the computer, teachers will remain wary and fearful of the new technology. (1987, p. 137)
Knowledge and Skills

A teacher preparing to teach any academic subject needs to have a working knowledge of the subject as well as the skills associated with its use. Olds (1983) provides support for helping teachers gain computer knowledge and skills:

...the more we study human beings, the more we realize how fundamental learning is to human nature. And the more microcomputers proliferate our society, the more everyone, from infants to grandparents, must become good learners. ...the idea that the best teacher is an expert learning is fundamental to all my work with teachers. (Olds, 1983, pp. 52, 53)

Olds suggests that one way to help teachers accept a new subject or innovation in education is to engage teachers in the process of learning. The process of gaining new knowledge is more effective if a teacher perceives the new subject as being relevant to his or her interest areas (Olds, 1983).


Although there may be some topics about which one can become 'literate' by listening to lectures, by participating in discussion or by reading, computer literacy is not one of these topics. (p. 61)

The results of research by Chandra, Bliss, and Cox (1988) discuss the need for "in school" and "out
of school" computer training for educators. These two elements are necessary for successful implementation of computers in the school.

**Software and Hardware**

Teachers who have computer software and hardware readily available for their use have more motivation to learn and more opportunities to become familiar with computers through "hands-on" experiences (Barrow and Karris, 1985). Teachers also need to be included in the decision-making processes in regard to selecting relevant computer software and locating the computers (Johnson and Hoot, 1986).

The necessity of having software and hardware for teachers' use was discussed by Shavelson, Winkler, Stasz, and Robyn (1983). Other than the lack of computers, two other obstacles slow computer implementation. "They are lack of adequate courseware and the lack of teachers well-enough versed to use the computer effectively in their instruction" (Shavelson et al., 1983, p. 1). Shavelson et al. (1983) examined the relationships among teachers' attitudes toward computers, their knowledge of computers, the subject taught, and their uses of microcomputers for instruction. The findings support the need for
computer knowledge, adequate and relevant computer software, and positive attitudes toward computers (Shavelson et al., 1983).

**Administrative Support**

The introduction of computer technology into the schools requires two kinds of support: technical and pedagogical. If the school board and the administration of a school district are not willing or able to provide the finances needed to hire a qualified person to introduce the innovation, chances are the innovation will not be readily accepted (Chomienne, 1988).

...(The) present economic context makes implementation of the computer difficult: resources are limited, good courseware is scarce, equipment is incomplete, and institutional support is deficient. (Chomienne, 1988, p. 90)

The administrator in the innovation process is a key to success. Chandra et al. (1988) stress the need for administrative support: Teachers need leadership and cooperation from the administration before the uptake of computers can occur. Ways in which administrators can show their support for computers in the schools are:

(1) allocating funds for computer hardware, courseware and staff development, (2) providing
teachers with release time to attend computer workshops or conferences, (3) encouraging teachers to pursue computer-related interests and activities, (4) welcoming input from the teachers in regard to the computer program, and (5) delegating committed teachers to manage the details of the school's computer implementation policies and processes (Shavelson et al., 1983).

Opportunity for Hands-on Experiences

Although it has been tried, learning to work with computers without opportunities for "hands-on" experience has had little success. Analogies can be made to teaching typing without typewriters or teaching swimming without water. The need for "hands-on" experiences has been supported by the works of Vockell and Rivers (1983). Vockell and Rivers taught computer literacy to teachers using very little lecture and found that this achieved positive educational outcomes. "While doing this, students achieved a high degree of computer literacy (reduced anxiety around computers, knowledge of what problems could and could not be solved by the computer, familiarity with computer terminology, etc.)" (1983, p. 61).
CHAPTER III

METHODOLOGY

Procedures for the Study

This chapter describes the procedures used in the conduct of the study. Topics presented in the chapter include the study design, a description of the sample, the data collection process, instrumentation, the statistical treatment of the data, and the limitations of the study.

Study Design

The study was designed to assess the relationships between the criterion variable of computer acceptance and the following predictor variables:

1. Open and closed-mindedness as defined by Rokeach,
2. Computer anxiety,
3. Computer confidence,
4. Number of years of teaching,
5. Age, and
The relationships between open-mindedness and computer anxiety and computer confidence were also tested.

Additional tests were applied to see whether one or more of the following contextual variables predicted the acceptance of computers: Knowledge and skills in using computers, availability of software for teacher's use and teacher's subject area, accessibility to computer hardware, administrative interest and support, and opportunity for "hands-on" experiences.

**Description of the Sample**

The population for the study consisted of 650 certificated teachers participating in graduate programs sponsored by Ashland College during the years of 1984 through 1987. All were teachers who had taken a minimum of one computer course sponsored by the Ashland College Graduate Education Program in Ohio.

A random sample of 550 were asked to participate in the study, 293 responded and 257 did not. The non-response group consisted of two sub-groups: (1) "No forwarding address" (154) and (2) Failure to respond (103). Three hundred
ninety-six members of the sample received questionnaires; the response rate for those contacted was 73.9 percent.

The respondents' group had a mean age of 41.9 years and a mean of 15.8 years for number of years teaching (see Tables 1 and 2).

### Table 1

**Personal Characteristic of Age for Respondents' Group**

<table>
<thead>
<tr>
<th>Age Span in Years</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 - 30</td>
<td>17</td>
<td>5.84</td>
</tr>
<tr>
<td>31 - 40</td>
<td>125</td>
<td>42.61</td>
</tr>
<tr>
<td>41 - 55</td>
<td>133</td>
<td>45.36</td>
</tr>
<tr>
<td>Over 55</td>
<td>18</td>
<td>6.19</td>
</tr>
</tbody>
</table>

\[ N = 293 \quad \bar{X} = 41.9^* \]

The mid-points for each age span, 25, 35, 48, and 60, were used to calculate the mean for the respondents.

Note: Data was not available for the non-respondents' group.
Table 2

Number of Years of Teaching for Respondents' Group

<table>
<thead>
<tr>
<th>Experience</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>0.01</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>0.00</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>0.01</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>0.00</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>0.04</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>0.01</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>0.02</td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td>0.03</td>
</tr>
<tr>
<td>9</td>
<td>11</td>
<td>0.04</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>0.03</td>
</tr>
<tr>
<td>11</td>
<td>10</td>
<td>0.03</td>
</tr>
<tr>
<td>12</td>
<td>23</td>
<td>0.08</td>
</tr>
<tr>
<td>13</td>
<td>14</td>
<td>0.05</td>
</tr>
<tr>
<td>14</td>
<td>13</td>
<td>0.04</td>
</tr>
<tr>
<td>15</td>
<td>22</td>
<td>0.08</td>
</tr>
<tr>
<td>16</td>
<td>16</td>
<td>0.05</td>
</tr>
<tr>
<td>17</td>
<td>21</td>
<td>0.07</td>
</tr>
<tr>
<td>18</td>
<td>16</td>
<td>0.05</td>
</tr>
<tr>
<td>19</td>
<td>9</td>
<td>0.03</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
<td>0.07</td>
</tr>
<tr>
<td>21</td>
<td>16</td>
<td>0.05</td>
</tr>
<tr>
<td>22</td>
<td>13</td>
<td>0.04</td>
</tr>
<tr>
<td>23</td>
<td>7</td>
<td>0.02</td>
</tr>
<tr>
<td>24</td>
<td>7</td>
<td>0.02</td>
</tr>
<tr>
<td>25</td>
<td>7</td>
<td>0.02</td>
</tr>
<tr>
<td>26</td>
<td>6</td>
<td>0.01</td>
</tr>
<tr>
<td>27</td>
<td>2</td>
<td>0.01</td>
</tr>
<tr>
<td>28</td>
<td>6</td>
<td>0.02</td>
</tr>
<tr>
<td>29</td>
<td>3</td>
<td>0.01</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>0.00</td>
</tr>
<tr>
<td>31</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>32</td>
<td>1</td>
<td>0.00</td>
</tr>
</tbody>
</table>

N = 293  \[ \bar{X} = 15.8 \]  SD = 6.19422

Note: Number of years of teaching for non-respondents was not available.
Non-respondents were compared on available data to get some indication whether the responses came from a sample that might be considered representative. The two groups were compared on two characteristics: (1) gender (see Table 3), and (2) number of classes taken in computer education (see Table 4).

Table 3 indicates the respondent group had 3.1 percent more females than the non-respondent group; however, the difference was not significant, an indication that the respondent sample was representative of the whole group on that characteristic.

Table 3

<table>
<thead>
<tr>
<th>Survey Status</th>
<th>Female</th>
<th>Percent of Females in Sample</th>
<th>Male</th>
<th>Percent of Males in Sample</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents</td>
<td>219</td>
<td>74.7</td>
<td>74</td>
<td>25.3</td>
<td>293</td>
</tr>
<tr>
<td>Non-respondents</td>
<td>184</td>
<td>71.6</td>
<td>73</td>
<td>28.4</td>
<td>257</td>
</tr>
<tr>
<td>Totals</td>
<td>403</td>
<td>147</td>
<td></td>
<td></td>
<td>550</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 0.6927 \quad df = 1 \quad p = 0.4221 \]
Table 4 shows that respondents had taken .36 more classes than the non-respondents. The mean number of courses taken by respondents was 1.98 compared to a mean number of 1.62 classes by the non-respondents. The difference is not great between the groups; however, it does indicate that the respondents took more classes than the non-respondents, an indication that the respondent group may have been slightly less resistant than the non-respondents. The variance for the respondents' group was 1.804; The variance for the non-respondents' group was 0.953. The statistical results indicate a significant difference exists between the two groups for a two tailed test (alpha = 0.05 yields z = 3.62 > 1.96 p=0.0002).

