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THE INFLUENCE OF A COMPUTER ASSISTED INSTRUCTION
EXPERIENCE UPON THE ATTITUDES OF SCHOOL ADMINISTRATORS

DISSERTATION

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

by

George Ronald Christopher, B.A., M.A.

* * * * * *

The Ohio State University
1969

Approved by

[Signature]
Adviser
College of Education
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VITA

June 10, 1934

Born - Pittsburgh, Pa.

1956

B.A. in English, Colgate University, Hamilton, N.Y.

1957-1959

U.S. Army

1959-1962

Junior High School Teacher at Harvey Bolich Jr. High School in Cuyahoga Falls, Ohio

1962-1964

Cadet Principal - Harvey Bolich Jr. High School Cuyahoga Falls, Ohio

1963

M.A., Kent State University Kent, Ohio

1964-1967

Teacher and Unit Principal at Worthington High School, Worthington, Ohio

1967-1969

Graduate Assistant, The Department of Anatomy, The Ohio State University, Columbus, Ohio

FIELDS OF STUDY

Undergraduate Major Fields: English, Education

Master's Degree Major: Educational Administration

Doctorate Fields: Major, Educational Administration

Minors, Curriculum/Supervision, Higher Education
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CHAPTER I

Introduction

To ensure acceptance of new systems, strategies must be designed to prepare users for the advent of technological change. (Bushnell and Allen, 6, p. 234)

The major purpose of this study was to determine the effect upon attitudes towards computer assisted instruction an experience with the medium would have upon experienced school administrators.

Computers are increasingly evident in many sectors of society wherein they are performing a diversity of functions. Few sectors of society are not being influenced in some way. The field of education is currently seen as a lucrative market for the applications of computers. Francis Keppel indicates:

A picture seems to be forming in the mind of the American educator: Knocking at the door of the little red schoolhouse is the giant fist of American business—big business... merchants of hardware, makers of electronic computers... and above all, makers of money. (39, p.187)

Several large business combines have been formed for the express purpose of tapping the potential of the educational market (29). Alexander Schure has predicted:

The use of the computer will alter the face of education, and indeed of civilization. The computer will be imbedded as a prime foundation stone in the schools, education centers, and universities of tomorrow. It will be a tool used locally within the classrooms as well as a management device to administer large regional school
The computer has been used for some time as an administrative tool to assist in educational data processing activities. Reliance upon the computer to handle accounting, scheduling, grade reporting, budgeting, transportation, and test scoring activities has assured it an important place in practically every large school system. Continued use of computers for handling these chores seems certain. What the role of the computer will be in the instructional process is not presently as clear.

Serious consideration has been given only recently to use of the computer in this aspect of the educational enterprise. Relatively few school systems have incorporated computer assisted instruction into their instructional programs. Yet, there is general agreement among forecasters that computers will play an essential role in the instructional process. Patrick Suppes, who is at the vanguard in the application of computers as a "drill and practice" medium, has predicted wide instructional applications of computers within the next ten years (50, p.50). Before such a prediction can be realized however, some present obstacles must be overcome.

Obstacles to Computer Assisted Instruction

The most formidable obstacles which must be overcome before the computer can assume an important role in the instructional process are: (1) the fledgling state of the art of computer assisted instruction; (2) the necessary financial commitment required by this medium, and (3) the resistant attitudes among professional educators towards the use of mechanically controlled instruction. Each of these obstacles deserves further discussion.
State of the Art

Commenting upon the state of the computer art relative to instructional applications, Murray Tondow has stated:

...there is great potential, relatively little done thus far. There is much speculation, some conceptualization, a few research studies, and even less implementation, even on an experimental basis (20, p.81).

Major efforts to develop the medium and appropriate materials are being conducted through more than 310 projects, at 14 universities, and within nine school systems (11). Notable progress has already been reported in the areas of mathematics, medicine, and the social studies. Most programs are still in the developmental stages, and only a few have become essential components of the curriculum.

Stolurow indicated a related contingency to the implementation of computer assisted instruction when he stated:

The available software, both computer and educational, is in a very primitive stage of development (18, p.6).

He considers the present CAI systems as temporary in nature with drastic improvements on the horizon. It is not difficult to deduce that the inadequacy of available software (materials) and the probability of significant improvements within a short time have contributed to the lack of commitment to computer assisted instruction.

In short, the present state of the CAI art provides an obstacle to its implementation due to the lack of sufficient and proven materials and the reluctance of educators to commit their resources to CAI systems which may soon be modified.

Financial

A second obstacle, somewhat related to the first, is the necessary
financial commitment required to develop materials and institute a computerized instructional system. Although the cost of computers and computer time has decreased greatly during the past decade (27, p.239), the required allocation of resources remains beyond all but the most well-financed school systems. Problems of incompatibility between software and hardware also increase cost. Various computer languages, hardware components, and competition among computer manufacturers presently serve to delay the investment required by computer assisted instruction.