Data Collection Process

The data were collected by mailed questionnaires. Names and addresses for the Ashland College graduate students were obtained via the college records for all of the branch campuses. A packet of materials was sent to 550 persons selected randomly from 650 former students. Each received a cover letter, two test instruments, the Computer Usage Questionnaire (CUQ) and the Rokeach Dogmatism
Table 4

Comparison of Number of Computer Education Classes Taken by Respondents and Non-Respondents

<table>
<thead>
<tr>
<th>Number of Classes Taken</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Respondents</td>
<td>139</td>
<td>67</td>
<td>39</td>
<td>7</td>
<td>13</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>293</td>
</tr>
<tr>
<td>Total of Classes</td>
<td>139</td>
<td>174</td>
<td>117</td>
<td>28</td>
<td>65</td>
<td>12</td>
<td>28</td>
<td>16</td>
<td>579</td>
</tr>
<tr>
<td>Percent of Classes</td>
<td>24.0</td>
<td>30.1</td>
<td>20.2</td>
<td>4.8</td>
<td>11.2</td>
<td>2.1</td>
<td>4.8</td>
<td>2.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Number of Non-respondents</td>
<td>157</td>
<td>59</td>
<td>30</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>257</td>
</tr>
<tr>
<td>Total of Classes</td>
<td>157</td>
<td>118</td>
<td>90</td>
<td>24</td>
<td>15</td>
<td>6</td>
<td>7</td>
<td>0</td>
<td>417</td>
</tr>
<tr>
<td>Percent of Classes</td>
<td>37.6</td>
<td>28.3</td>
<td>21.6</td>
<td>5.8</td>
<td>3.6</td>
<td>1.4</td>
<td>1.7</td>
<td>0.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

\[
\bar{X} \text{ Number of Classes for Respondents} = 1.98 \\
\bar{X} \text{ Number of Classes for Total Sample} = 1.81 \\
\bar{X} \text{ Number of Classes for Non-respondents} = 1.62 \\
\bar{X} \text{ Difference Between Groups} = 0.36
\]

* The size of the population was 650. A random sampling of 550 was used in the study. The population consisted of certificated educators taking graduate work in computer education at Ashland College branch campuses during 1964 through 1967.
Scale, and a self-addressed stamped envelope for the respondent to use in mailing back the completed questionnaires. Respondents could indicate on the questionnaire if they desired a copy of the results of the study. A copy of the cover letter and the research instruments are shown in Appendices A, B, and C. Each person in the sample was sent a pen and a public domain software disk with a collection of Print Shop graphics, specifically selected for educators, as inducement for participating.

**Instrumentation**

Two instruments were used to collect data for the study. One was created for the present study and labelled the Computer Usage Questionnaire (CUQ). It was based on the subscales found in the CAS\(^1\) and two questions came from the CAIN.\(^2\) The CUQ also included a section for collecting demographic information. The other instrument used in the study was the Rokeach Dogmatism Scale.

---


\(^2\)D. J. Rohner and M. R. Simonson, "Development of an Index of Computer Anxiety" (Iowa State University, 1985).
Computer Usage Questionnaire

The CUQ contained 44 items and required 10 to 15 minutes to write the responses. The CUQ is shown in Appendix B.

Two tests were used as a basis for the CUQ that was developed for the present study. The Computer Attitude Scale (Lloyd and Gressard, 1984, 1985) and the Computer Anxiety Index (Montag et al., 1984) each furnished items and a research base.

The CUQ contained three types of questions. One type called for responses related to the demographics of the respondents. Each of three questions focused on the number of years of teaching, sex, and age (questions 1, 2, and 5).

A second group of questions was related to the contextual variables thought to predict the acceptance of computer technology. These asked for responses about: (1) Knowledge and skills in using the computer (question 11), (2) Availability of software for the educator's use (questions 12, 14, and 15), (3) Accessibility of hardware for teacher or class use (questions 6, 7, and 10), (4) Administrative interest in and support of computer technology (question 13), and
(5) Opportunity for "hands-on" experiences when learning to use the computer (question 16).

The final portion of the CUQ consisted of questions (19 through 44) taken from the subscales of CAS (Loyd and Gressard, 1984, 1985). These questions were scattered randomly throughout the last section of the CUQ. The respondent was asked to choose his or her answer from the following Likert-type responses:
(1) Strongly agree, (2) Slightly agree, (3) Slightly disagree, and (4) Strongly disagree. The value of each response (1 to 4) depended on whether the question was stated favorably for the accepter or the resister.

The Computer Acceptance Subscale

The following questions comprised the Acceptance Subscale. The numbers are shown in the order in which the questions appeared in the questionnaire. The asterisk indicates a question was rated in reverse order (high score being a four).
21. "I would like working with computers."
24. "The challenge of solving problems with a computer does not appeal to me."
27. "I think working with computers would be enjoyable and stimulating."
29. "Figuring out computer problems does not appeal to me.
33. "I don't understand how some people can spend so much time working with computers and seem to enjoy it."
35. "Once I start to work with a computer, I would find it hard to stop."
37. "I will do as little work with computers as possible."
40. "If a problem is left unsolved in a computer class, I would continue to think about it afterward."
44. "I do not enjoy talking with others about computers."

The responses to these nine questions from the Acceptance Subscale were used to divide the sample into two groups, accepters and resisters. Four of the items, questions 21, 27, 37, and 40, were rated in reverse order to prevent response bias.*

The range for the scores of the Accepter Subscale was 9 through 36. The mid-point was 22.5. If a person scored 22.5 or greater, he or she was identified as an accepter. If the individual had a score of less than 22.5, he or she was identified as a resister.

Note: * Indicates questions scored in reverse order.
The questions from the anxiety and confidence subscales were used to test the predictor variables of anxiety and confidence.

The Computer Anxiety Subscale

Questions used to measure computer anxiety were:

*19. "Computers do not scare me at all."
22. "Working with a computer would make me very nervous."
25. "I do not feel threatened when others talk about computers."
30. "It wouldn't bother me at all to take computer courses."
31. "Computers make me feel very uncomfortable."
36. "I get a sinking feeling when I think of trying to use a computer."
38. "I would feel comfortable working with a computer."
42. "Computers make me feel uneasy and confused."

Four of the questions testing for computer anxiety were rated in reverse order to prevent response bias. The four questions were numbers 19, 25, 30, and 38.*

The Computer Confidence Subscale

The following questions of the CUQ were used to measure computer confidence.

20. "I'm no good with computers."

Note: * indicates questions scored in reverse order.
"Generally, I would feel OK about trying a new problem on the computer."

"I don't think I would do advanced computer work."

"I am sure I could do advanced work with computers."

"I am sure I could learn a computer language.

"I think using a computer would be very hard for me."

"I do not think I could handle a computer course."

"I have a lot of self-confidence when it comes to working with computers."

Four questions from the Confidence Subscale were rated in reverse order to prevent response bias. The questions rated in reverse order were numbers 23, 28, 32, and 43.*

**Statistical Treatment of the Data**

The sample was sorted into two groups, accepters and resisters, using the Acceptance Subscale scores. The best model for predicting acceptance was based upon the score total for each member of the sample. Logistic regression, a multivariate analysis procedure, was used to test the data. PROC LOGIST, a process found in the Statistical Analysis System.

*Note: * Indicates questions scored in reverse order.
(SAS), was applied to test the relationship between the criterion variable of acceptance and the predictor variables. Each variable was tested simultaneously with the other variables. In most cases, when appropriate, score totals were used.

Logistic regression was selected to analyze the data because it enables the researcher to obtain the "best" possible estimate of the probability for each variable in predicting acceptance of computer technology. Kachigan (1986) discusses the use of logistic regression:

"...A special case occurs when we are primarily interested in the probability of membership in one of the many categories as a function of the others. For example, we might want to predict membership in the "yes" referendum vote category, as a function of membership in the remaining categories of gender, political affiliation, and religion. The equation which produces the probability p of an individual belonging to the category of interest is referred to as a logistic regression equation. It is based on the log odds of membership in the category of interest. (p. 355)

The Rokeach Dogmatism Scale was used to determine if a relationship existed between the criterion variable of open-mindedness and the predictor variables of computer anxiety and computer confidence. The Rokeach scores were used to sort the sample into two groups, open and closed-minded. An individual scoring less than zero was identified as being open-minded, while those with scores greater than zero
were considered to be closed-minded. Logistic regression was used to test the relationship between the respondents' Rokeach scores and the scores of the two subscales, anxiety and confidence.

An overall significance level of alpha = 0.05 was selected to accept or reject each hypothesis.

**Limitations of the Study**

All of the respondents had varying degrees of computer training; some had only one class while others may have taken as many as eight computer courses. Consequently, the number of accepters found in the sample may be higher than would characterize teachers in general. The overall number of courses taken by the respondents' group (\(\bar{x} = 1.98\)) was greater than the non-respondents (\(\bar{x} = 1.62\)) with the difference being 0.36 (see Table 4).

Non-response bias was probably the most critical limitation of the study. Only 53.2 percent of those solicited sent back usable data. Non-respondents may have represented the strongest resisters and their absence may have had an effect on the findings.

The predictor variable of "subject taught" was not evenly distributed throughout the sample. The sample distribution in regard to subject might be considered as biased because of a lack of data in the
areas of Physics and Chemistry, Music and Art, Physical Education and Health, and Guidance.

Other limitations are inherent in self-reported questionnaire studies and might have affected the study. Some of the respondents did not answer all of the items in the questionnaires and this may have had an effect on the findings. A few respondents indicated on the questionnaires that the Rokeach Dogmatism Scale was biased in regard to gender, and their responses may have been somewhat skewed by their feelings about the instrument.
CHAPTER IV

RESULTS OF THE STUDY

The primary purpose of the investigation was to determine the relationships, if any, between the predictor variables and the acceptance of computer technology. Each predictor variable was measured by scales or other responses from the Computer Usage Questionnaire (CUQ) and the Rokeach Dogmatism Scale. The CUQ was administered to gather data relative to the respondents' attitudinal, contextual, and personal characteristics. The Rokeach Dogmatism Scale was used to measure open-mindedness.

Analysis consisted of logistic regression using the *Statistical Analysis System* (SAS) procedure called PROC LOGIST. A stepwise option was used with all variables in the model.

Seventeen tests were performed and hypotheses were accepted as significant if the level of alpha was .05 or less.
Results for the Acceptance Subscale

The Acceptance Subscale was of primary importance because it was used to sort the sample into two groups, accepters and resisters. The sorting was based on the scores for the subscale having a range of 9 through 36. Members of the sample with a score of 22.5 or above were classified as accepters; those with scores less than 22.5 were identified as resisters. The means and standard deviations for the sample are shown in Table 5.

Table 5
Distribution of Sample Sorted Into Accepter and Resister Groups

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>(\overline{X})</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepters</td>
<td>243</td>
<td>30.658</td>
<td>4.267</td>
<td>11.787</td>
</tr>
<tr>
<td>Resisters</td>
<td>32</td>
<td>18.871</td>
<td>2.977</td>
<td></td>
</tr>
<tr>
<td>Total Group</td>
<td>275</td>
<td>29.280</td>
<td>5.632</td>
<td></td>
</tr>
</tbody>
</table>

* The range of scores for the accepters was 23.00 to 36.00; the range of scores for the resisters was 10.00 to 22.00.
Attitudinal Variables

Hypothesis I

Accepting educators, as defined by scores on the Acceptance Subscale in the Computer Usage Questionnaire, tend to be open-minded as defined by scores on the Rokeach Dogmatism Scale. Resisting educators tend to be closed-minded.

The means and standard deviations for the predictor variable of open-mindedness are shown in Table 6.

Table 6

Means and Standard Deviations for the Predictor Variable of Open-mindedness

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resisters</td>
<td>40</td>
<td>-17.775</td>
<td>23.164</td>
<td>6.760</td>
</tr>
<tr>
<td>Total Group</td>
<td>283</td>
<td>-23.579</td>
<td>23.287</td>
<td></td>
</tr>
</tbody>
</table>

* The range of scores for the accepters was -34.00 to 39.00; the range of scores for the resisters was -58.00 to 50.00.

The results for testing the relationship between computer acceptance and open-mindedness are shown in Table 7.
Table 7

Results of the Analysis
Testing the Relationship Between
Computer Acceptance and Open-mindedness

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>$X^2$</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.54164</td>
<td>0.21995</td>
<td>49.13</td>
<td>-</td>
<td>0.0000</td>
</tr>
<tr>
<td>Dogmatism</td>
<td>-0.01239</td>
<td>0.00731</td>
<td>2.87</td>
<td>1</td>
<td>0.0902</td>
</tr>
</tbody>
</table>

Model $X^2 = 2.83$ with 1 d.f.; p-value = 0.0896.

The analysis indicated that there was no significant relationship between acceptance of computer technology and open-mindedness.

Hypothesis II

Accepting educators are less anxious than resisting educators about computer technology.

Accepting educators were hypothesized to be less anxious than resisting educators about computer technology. Anxiety was measured by using the Computer Anxiety Subscale found in the CUQ. Means and standard deviations for the accepters and resisters are shown in Table 8.
Table 8
Means and Standard Deviations for the Predictor Variable of Computer Anxiety

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepters</td>
<td>243</td>
<td>30.656</td>
<td>4.288</td>
<td></td>
</tr>
<tr>
<td>Resisters</td>
<td>38</td>
<td>17.684</td>
<td>6.115</td>
<td></td>
</tr>
<tr>
<td>Total Group</td>
<td>281</td>
<td>12.463</td>
<td>4.687</td>
<td>12.974</td>
</tr>
</tbody>
</table>

* The range of scores for both the accepters and resisters was 8.00 to 25.00.

The results for the logistic regression statistics are shown in Table 9.

Table 9
Results of the Analysis Testing the Relationship Between Computer Acceptance and Computer Anxiety

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>(\chi^2)</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>5.65082</td>
<td>0.70392</td>
<td>64.44</td>
<td>-</td>
<td>0.0000</td>
</tr>
<tr>
<td>Anxiety</td>
<td>-0.26178</td>
<td>0.04167</td>
<td>39.45</td>
<td>1</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Model \(\chi^2 = 49.97\) with 1 d.f.; p-value = 0.0000.
The results of the analysis indicate there was a significant relationship between acceptance of computer technology and anxiety. As anxiety scores decrease, the probability of being an accepter increases. Those who have less anxiety when working with computers will most likely be accepters.

Hypothesis III

Accepting educators are more confident than resisting educators about computer technology. Accepting educators were expected to be more confident than resisting educators about computer technology. Confidence was measured using the Computer Confidence Subscale from the CUQ. Stepwise logistic regression was used to determine the best model for predicting computer acceptance. The results of the procedure indicate that the confidence measure is the best predictor for computer acceptance for this sample.

The means and standard deviations for the sample are shown in Table 10. The results of the data analysis, logistic regression, are shown in Table 11.
Table 10
Means and Standard Deviations for the Predictor Variable of Computer Confidence

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepters</td>
<td>243</td>
<td>27.104</td>
<td>3.922</td>
<td></td>
</tr>
<tr>
<td>Resisters</td>
<td>37</td>
<td>20.189</td>
<td>4.339</td>
<td></td>
</tr>
<tr>
<td>Total Group</td>
<td>278</td>
<td>26.183</td>
<td>4.617</td>
<td>6.915</td>
</tr>
</tbody>
</table>

* The range of scores for the accepters was 15 to 32:
The range of scores for the resisters was 12 to 31.

As confidence increases, the probability of
being an accepter increases. The results are shown
in Table 11.

Table 11
Results of the Analysis Testing the Relationship Between
Computer Acceptance and Computer Confidence

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>X^2</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-7.41964</td>
<td>1.35208</td>
<td>30.11</td>
<td>-</td>
<td>0.0000</td>
</tr>
<tr>
<td>Confidence</td>
<td>0.39353</td>
<td>0.06087</td>
<td>41.80</td>
<td>1</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Model X^2 = 73.94 with 1 d.f.; p-value = 0.0000.
The variable of computer confidence was the best predictor of computer acceptance for this sample.

Open and Closed-mindedness

The Rokeach Dogmatism Scale was used to sort the sample into two groups, open and closed-minded. The Rokeach scale was based on a six-point spread with +3 being the most dogmatic and -3 being the most open-minded. Zero was not an option and its absence forced the respondent to give an answer either on the high or low side of zero.

The responses to the questionnaire indicated there were 45 closed-minded members and 236 open-minded members in the sample. The range of scores for the resisters was -58.00 to 50.00; the range for the accepters was -84.00 to 38.00. The mean score for the open-minded group was -24.53; the mean score for the closed-minded group (dogmatic) was -17.78.

Hypothesis IV

Open-minded educators are less anxious than closed-minded educators about computer technology.

Open-minded educators were expected to be less anxious about computer technology than closed-minded educators. Previous studies have shown there is more
flexibility and acceptance of innovations within an open-minded group (Rokeach, 1960).

Results of the analysis for the sample in this study indicated no relationship between open-mindedness and anxiety. The results of the analysis are shown in Table 12.

Table 12

<table>
<thead>
<tr>
<th>Result of the Analysis</th>
<th>Testing the Relationship Between Open-mindedness and Computer Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable</strong></td>
<td><strong>Beta</strong></td>
</tr>
<tr>
<td>Intercept</td>
<td>-2.16005</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0.39410</td>
</tr>
</tbody>
</table>

Model X^2 = 1.37 with 1 d.f.; p-value = 0.2424.

Hypothesis V

Open-minded educators are more confident than closed-minded educators about computer technology.

Although the literature (Havelock, 1973; Rokeach, 1960) tends to support a direct relationship between confidence and open-mindedness, the results of this analysis showed no relationship (see Table 13).
Table 13
Results of the Analysis
Testing the Relationship Between
Open-mindedness and Computer Confidence

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>$\chi^2$</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-1.03667</td>
<td>0.91180</td>
<td>1.28</td>
<td>-</td>
<td>0.2583</td>
</tr>
<tr>
<td>Confidence</td>
<td>-0.02359</td>
<td>0.03471</td>
<td>0.46</td>
<td>1</td>
<td>0.4958</td>
</tr>
</tbody>
</table>

Model $\chi^2 = 0.45$ with 1 d.f.; p-value = 0.4990.

The Contextual Variables

Hypothesis VI

Computer knowledge and skills are related to the acceptance of computer technology.

Whether teachers had knowledge and skills in using computers would seem to be related to acceptance. Respondents were asked to indicate the degree to which they felt the statement, "I know how to use computers," represented their feelings about their personal computer use. A four-point scale ranging from one (A lot) to four (None) was used to measure knowledge and skills and its effect on computer acceptance.
The means and standard deviations for the predictor variable of computer knowledge and skills is shown in Table 14.

Table 14

Means and Standard Deviations for the Predictor Variable of Computer Knowledge and Skills

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepters</td>
<td>243</td>
<td>1.642</td>
<td>0.559</td>
<td></td>
</tr>
<tr>
<td>Resisters</td>
<td>40</td>
<td>2.275</td>
<td>0.599</td>
<td>0.633</td>
</tr>
<tr>
<td>Total Group</td>
<td>283</td>
<td>1.731</td>
<td>0.606</td>
<td></td>
</tr>
</tbody>
</table>

* The range of scores for the accepters was 1.00 to 3.00.
  The range of scores for the resisters was 1.00 to 4.00.