**Attitudes**

A third obstacle presently exists which inhibits the acceptance of computer assisted instruction and is much less amenable to technological advance. Personal resistance to the innovation (CAI) present among members of the educational profession is an obstacle which is delaying acceptance of computer assisted instruction. It is quite possible that this resistance is greater than the usual reluctance to change presented by other innovations due to the magnitude of change CAI may cause. Murray Tondov has contended:

> There is no question that this technique CAI will change the structure, process, and form of education in the not-too-distant future (20, p.83).

He is not alone in this belief. Others have likened computer assisted instruction in its potential effect to that caused by the invention of the printing press. Such implications have caused some individuals to develop almost a dread of the advent of CAI (39, p. 187). The result of such apprehension is suggested by Blyth:

> The phrase automation of education with teaching machines represents such a summation of horrors for some people that it blocks intelligent inquiry
into the merits of teaching machines (30, p.401).

[Italics mine].

This third obstacle can be thought of as the presence of psychological dispositions (attitudes) which prohibit intelligent investigation of the capabilities of CAI. The importance of these attitudes among teachers and administrators can be inferred from a statement by John Loughary, who points out:

Each teacher is, in a manner of speaking, a relatively closed system. . .at a different level of operation the same holds true for the supervisor and for administrators (42, p.205).

The importance of the teacher's role in the instructional process and the general responsibility of administrative personnel for instruction suggests that the attitudes of these educators are of significance.

The present study focuses attention upon the third obstacle, attitude towards computer assisted instruction, since it is believed that the attitudes of professional educators will play a crucial role in the realization of the potential of the CAI innovation.

Literature

Although the literature contains numerous articles concerning computer assisted instruction, only those which seemed to be of particular importance to the present study are discussed. Only four empirical studies were found which dealt specifically with attitudes towards automated instruction and were current enough to have relevance to computer assisted instruction. There were any number of subjective opinions expressed in the literature relevant to attitudes towards computer assisted instruction from which representative examples are presented.
Empirical Studies of Attitudes Relevant to CAI

Of the few studies which qualify as empirical research pertinent to computer assisted instruction, only one attempted to measure the attitudinal effect of a CAI experience through a before-after assessment. A study conducted at Florida State University by Mathis, Smith, and Hansen (17) used the Brown Semantic Differential Attitude Scales instrument (11, 1968, appendix C), with some modifications, within a pre-post design. Undergraduate students in psychology were tested, experienced a CAI program, and then were retested. This group was compared with several matched samples who did not experience the CAI program. The researchers were able tentatively to conclude that the CAI experience had no unfavorable consequences but they were unable to specify the exact attitudinal effect of the CAI experience due to other variables which impinged upon their study.

Three studies have been concluded by Sigmund Tobias which pertain to the attitude of teachers towards automated instruction (52, 53, 54). Although these studies did not mention CAI specifically, the automated nature of CAI would suggest that it could be included in the category of "automated instruction" used in his studies. Tobias asked teachers to rank various instructional media terms according to their favorableness in the instructional process. After completion of the initial study, Tobias concluded:

The data strongly suggested that teachers were biased against terms implying automation and indicated the possibility that teachers viewed such media as threatening to their role (52, p.99).

At the conclusion of his third study, Tobias stated:

This finding confirmed previous results (Tobias, 1963, 1966) indicating that teachers have significantly less favorable attitudes towards terms which
directly connote automation than they do to comparable terms which are not identified with automation (54, p.97).

A more typical research methodology used at present to ascertain attitude towards computer assisted instruction is exemplified in a study conducted by IBM (44, p.53). Upon completion of a computerized instructional unit, users (high school students in this instance) were asked to indicate, via questionnaire, reaction to the experience. In this particular study an 88 percent favorable reaction to the medium was reported. Since this approach measures attitudes only after the CAI experience, it is not possible to derive conclusions relative to the change in attitude directly caused by the experience. A further assumption made in this type study is that attitudes are not formed towards computer assisted instruction before knowledge about the medium is gained through personal experience.

No empirical studies have been reported which deal adequately with the attitudes of school administrators towards computer assisted instruction, nor any which indicate the effect an experience with CAI had upon attitudes. On the basis of the meager data available, it can only be concluded that some teachers are apprehensive towards automated instruction and that attitudes towards computer assisted instruction seem to become more favorable after experience with the medium. Most of the other beliefs presently held concerning attitudinal dispositions towards CAI are subjectively derived.

Opinions Concerning Attitudes Towards CAI

Of specific concern to this researcher were the attitudes of parents, teachers, and particularly school administrators since these
groups were thought to exert significant influence upon the allocation of resources and acceptance of computer assisted instruction. The attitudes of each of these groups can be appreciated through consideration of selected references.

An example of parental attitudes towards CAI is candidly portrayed in a recent article in a widely circulated popular magazine, REDBOOK. Bernard Asbell, upon returning from a visit to the Stanford-Brentwood project (50), contacted parents about his experience. He relates:

I came back convinced that schools aided by computers can accomplish what our present schools do not; enable every child to master the fundamentals of reading, writing, and figuring. But when I mentioned computer teaching to mothers of small children, their first reaction in almost every case was uneasiness, and occasionally open distaste (24, p.44).