As knowledge and skills in computer usage increased, confidence increased. The results of the logistic regression statistic are shown in Table 15.
Table 15

Results of the Analysis
Testing the Relationship Between
Computer Acceptance and Computer Knowledge and Skill

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>$x^2$</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>5.58793</td>
<td>0.77978</td>
<td>51.35</td>
<td>-</td>
<td>0.0000</td>
</tr>
<tr>
<td>Knowledge</td>
<td>-1.94034</td>
<td>0.36034</td>
<td>28.99</td>
<td>1</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Model $X^2 = 38.74$ with 1 d.f.; p-value = 0.0000.

Hypothesis VII

Availability of software for teacher's use and teacher's subject area is related to the acceptance of computer technology.

The means and standard deviations for the predictor variable of availability of software are shown in Table 16.

Although several educators indicated in anecdotal form that finding good software was important, the statistical analysis indicated that availability of software was not a major consideration in regard to computer acceptance (see Table 17).
Table 16
Means and Standard Deviations for the Predictor Variable of Availability of Computer Software

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>( \bar{X} )</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepters</td>
<td>237</td>
<td>5.958</td>
<td>2.068</td>
<td></td>
</tr>
<tr>
<td>Resisters</td>
<td>39</td>
<td>6.308</td>
<td>1.908</td>
<td></td>
</tr>
<tr>
<td>Total Group</td>
<td>276</td>
<td>6.007</td>
<td>2.047</td>
<td></td>
</tr>
</tbody>
</table>

* The range of scores for the accepters' group was 3.00 to 12.00. The range of scores for the resisters' group was 3 to 10.00.

The results of the analysis testing the relationship between computer acceptance and software availability are shown in Table 17.

Table 17
Results of the Analysis Testing the Relationship Between Computer Acceptance and Software Availability

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>( \chi^2 )</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2.30687</td>
<td>0.51649</td>
<td>17.62</td>
<td>-</td>
<td>0.0000</td>
</tr>
<tr>
<td>Availability</td>
<td>-0.08194</td>
<td>0.03287</td>
<td>0.98</td>
<td>1</td>
<td>0.3228</td>
</tr>
</tbody>
</table>

Model \( \chi^2 = 0.97 \) with 1 d.f.; p-value = 0.3255.
Hypothesis VIII

Accessibility to computer hardware is related to the acceptance of computer technology.

The accessibility of computer hardware was expected to be related to the acceptance of computer technology. Respondents were asked three questions about hardware accessibility in the CUQ. They were: (1) "Do you have a computer available for classroom use?" (2) "Do you have a computer available to keep records, average grades, score tests, write tests, and to do other management tasks?" and (3) "Do you own a computer?"

The means and standard deviations for the accepters' and resisters' groups are shown in Table 18.

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepters</td>
<td>239</td>
<td>3.870</td>
<td>0.843</td>
<td></td>
</tr>
<tr>
<td>Resisters</td>
<td>39</td>
<td>4.462</td>
<td>0.913</td>
<td>0.592</td>
</tr>
<tr>
<td>Total Group</td>
<td>278</td>
<td>3.953</td>
<td>0.875</td>
<td></td>
</tr>
</tbody>
</table>

* The range of scores for both the accepters and resisters was 3.00 to 6.00.
The results, shown in Table 19, indicate that computer accessibility was a significant factor in predicting the acceptance of computer technology.

Table 19

Results of the Analysis
Testing the Relationship Between Computer Acceptance and Hardware Accessibility

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>$X^2$</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>4.90663</td>
<td>0.88050</td>
<td>31.05</td>
<td>-</td>
<td>0.0000</td>
</tr>
<tr>
<td>Accessibility</td>
<td>-0.74419</td>
<td>0.19818</td>
<td>14.10</td>
<td>1</td>
<td>0.0002</td>
</tr>
</tbody>
</table>

Model $X^2 = 14.74$ with 1 d.f.; p-value = 0.0001.

As accessibility increased, the probability of being an accepter of computer technology increased.

Hypothesis IX

Administrative interest and support are related to the acceptance of computer technology.

The literature and popular opinion support the hypothesis that administrative interest and support are related to the acceptance of computer technology.
Respondents were asked to indicate the degree to which they felt the following statement was true, "My administration supports me in my efforts to use computers." A four-point scale was used to determine if there was a significant relationship between administrative interest and support and computer acceptance. The answers ranged from 1 (A lot) to 4 (None).

The mean scores and standard deviations for the accepters and resisters are shown in Table 20.

Table 20
Means and Standard Deviations for the Predictor Variable of Administrative Support

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>( \overline{X} )</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepters</td>
<td>243</td>
<td>30.658</td>
<td>4.288</td>
<td>12.974</td>
</tr>
<tr>
<td>Resisters</td>
<td>38</td>
<td>17.684</td>
<td>6.115</td>
<td></td>
</tr>
<tr>
<td>Total Group</td>
<td>281</td>
<td>12.463</td>
<td>4.687</td>
<td></td>
</tr>
</tbody>
</table>

* The range of scores for both the accepters and resisters was 8.00 to 25.00.
The results of the data analysis indicated no significant relationship between computer acceptance and administrative interest and support (see Table 21).

Table 21

Results of the Analysis
Testing the Relationship Between Computer Acceptance and Administrative Interest and Support

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>$\chi^2$</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.88519</td>
<td>0.39591</td>
<td>22.75</td>
<td>-</td>
<td>0.0000</td>
</tr>
<tr>
<td>Administrative Support</td>
<td>-0.03525</td>
<td>0.19893</td>
<td>0.03</td>
<td>1</td>
<td>0.8593</td>
</tr>
</tbody>
</table>

Model $\chi^2 = 0.03$ with 1 d.f.; p-value = 0.8598.

Hypothesis X

Opportunity for "hands-on" experience on the computer is related to the acceptance of computer technology.

Both popular opinion and literature support the hypothesis that "hands-on" experience on the computer is related to the acceptance of computers. The statement, Item 16 in the CUQ, "I've had 'hands-on' experience with computers," was used to gain a
response ranging from 1 (A lot) to 4 (None). The mean scores for the accepters and resisters are shown with the standard deviations in Table 22.

Table 22

Means and Standard Deviations for the Predictor Variable of "Hands-on" Experience

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>( \bar{X} )</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepters</td>
<td>242</td>
<td>1.492</td>
<td>0.563</td>
<td>0.558</td>
</tr>
<tr>
<td>Resisters</td>
<td>40</td>
<td>2.050</td>
<td>0.714</td>
<td></td>
</tr>
<tr>
<td>Total Group</td>
<td>282</td>
<td>1.571</td>
<td>0.617</td>
<td></td>
</tr>
</tbody>
</table>

* The range of scores for the accepters was 1.00 to 3.00; the range of scores for the resisters was 1.00 to 4.00.

The data analysis indicated that popular opinion and the literature were correct in supporting the use of "hands-on" activities when learning to use a computer. The results of the data analysis are shown in Table 23.
Table 23

Results of the Analysis
Testing the Relationship Between
Computer Acceptance and "Hands-on" Experience

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>$X^2$</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-7.41964</td>
<td>1.35206</td>
<td>30.11</td>
<td>-</td>
<td>0.0008</td>
</tr>
<tr>
<td>Hands-on</td>
<td>0.39353</td>
<td>0.06087</td>
<td>41.80</td>
<td>1</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Model $X^2 = 26.60$ with 1 d.f.; $p$-value $= 0.0000$.

Personal Variables

Hypothesis XI

The personal characteristic of the number of years of teaching is related to computer acceptance.

A popular notion relative to the acceptance of innovations in education is "teachers who are set in their ways (many years of teaching experience) are less likely to accept an innovation than teachers who are new to the field of teaching."

The means and standard deviations relative to the predictor variable of number of years of teaching are shown in Table 24.
Table 24

Means and Standard Deviations for the Predictor Variable of Number of Years of Teaching

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepters</td>
<td>242</td>
<td>15.572</td>
<td>6.192</td>
<td></td>
</tr>
<tr>
<td>Resistors</td>
<td>40</td>
<td>17.300</td>
<td>6.069</td>
<td>1.728</td>
</tr>
<tr>
<td>Total Group</td>
<td>282</td>
<td>15.796</td>
<td>6.194</td>
<td></td>
</tr>
</tbody>
</table>

* The range of scores for the accepters was 1.00 to 32.00. The range of scores for the resistors was 3.00 to 29.00.

The results of the statistical analysis indicated no significant relationship between number of years of teaching and computer acceptance for this sample (see Table 25).

Table 25

Results of the Analysis Testing the Relationship Between Computer Acceptance and the Number of Years of Teaching

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>X^2</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2.56305</td>
<td>0.50942</td>
<td>25.31</td>
<td>-</td>
<td>0.0000</td>
</tr>
<tr>
<td>Years of Teaching</td>
<td>-0.03644</td>
<td>0.02813</td>
<td>2.72</td>
<td>1</td>
<td>0.0988</td>
</tr>
</tbody>
</table>

Model X^2 = 2.78 with 1 d.f.; p-value = 0.0957.
Hypothesis XII

The personal characteristic of age is related to computer acceptance.

Literature supports the view that older teachers are less flexible than younger teachers in adopting an innovation. The results of the study indicated that age was not related to acceptance of or resistance to the innovation of computer technology.

Age was scored using a range of scores for both accepters and resisters of 1.00 to 4.00: Ages 20 to 30 = 1, 31 to 40 = 2, 41 to 55 = 3, and over 55 = 4. The means and standard deviations for the sample in this category are shown in Table 26.

The statistical analysis of the data is shown in Table 27.
### Table 26

Means and Standard Deviations for the Predictor Variable of Age

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>Between Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accepters</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 1 (21 to 30)</td>
<td>243</td>
<td>0.062</td>
<td>0.241</td>
<td>0.037</td>
</tr>
<tr>
<td>Age 2 (31 to 40)</td>
<td>243</td>
<td>0.412</td>
<td>0.493</td>
<td>0.063</td>
</tr>
<tr>
<td>Age 3 (41 to 55)</td>
<td>243</td>
<td>0.457</td>
<td>0.499</td>
<td>0.018</td>
</tr>
<tr>
<td>Age 4 (Over 55)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Resisters</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 1 (21 to 30)</td>
<td>40</td>
<td>0.025</td>
<td>0.158</td>
<td></td>
</tr>
<tr>
<td>Age 2 (31 to 40)</td>
<td>40</td>
<td>0.475</td>
<td>0.506</td>
<td></td>
</tr>
<tr>
<td>Age 3 (41 to 55)</td>
<td>40</td>
<td>0.475</td>
<td>0.506</td>
<td></td>
</tr>
<tr>
<td>Age 4 (Over 55)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 1 (21 to 30)</td>
<td>283</td>
<td>0.057</td>
<td>0.231</td>
<td></td>
</tr>
<tr>
<td>Age 2 (31 to 40)</td>
<td>283</td>
<td>0.420</td>
<td>0.495</td>
<td></td>
</tr>
<tr>
<td>Age 3 (41 to 55)</td>
<td>283</td>
<td>0.459</td>
<td>0.499</td>
<td></td>
</tr>
<tr>
<td>Age 4 (Over 55)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The final category is redundant for fitting the model.

The range of grouped scores was 1.00 to 4.00.

The results of the statistical analysis are shown in Table 27.
Hypothesis XIII

The personal characteristic of sex is related to computer acceptance.

The view that a relationship exists between gender and the acceptance of computer technology has been discussed in literature (Loyd and Gressard,
The theory that males are "naturally" more computer-oriented than females has merit as a research topic (Raub, 1981).

Using the data obtained from answers to question 2 on the CUQ, the results indicated no significant relationship between sex and computer acceptance. The mean scores for accepters and resisters are shown in Table 28.

Table 28
Means and Standard Deviations for the Predictor Variable of Sex

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepters</td>
<td>243</td>
<td>0.176</td>
<td>0.429</td>
<td></td>
</tr>
<tr>
<td>Resisters</td>
<td>40</td>
<td>0.725</td>
<td>0.452</td>
<td>0.549</td>
</tr>
<tr>
<td>Total Group</td>
<td>283</td>
<td>0.763</td>
<td>0.432</td>
<td></td>
</tr>
</tbody>
</table>

* The respondents for the study consisted of 219 females and 74 males.

The results of the statistical analysis are shown in Table 29.
Table 29

Results of the Analysis
Testing the Relationship Between
Computer Acceptance and Sex

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>X2</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.67964</td>
<td>0.32841</td>
<td>26.16</td>
<td>-</td>
<td>0.0000</td>
</tr>
<tr>
<td>Sex</td>
<td>0.16799</td>
<td>0.38441</td>
<td>0.19</td>
<td>1</td>
<td>0.6621</td>
</tr>
</tbody>
</table>

Model $X^2 = 0.19$ with 1 d.f.; p-value = 0.6650.

Predictor Variables Considered

Four hypotheses emerged as the study progressed. The results of the analyses are shown with each of the hypotheses.

Hypothesis XIV:

Acceptance of computers is related to the grade level taught.

The results of data for CUQ question 3 indicated that no significant relationship did not exist between criterion variable of acceptance and the predictor variable of grade level taught.

The means and standard deviations for accepters and resisters are shown in Table 30.
Table 30  
Means and Standard Deviations for the Predictor Variable of Grade Level Taught

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 1</td>
<td>240</td>
<td>0.275</td>
<td>0.447</td>
<td>0.125</td>
</tr>
<tr>
<td>(K - 2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 2</td>
<td>240</td>
<td>0.192</td>
<td>0.394</td>
<td>0.042</td>
</tr>
<tr>
<td>(3 - 5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 3</td>
<td>240</td>
<td>0.258</td>
<td>0.438</td>
<td>0.033</td>
</tr>
<tr>
<td>(6 - 8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 4</td>
<td>240</td>
<td>0.067</td>
<td>0.245</td>
<td>0.008</td>
</tr>
<tr>
<td>(9 - 12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 5</td>
<td>240</td>
<td>0.088</td>
<td>0.283</td>
<td>0.012</td>
</tr>
<tr>
<td>(Other)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resisters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 1</td>
<td>40</td>
<td>0.400</td>
<td>0.496</td>
<td></td>
</tr>
<tr>
<td>(K - 2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 2</td>
<td>40</td>
<td>0.150</td>
<td>0.362</td>
<td></td>
</tr>
<tr>
<td>(3 - 5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 3</td>
<td>40</td>
<td>0.225</td>
<td>0.423</td>
<td></td>
</tr>
<tr>
<td>(6 - 8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 4</td>
<td>40</td>
<td>0.075</td>
<td>0.267</td>
<td></td>
</tr>
<tr>
<td>(9 - 12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 5</td>
<td>40</td>
<td>0.100</td>
<td>0.304</td>
<td></td>
</tr>
<tr>
<td>(Other)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 1</td>
<td>280</td>
<td>0.293</td>
<td>0.456</td>
<td></td>
</tr>
<tr>
<td>(K - 2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 2</td>
<td>280</td>
<td>0.186</td>
<td>0.389</td>
<td></td>
</tr>
<tr>
<td>(3 - 5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 3</td>
<td>280</td>
<td>0.254</td>
<td>0.436</td>
<td></td>
</tr>
<tr>
<td>(6 - 8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 4</td>
<td>280</td>
<td>0.068</td>
<td>0.252</td>
<td></td>
</tr>
<tr>
<td>(9 - 12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 5</td>
<td>280</td>
<td>0.089</td>
<td>0.286</td>
<td></td>
</tr>
<tr>
<td>(Other)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The results of the statistical analysis indicated no significant relationship between computer acceptance and grade level taught (see Table 31).

Table 31

Results of the Analysis
Testing the Relationship Between Computer Acceptance and Grade Level Taught

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>$X^2$</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.65822</td>
<td>0.54554</td>
<td>9.24</td>
<td>-</td>
<td>0.0024</td>
</tr>
<tr>
<td>Level 1 (K - 2)</td>
<td>1.01592</td>
<td>0.91219</td>
<td>1.24</td>
<td>1</td>
<td>0.2654</td>
</tr>
<tr>
<td>Level 2 (3 - 5)</td>
<td>-0.24116</td>
<td>0.61259</td>
<td>0.15</td>
<td>1</td>
<td>0.6938</td>
</tr>
<tr>
<td>Level 3 (6 - 8)</td>
<td>0.37865</td>
<td>0.69715</td>
<td>0.30</td>
<td>1</td>
<td>0.5870</td>
</tr>
<tr>
<td>Level 4 (9 - 12)</td>
<td>0.27168</td>
<td>0.55181</td>
<td>0.17</td>
<td>1</td>
<td>0.6768</td>
</tr>
<tr>
<td>Level 5 (Other)</td>
<td>0.01574</td>
<td>0.83273</td>
<td>0.00</td>
<td>1</td>
<td>0.5849</td>
</tr>
</tbody>
</table>

Model $X^2 = 4.15$ with 5 d.f.; p-value = 0.5277.

Hypothesis XV:

Acceptance of computers is related to the subject taught.

Question 4 of the CUG asked respondents to list the subject or subjects taught. The analysis of the data relative to the acceptance of computer
technology and the subject taught indicated no significant relationship between computer acceptance and the subject taught (see Tables 32 and 33).

Table 32
Means and Standard Deviations for the Predictor Variable of Subject Taught

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accepters</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject 1 (Self Contained)</td>
<td>240</td>
<td>0.429</td>
<td>0.496</td>
<td>0.096</td>
</tr>
<tr>
<td>Subject 2 (Language and Social Studies)</td>
<td>243</td>
<td>0.139</td>
<td>0.348</td>
<td>0.039</td>
</tr>
<tr>
<td>Subject 3 (Math)</td>
<td>240</td>
<td>0.121</td>
<td>0.327</td>
<td>0.029</td>
</tr>
<tr>
<td>Subject 4 (Science)</td>
<td>243</td>
<td>0.086</td>
<td>0.292</td>
<td>0.036</td>
</tr>
<tr>
<td>Subject 5 (Miscellaneous)</td>
<td>243</td>
<td>0.111</td>
<td>0.314</td>
<td>0.061</td>
</tr>
<tr>
<td><strong>Resisters</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject 1 (Self Contained)</td>
<td>40</td>
<td>0.525</td>
<td>0.506</td>
<td></td>
</tr>
<tr>
<td>Subject 2 (Language and Social Studies)</td>
<td>40</td>
<td>0.100</td>
<td>0.304</td>
<td></td>
</tr>
<tr>
<td>Subject 3 (Math)</td>
<td>40</td>
<td>0.150</td>
<td>0.367</td>
<td></td>
</tr>
<tr>
<td>Subject 4 (Science)</td>
<td>40</td>
<td>0.050</td>
<td>0.221</td>
<td></td>
</tr>
<tr>
<td>Subject 5 (Miscellaneous)</td>
<td>40</td>
<td>0.050</td>
<td>0.221</td>
<td></td>
</tr>
</tbody>
</table>

Results for the total sample are shown on the next page.
Table 32 (continued)

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>X</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject 1 (Self Contained)</td>
<td>280</td>
<td>0.443</td>
<td>0.498</td>
</tr>
<tr>
<td>Subject 2 (Language and Social Studies)</td>
<td>283</td>
<td>0.134</td>
<td>0.342</td>
</tr>
<tr>
<td>Subject 3 (Math)</td>
<td>280</td>
<td>0.125</td>
<td>0.331</td>
</tr>
<tr>
<td>Subject 4 (Science)</td>
<td>283</td>
<td>0.081</td>
<td>0.274</td>
</tr>
<tr>
<td>Subject 5 (Miscellaneous)</td>
<td>240</td>
<td>0.088</td>
<td>0.283</td>
</tr>
</tbody>
</table>

* The predictor variable of "subject taught" was analyzed in two ways: The first—using the original categories and the second way—compressing some of the data that did not have enough entries to show the chi or standard error. The results indicated there was very little difference between the methods. The results of the second procedure were used in Table 32.
Table 33

Results of the Analysis
Testing the Relationship Between
Computer Acceptance and Subject Taught

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>$\chi^2$</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.64865</td>
<td>0.48832</td>
<td>11.40</td>
<td>-</td>
<td>0.0007</td>
</tr>
<tr>
<td>Subject 1 (Self-contained)</td>
<td>-0.05845</td>
<td>0.54386</td>
<td>0.01</td>
<td>1</td>
<td>0.9144</td>
</tr>
<tr>
<td>Subject 2 (Language Arts and Social St.)</td>
<td>0.49141</td>
<td>0.71963</td>
<td>0.47</td>
<td>1</td>
<td>0.4947</td>
</tr>
<tr>
<td>Subject 3 (Math)</td>
<td>-0.07312</td>
<td>0.56303</td>
<td>0.01</td>
<td>1</td>
<td>0.9122</td>
</tr>
<tr>
<td>Subject 4 (Science)</td>
<td>0.70272</td>
<td>0.88661</td>
<td>0.63</td>
<td>1</td>
<td>0.4280</td>
</tr>
<tr>
<td>Subject 5 (Miscellaneous)</td>
<td>0.95403</td>
<td>0.88062</td>
<td>1.17</td>
<td>1</td>
<td>0.2786</td>
</tr>
</tbody>
</table>

Subject 6* (Others)

Model $\chi^2 = 3.68$ with 5 d.f.; p-value = 0.5996.

* Subject 6 is redundant for fitting the model.

Hypothesis XVI:

Accepters of computer technology use computers more frequently than resistors.

The frequency of computer use was asked in question 8 of the CUQ, "How often do you use the computer?" The response options were: "Daily, Weekly, Monthly, Never, and Only if I have to." The
results indicated a significant relationship between computer acceptance and the frequency of computer use (see Tables 34 and 35). If a person used computers as often as daily or weekly the chance of being an accepter increased.

Table 34

Means and Standard Deviations for the Predictor Variable of Frequency of Use

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often 1 (Daily)</td>
<td>241</td>
<td>0.469</td>
<td>0.500</td>
<td>0.344</td>
</tr>
<tr>
<td>Often 2 (Weekly)</td>
<td>241</td>
<td>0.278</td>
<td>0.449</td>
<td>0.253</td>
</tr>
<tr>
<td>Often 3 (Monthly)</td>
<td>241</td>
<td>0.133</td>
<td>0.340</td>
<td>0.042</td>
</tr>
<tr>
<td>Often 4 (Never)</td>
<td>241</td>
<td>0.071</td>
<td>0.257</td>
<td>0.179</td>
</tr>
<tr>
<td>Often 5 (Only if I have to)</td>
<td>241</td>
<td>0.049</td>
<td>0.218</td>
<td>0.356</td>
</tr>
<tr>
<td>Resistors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often 1 (Daily)</td>
<td>40</td>
<td>0.125</td>
<td>0.335</td>
<td></td>
</tr>
<tr>
<td>Often 2 (Weekly)</td>
<td>40</td>
<td>0.025</td>
<td>0.439</td>
<td></td>
</tr>
<tr>
<td>Often 3 (Monthly)</td>
<td>40</td>
<td>0.175</td>
<td>0.385</td>
<td></td>
</tr>
<tr>
<td>Often 4 (Never)</td>
<td>40</td>
<td>0.250</td>
<td>0.439</td>
<td></td>
</tr>
<tr>
<td>Often 5 (Only if I have to)</td>
<td>40</td>
<td>0.200</td>
<td>0.405</td>
<td></td>
</tr>
</tbody>
</table>

Results for the total sample are shown on the next page.
Table 34 (continued)

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>X</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often 1 (Daily)</td>
<td>281</td>
<td>0.419</td>
<td>0.494</td>
</tr>
<tr>
<td>Often 2 (Weekly)</td>
<td>281</td>
<td>0.274</td>
<td>0.447</td>
</tr>
<tr>
<td>Often 3 (Monthly)</td>
<td>281</td>
<td>0.139</td>
<td>0.346</td>
</tr>
<tr>
<td>Often 4 (Never)</td>
<td>281</td>
<td>0.096</td>
<td>0.295</td>
</tr>
<tr>
<td>Often 5 (Only if I have to)</td>
<td>281</td>
<td>0.071</td>
<td>0.258</td>
</tr>
</tbody>
</table>

Table 35

Results of the Analysis Testing the Relationship Between Computer Acceptance and Frequency of Computer Use

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>X^2</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.40547</td>
<td>0.45644</td>
<td>0.79</td>
<td>-</td>
<td>0.3744</td>
</tr>
<tr>
<td>Often 1 (Daily)</td>
<td>2.71248</td>
<td>0.64590</td>
<td>17.64</td>
<td>1</td>
<td>0.0000</td>
</tr>
<tr>
<td>Often 2 (Weekly)</td>
<td>1.49664</td>
<td>0.56856</td>
<td>6.93</td>
<td>1</td>
<td>0.0085</td>
</tr>
<tr>
<td>Often 3 (Monthly)</td>
<td>1.11436</td>
<td>0.61842</td>
<td>3.25</td>
<td>1</td>
<td>0.0716</td>
</tr>
<tr>
<td>Often 4 (Never)</td>
<td>0.12516</td>
<td>0.60593</td>
<td>0.04</td>
<td>1</td>
<td>0.8364</td>
</tr>
<tr>
<td>Often 5* (Only if I have to)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model X^2 = 29.89 with 4 d.f.; p-value = 0.0000.

* Note: Final category is redundant for fitting the model.
Hypothesis XVII:

Accepters of computer technology use computers more hours per week than resisters.

The options to answer question 9, "How many hours a week do you use a computer?" were: 0, 1 to 5, 6 to 10, 11 to 15, and Over 15 hours. If a person used computers 15 hours or more per week, the probability of being an accepter increased. See Tables 36 and 37.

Table 36

Means and Standard Deviations for the Predictor Variable of Hours of Computer Use

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours 1 (0)</td>
<td>242</td>
<td>0.225</td>
<td>0.435</td>
<td>0.330</td>
</tr>
<tr>
<td>Hours 2 (1 to 5)</td>
<td>242</td>
<td>0.401</td>
<td>0.491</td>
<td>0.051</td>
</tr>
<tr>
<td>Hours 3 (6 to 10)</td>
<td>242</td>
<td>0.198</td>
<td>0.399</td>
<td>0.948</td>
</tr>
<tr>
<td>Hours 4 (10 to 15)</td>
<td>242</td>
<td>0.087</td>
<td>0.283</td>
<td>0.037</td>
</tr>
<tr>
<td>Hours 5 (Over 15)</td>
<td>242</td>
<td>0.062</td>
<td>0.242</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Results for the resisters and total sample are shown on the next page.
Table 36 (continued)

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>X</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resisters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours 1 (0)</td>
<td>40</td>
<td>0.555</td>
<td>0.504</td>
</tr>
<tr>
<td>Hours 2 (1 to 5)</td>
<td>40</td>
<td>0.350</td>
<td>0.483</td>
</tr>
<tr>
<td>Hours 3 (6 to 10)</td>
<td>40</td>
<td>0.050</td>
<td>0.221</td>
</tr>
<tr>
<td>Hours 4 (10 to 15)</td>
<td>40</td>
<td>0.050</td>
<td>0.271</td>
</tr>
<tr>
<td>Hours 5 (N/A) (Over 15)</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours 1 (0)</td>
<td>282</td>
<td>0.294</td>
<td>0.457</td>
</tr>
<tr>
<td>Hours 2 (1 to 5)</td>
<td>282</td>
<td>0.394</td>
<td>0.489</td>
</tr>
<tr>
<td>Hours 3 (6 to 10)</td>
<td>282</td>
<td>0.177</td>
<td>0.383</td>
</tr>
<tr>
<td>Hours 4 (10 to 15)</td>
<td>282</td>
<td>0.082</td>
<td>0.274</td>
</tr>
<tr>
<td>Hours 5 (Over 15)</td>
<td>282</td>
<td>0.053</td>
<td>0.225</td>
</tr>
</tbody>
</table>
### Table 37

**Results of the Analysis Testing the Relationship Between Computer Acceptance and Hours of Computer Use**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>x²</th>
<th>d.f.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>9.04498</td>
<td>23.77374</td>
<td>0.14</td>
<td>-</td>
<td>0.7036</td>
</tr>
<tr>
<td>Hour 1 (0)</td>
<td>-8.02525</td>
<td>23.77504</td>
<td>0.11</td>
<td>1</td>
<td>0.7357</td>
</tr>
<tr>
<td>Hour 2 (1-5)</td>
<td>-7.10932</td>
<td>23.77546</td>
<td>0.09</td>
<td>1</td>
<td>0.7649</td>
</tr>
<tr>
<td>Hour 3 (6-10)</td>
<td>-5.86692</td>
<td>23.78469</td>
<td>0.06</td>
<td>1</td>
<td>0.8052</td>
</tr>
<tr>
<td>Hour 4 (11-15)</td>
<td>-6.69360</td>
<td>23.78526</td>
<td>0.08</td>
<td>1</td>
<td>0.7784</td>
</tr>
<tr>
<td>Hour 5* (Over 15)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model $x^2 = 19.77$ with 4 d.f.; p-value = 0.0006.

*Note: Final category is redundant for fitting the model.*

**Summary**

The variable of computer confidence, as tested by the Computer Confidence Subscale in the CUQ, had the "best" probability of being used to predict computer acceptance. The contextual variable of knowing how to use the computer and having computer skills coupled with the attitudinal variable of confidence were the best predictors for acceptance of computer technology for this sample.

Testing the hypotheses helped to provide the answers to the central research question: Do
educators who are identified as "accepters" of computer technology: (1) Score high in open-mindedness as defined by Rokeach (1960); (2) Exhibit low anxiety toward computers; (3) Attribute computer acceptance to specific contextual variables; and (4) Share demographic characteristics?

The response to the first part of the central research question was "no." The results of the statistical analysis indicated no significant relationship between computer acceptance and open-mindedness for this sample.

The second response was "yes." Based on the findings of the study, the less anxiety a person had the likelihood of his or her being an accepter of computer technology increased.

The third part of the central research question focused on contextual variables that could be used as good predictors of computer acceptance. Three contextual variables were related significantly to computer acceptance. They were: (1) Knowledge and skills in computer use, (2) Accessibility to computer hardware, and (3) "Hands-on" experience using a computer.
The last part of the central research question was answered in a positive way. There was a significant relationship between computer acceptance and the variables of frequency of computer use and hours per week (duration) of computer use. However, four variables had no significant relationship to computer acceptance. The variables were: (1) the number of years of teaching, (2) gender, (3) age, (4) grade level taught, and (5) subject taught.

In summary, the test results for all of the variables were compiled and the variables were ranked according to their importance as predictors of computer acceptance based on their p-values. A summary of the results are shown Table 38.

The conclusion indicated by the data analyses for the study would be: Educators who are identified as "accepters" of computer technology score low in computer anxiety and high in computer confidence. The predictor variables of knowledge and skill in using computers, hardware accessibility, and "hands-on" experience support the acceptance of computers. Frequency of computer use, daily or weekly, and using the computer 15 or more hours a week were found to be good predictors of computer acceptance.
Table 38

Results of the Analyses for Predictor Variables
Ranked by P-values

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Confidence</td>
<td>0.0000*</td>
</tr>
<tr>
<td>Computer Knowledge and Skills</td>
<td>0.0000*</td>
</tr>
<tr>
<td>Lack of Computer Anxiety</td>
<td>0.0000*</td>
</tr>
<tr>
<td>&quot;Hands-on&quot; Experience on the Computer</td>
<td>0.0000*</td>
</tr>
<tr>
<td>Frequency of Computer Use</td>
<td>0.0000*</td>
</tr>
<tr>
<td>Accessibility of Computer Hardware</td>
<td>0.0001*</td>
</tr>
<tr>
<td>Duration - Hours of Computer Use per Week</td>
<td>0.0006*</td>
</tr>
<tr>
<td>Open-mindedness</td>
<td>0.0896</td>
</tr>
<tr>
<td>Number of Years of Teaching</td>
<td>0.0957</td>
</tr>
<tr>
<td>Availability of Computer Software</td>
<td>0.3244</td>
</tr>
<tr>
<td>Age</td>
<td>0.4375</td>
</tr>
<tr>
<td>Subject Taught</td>
<td>0.5723</td>
</tr>
<tr>
<td>Grade Level</td>
<td>0.5277</td>
</tr>
<tr>
<td>Sex</td>
<td>0.6650</td>
</tr>
<tr>
<td>Administrative Interest and Support</td>
<td>0.8598</td>
</tr>
</tbody>
</table>

* means significant at an overall significance level of 0.05.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Statement of the Problem

The purpose of the study was to identify characteristics of accepters of computer technology in education. The problem statement was: "What personal and contextual characteristics differentiate teachers who accept computer technology from resisters?"

As technology becomes increasingly more evident in our society, finding educators who are likely to support or accept innovations in education becomes important. Knowing the characteristics of accepters within a group of educators could provide some information helpful to planning and implementing a computer program within a school district.

Accepters have a natural tendency to be enthusiastic about an innovation. They are generally
eager to learn and willing to share their newly acquired knowledge. Many accepters are self-motivated and need very little encouragement to "run with the innovation." Time, energy, and expense can be saved by an administrator or innovator when introducing an innovation if they start by working with a group of "accepters."

The Hypotheses Reviewed

Seventeen hypotheses were tested in the study. Fifteen of the hypotheses dealt with predictor variables and their impact on computer acceptance. The variables were of four types: (1) attitudinal, (2) contextual, (3) personal, and (4) demographic. Four variables evolving from the demographics section of the CUDQ were tested to determine their relationship to the criterion variable of "acceptance." Two of the 17 variables were tested to determine if a significant relationship existed between the criterion variable of open-mindedness and the predictor variables of computer anxiety and computer confidence.

Three attitudinal variables were tested, open-mindedness, computer anxiety, and computer confidence, to determine if each was significantly
related to computer acceptance. The results of the analyses for two of the variables, computer anxiety and computer confidence, indicated low anxiety and high confidence as having a significant relationship to the acceptance of computers.

Five contextual variables were tested to determine their relationships to computer acceptance. They were: (1) Knowledge and skills in using computers, (2) Availability of software, (3) Accessibility of hardware, (4) Administrative interest and support, and (5) "Hands-on" experience. The results of the analysis indicated a significant relationship between computer acceptance and three of the variables. The three predictor variables were: (1) knowledge and skills in using the computer, (2) easy access to computer hardware, and (3) opportunities for "hands-on" experience in using computers.

Three personal variables, number of years of teaching, sex, and age, were tested to determine if there was a significant relationship between them and acceptance of computers. The results of the analyses indicated there was no significant relationship between any of the personal variables and computer acceptance.
The relationships between the criterion variable of open-mindedness and the attitudinal variables of anxiety and confidence were tested. The results of the data analyses indicated no relationship between open-mindedness and computer anxiety or open-mindedness and computer confidence.

Four variables taken from the demographics section of the CUQ were tested to determine if any had a significant relationship to computer acceptance. The predictor variables tested were: (1) Grade level, (2) Subject taught, (3) Frequency of computer use, and (4) Hours of computer use. The results of the analysis indicated two of the four, frequency (daily or weekly) and hours of use (15 or more), were related to the acceptance of computers.

Conclusions

Results of the Analysis

Seventeen hypotheses were tested. Fifteen hypotheses focused on the relationship between predictor variables and the criterion variable of computer acceptance: Two hypotheses tested the relationship between open-mindedness, as a criterion variable and the predictor variables of computer
anxiety and computer confidence. A total of seven hypotheses were accepted in the study; ten hypotheses were rejected.

Conclusions concerning computer acceptance and the 15 hypotheses tested are listed in the order of their importance as determined by the results of the logistic regression analyses.

1. An "accepter" could be identified by his or her score on the Computer Confidence Subscale.

2. Having computer knowledge and skills contributes to computer confidence and was found to be the second best predictor of acceptance.

3. Educators who are accepting of computers had less computer anxiety than resisters of computers.

4. "Hands-on" experience was significantly related to computer acceptance.

5. The more a person used a computer, daily or weekly, the greater the probability he or she was an accepter.

6. Easy access to computer hardware was related to computer acceptance.

7. A computer accepter was most likely to use the computer 15 or more hours a week.

8. Open-mindedness was not related to computer acceptance.

9. The personal variable of the number of years of teaching was not a good predictor of computer acceptance.

10. Software availability was not related to the acceptance of computer technology.
11. Age was not significantly related to computer acceptance.

12. The subject taught was not significantly related to computer acceptance.

13. The grade level taught was not related to the acceptance of computer technology.

14. The relationship between computer acceptance and sex was not significant for the sample studied.

15. Administrative interest and support were not significantly related to the acceptance of computers for this sample.

Two hypotheses tested the relationship between the criterion variable of open-mindedness and the predictor variables of computer anxiety and computer confidence. Both hypotheses were rejected.

The commonalities for the responders and non-responders groups were: (1) All were graduate students, (2) All took at least one computer class with some taking as many as eight classes, (3) All were certificated educators, and (4) The number of males and females in each group was a known quantity.

Discussion

Computer confidence, one of the attitudinal variables studied, was the best predictor of computer acceptance for this sample. A significant relationship was also found between acceptance,
computer confidence, and increased computer knowledge. Apparently, as an educator gains knowledge and skill in working with computers, his or her confidence increases. Computer confidence may also be enhanced by having "hands-on" experience and having easy access to computer hardware.

Finding a significant relationship between computer acceptance and computer anxiety was no surprise to the researcher. Much of the literature discussing computerphobia, technostress, and computer anxiety indicate that anxiety is one of the causes for resistance to computer technology. The literature has addressed the problem of computer anxiety and supports the concept that anxiety often accompanies resistance. The findings in this study lend support to the theory that resisters may experience a high level of anxiety.

Recognizing that anxiety is often a deterrent when an individual learns something new, the innovator might be wise to find ways to decrease computer-related stress. Allowing the learner to have time for experimentation and to work at his or her own pace can help to provide an anxiety-free learning experience (Brod, 1984; Stein, 1982; Weinberg and Fuerst, 1984).
One of the findings was unexpected. Software availability had no relationship to computer acceptance. Though some teachers wrote comments concerning software availability and their own negativity toward computers ("No relevant software available; games are often the only software provided;" and "many programs are too hard to learn to use for teacher management tasks"), the statistical analysis did not corroborate these responses. The items concerning computer software may have been difficult to answer, or perhaps all of the members of the sample had equal access to software. Whatever the cause, teachers in the study felt software was not as important to acceptance as hardware accessibility (see Table 22 on page 113).

Another unexpected result of this study was finding no significant relationship between computer acceptance and administrative interest and support. Previous research by Ditzler (1983) and Havelock (1973) indicated that a relationship would normally exist. Perhaps the role of administrator is less important for teachers who take computer courses or is less important after teachers have taken such courses. Perhaps the courses themselves were support enough. The question used to assess support may not
have been sufficient to differentiate between levels of support. The respondents did not perceive differences in administrative support. Whatever caused the results reported here, more research is needed regarding the role of the administrator in promoting teachers' acceptance of an innovation.

Contrary to the findings of Oscarson and Finch (1979), the number of years of teaching did not affect acceptance in this study.

Research by Campbell (1983) suggests that age has no relationship to computer acceptance. This research supports Campbell's findings. Age was not related to computer acceptance.

Some researchers have found a connection between sex and the acceptance of computer technology (Jordan and Stroup, 1982); however, others, (Loyd and Gressard, 1984) have found no significant relationship between computer acceptance and the personal variable of sex. The present study supports the findings of Loyd and Gressard. No significant relationship existed between computer acceptance and sex for this sample.

It was surprising to discover that the findings for the sample did not include a significant relationship between open-mindedness and computer
anxiety and computer confidence. Although Rokeach (1960) and Havelock (1972) have researched the attitudinal variable of open-mindedness, both authors indicate that anxiety and lack of confidence tend to be characteristics of closed-minded people. Closed-minded individuals characteristically oppose change more readily than those who are open-minded. However, the results of the statistical analyses indicated no significant relationships were found between open-mindedness and computer anxiety or open-mindedness and computer confidence.

**Recommendations**

The process of preparing teachers to deal with computer technology poses questions revolving around teachers' acceptance or resistance to computers. This study indicated that computer confidence was the strongest predictor for computer acceptance. The analyses for the study resulted in identifying several other variables as good predictors of computer acceptance. These variables were: (1) Low computer anxiety, (2) High computer confidence, (3) Computer knowledge and skills, (4) Computer hardware accessibility, (5) "Hands-on" opportunities
and experience, (6) Frequent computer use (daily or weekly), and (7) Hours of computer use (15 or over).

Literature indicates anxiety may be one of the main causes for computer resistance and that computer anxiety can be reduced. Selected processes can be used to reduce resistance to computers.

Suggestions to help decrease the fear of computers and increase computer acceptance can be found in the literature. The list might include:

1. Let learning about computers be fun (Stein, 1982; Weinberg and Fuerst, 1984).

2. Software should be user friendly and relevant to the teacher's subject area (Shavelson et al., 1983).

3. Involve teachers in the selection of software (Johnson and Hoot, 1986).

4. Involve teachers in setting up the computer program for their school district (Johnson and Hoot, 1986).


6. Help teachers to understand you do not have to be good at math to use a computer (Naiman, 1982).

7. When training teachers to work with computers, minimize the lecture time and teach through "hands-on" experiences (Vockell and Rivers, 1983).

8. Allow teachers to move at their own pace and set their own course for learning about computers (Stein, 1982).
Efforts on the part of the Innovator to use activities to decrease anxiety and increase computer confidence might also include creating the following conditions which were found to be significantly related to computer acceptance in this study:

1. Provide computer learning experiences where the teacher can increase his or her knowledge base about computers and at the same time improve his or her computer skills.

2. Position computer hardware in a convenient place where teachers have easy access in order to facilitate the use of the computer.

3. Provide opportunities for teachers to have "hands-on" experiences using the computer.

Further Research

Further research on the subject of acceptance and resistance to computer technology should test these findings with a sample randomly selected from the teacher force to include respondents who have had no experiences with computers or computer courses. Responses from such a sample might provide a clearer understanding of the effect each predictor variable has on computer acceptance.
APPENDIX A

COVER LETTER
November 10, 1987

28295 S.R.
Fresno, OH 43824

Dear:

You have been selected from a random sample to help us gather data concerning how people feel about the use of computers in schools. Your responses are very important to us.

Please take a few minutes (approximately 20 minutes) to answer the two enclosed questionnaires. Place them in the self-addressed envelope and return by October 1, if possible. The questionnaires are completely anonymous; we have used an ID number so we can match the two questionnaires.

To show our appreciation, we have enclosed a diskette. This disk contains graphics to use with the program "Print Shop." Directions for the use of the disk are on the label. Pictures are on a separate piece of paper with the names printed below each item to help you identify each graphic display by name.

Please check the box at the bottom of page 3 of the Computer Usage Questionnaire and sign your name if you would like to receive a copy of the results of this study. If you would prefer not to sign your name, please send a request by separate mail.

Thank you for participating.

Sincerely,

Lois K. Forsythe
Research Assistant
The Ohio State University
College of Education
Department of Educational Policy and Leadership

PROGRAM AREAS
Curriculum and Instructional Development
121 Ramseyer Hall
614-292-2181

Educational Administration
301 Ramseyer Hall
614-292-7720

Higher Education, Student Affairs and Adult Education
301 Ramseyer Hall
614-292-7720

Humanistic Foundations
121 Ramseyer Hall
614-292-2181

Vocational-Technical Education
140 Ramseyer Hall
614-292-5037
APPENDIX B

COMPUTER USAGE QUESTIONNAIRE
COMPUTER USAGE QUESTIONNAIRE

Some teachers use the computer a lot; other teachers do not. We are trying to identify educators who use and do not use computers.

PART I

Please answer the following questions by filling in the blanks.

1. Years teaching experience? ______________________  2. Sex? _________

3. Grade level/s taught? ______________________

4. Subject/s taught? ______________________

5. Age group? 21 to 30 ______31 to 40 ______41 to 55 ______Over 55 ______

6. Do you have a computer available for classroom use? Yes_______ No_______
   *If Yes, do you use it regularly? Yes_______ No_______

7. Do you have a computer available to keep records, average grades, score tests, write tests, and to do other management tasks? Yes_______ No_______
   *If Yes, do you use it regularly? Yes_______ No_______

8. How often do you use the computer?
   Daily____ Weekly____ Monthly____ Never____ Only if I have to____

9. How many hours a week do you use a computer?
   0____ 1 to 5____ 6 to 10____ 11 to 15____ Over 15 hours____
   *If over 15 hours please indicate the number of hours ______

10. Do you own a personal computer? Yes_______ No_______

PART II

Please determine the response which best describes the effect the following conditions have had on your use of the computer. Place a check mark in the parentheses under the label which is closest to your response.

<table>
<thead>
<tr>
<th>A lot</th>
<th>Some</th>
<th>Little</th>
<th>None</th>
</tr>
</thead>
</table>

11. I know how to use computers.

12. Appropriate software is available for me to use with my students.

13. My administration supports me in my efforts to use computers.

14. The software programs are relevant to the subject I teach.

15. Software is available to help me manage my instruction (e.g., wordprocessing, recordkeeping, grades, etc.).

16. I've had "hands-on" experience with computers.
**PART III**

Please determine the response which best reflects your present feelings concerning each of these statements. Place a check mark in the parentheses under the label which is closest to your response.

<table>
<thead>
<tr>
<th></th>
<th>A lot</th>
<th>Some</th>
<th>Very</th>
<th>Little</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. I feel very negative about computers in general.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td></td>
<td>Please tell why you answered number 17 the way you did.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. I avoid using computers whenever I can.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td></td>
<td>Please tell why you answered number 18 the way you did.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PART IV**

Below are a series of statements. There are no correct answers to these statements. They are designed to permit you to indicate the extent to which you agree or disagree with the ideas expressed. Place a check mark in the parentheses under the label which is closest to your agreement or disagreement with the statements.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Slightly Agree</th>
<th>Slightly Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. Computers do not scare me at all.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>20. I'm no good with computers.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>21. I would like working with computers.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>22. Working with a computer would make me very nervous.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>23. Generally I would feel OK about trying a new problem on the computer.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>24. The challenge of solving problems with a computer does not appeal to me.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>25. I do not feel threatened when others talk about computers.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>26. I don't think I would do advanced computer work.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td></td>
<td>Strongly Slightly Slightly Strongly Agree</td>
<td>Agree</td>
<td>Disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------</td>
<td>-------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>27.</td>
<td>I think working with computers would be enjoyable and stimulating.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>28.</td>
<td>I am sure I could do work with computers.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>29.</td>
<td>Figuring out computer problems does not appeal to me.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>30.</td>
<td>It wouldn't bother me at all to take a computer course.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>31.</td>
<td>Computers make me feel uncomfortable.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>32.</td>
<td>I am sure I could learn a computer language.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>33.</td>
<td>I don't understand how some people can spend so much time working with computers and seem to enjoy it.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>34.</td>
<td>I think using a computer would be very hard for me.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>35.</td>
<td>Once I start to work with the computer, I would find it hard to stop.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>36.</td>
<td>I get a sinking feeling when I think of trying to use a computer.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>37.</td>
<td>I will do as little work with computers as possible.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>38.</td>
<td>I would feel comfortable working with a computer.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>39.</td>
<td>I do not think I could handle a computer course.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>40.</td>
<td>If a problem is left unsolved in a computer class, I would continue to think about it afterward.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>41.</td>
<td>It is important to me to do well in computer class.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>42.</td>
<td>Computers make me feel uneasy and confused.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>43.</td>
<td>I have a lot of self-confidence when it comes to working with computers.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>44.</td>
<td>I do not enjoy talking with others about computers.</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
</tbody>
</table>

*Questions number 19 through 44 are adopted from an instrument developed by Bernice H. Loyd and Clarice P. Gressard of the University of Virginia, 1984-85.*

Please check here if you would like to receive the results of this survey. If so, please sign your name or write a separate letter requesting a copy.

Signature: _______________________
APPENDIX C
ROKEACH DOGMATISM SCALE
PLEASE NOTE:

Copyrighted materials in this document have not been filmed at the request of the author. They are available for consultation, however, in the author's university library.

These consist of pages:

146-148
REFERENCES