A personal expression of teacher reaction to computer assisted instruction was offered by Lawrence Stolurov:

As a teacher it frightens me to think that the use of CAI will reveal to the world that I may have been wrong about teaching principles to which I am currently committed and believe in (18, p.8).

This statement was made by the director of the CAI lab at Harvard University! The findings of Tobias, already discussed, would seem to indicate that those less knowledgeable about CAI than Stolurov, share his concern and apprehension.

The importance of teacher attitudes towards computer assisted instruction was clearly stated by Charles F. Hoban:

The attitude of the classroom teacher towards any instructional innovation -- technological or otherwise -- is of paramount importance (43, p.6).

The effect of teacher attitude is clearly stated by Jerman and Anastasiow:
The attitude of the teacher is a very important factor in determining the attitude students will bring to their work on the terminals\(^1\) (3, p.13).

Although, as stated earlier, there are no empirical studies which reveal administrative attitudes towards CAI, there is almost unanimous agreement expressed in the literature that school administrators are apprehensive. McDonald has stated:

The fears and negative speculation engaged in by education administrators may not be valid, but they are real at the present time (16, p.289).

Spokesmen for the American Association of School Administrators (AASA) have concluded that:

There is considerable fear, anxiety, or an unhealthy sense of awe that suggests that the computer is some kind of all-powerful, incomprehensible, infallible, and independent "superbrain" (1, p.10).

Cullinan and Ruderman have observed a need to "reduce the apprehension with which many present administrators approach computers generally" (8, p.141).

Dispelling the anxiety and apprehension which apparently exist towards computers and computer assisted instruction among professional educators would appear to be the responsibility of institutions which prepare such professionals.

**Institutional Responsibilities**

John Loughary spoke to the responsibility of institutions which prepare teachers in these words:

\(^{1}\)The input device which students use to respond to computer based materials.
All that has been said so far is offered in support of the assertion that by and large, current attitudes, professional self-concepts, and instructional procedures in teacher education will need to be altered before broad implementation of man-machine systems in education can be achieved effectively (14, p.212).

Tobias has suggested that the threat posed by automation among teachers implies that:

Attention should be paid to these attitudes when the teacher first comes in contact with newer media, before the attitudes become solidified and finally self-perpetuating (53, p.98).

The responsibility upon institutions which prepare school administrators was unequivocally stated by the AASA Committee on Electronic Data Processing:

No program for preparing school administrators worthy of its name can afford to neglect the study of this important electronic tool (1, p.40).

This course of action was suggested:

Familiarity through study and access to computer terminals and peripheral devices will reduce significantly whatever mystery and uneasiness which now surrounds the computer (1, p.10).

Hamblen, like Tobias, considers it essential that instruction be provided during the preparation programs (in this instance, for school administrators) which would demonstrate the complexity of computer systems while indicating the potential impact such computer applications may have upon the total educational system (38).

At a recent conference of the University Council of Educational Administration\(^2\), the primary focus was expressed in its topic, i.e.,

\(^2\)Columbus, Ohio - April 2-4, 1969
"The Development and Use of Computer-Based Systems in Educational Administration". Attempts to provide computer familiarity to school administrators were reported under development at UCLA, The University of Iowa, The University of Texas, Columbia University, and Florida State University. With the exception of the University of Iowa, the computer is being used primarily as a "simulator" of problem situations. At The University of Iowa, some computerized instruction in the "tutorial" mode is being offered which pertains to administrative task areas.

Recognition of the need for early exposure of school administrators to the capabilities of the computer is presently being acknowledged. Direct use of the computer to instruct students of educational administration (tutorial mode) is even less developed at present than the problem solving application (inquiry mode).

Conclusion

The prediction of Patrick Suppes that computers will be used to assist instruction in most school systems within ten years will depend upon the ability of professional educators to overcome the obstacles presented by the state of the CAI art, the cost of such an instructional system, and apprehension towards the medium. As cost is continually decreased and software becomes more appropriate, available, and compatible, the need will remain for the development of attitudes which will permit assessment of the medium from a rational base. According to Robert Glaser, educators must be equipped to:

---

3See Definitions Section, i.e., "inquiry mode",
4See Definitions Section, i.e., "tutorial mode"
Insist upon validated (i.e., backed-up by evidence) information about how to use a product, what organizational changes are required, and the conditions under which its effectiveness will be enhanced or diminished (37, p. 745).

Preparation for such a role relative to the innovation (CAI) suggests that decisions be made not on the basis of unfamiliarity or bias, but from a sound rational consideration of educational objectives and the best methods to be employed.

If computer assisted instruction can individualize instruction, then it behooves those charged with educational responsibility to approach this instructional medium in an intelligent manner, with a disposition free of unfounded fear and ego protective devices.

Statement of the Problem

The problem of this study was three dimensional: First, to create a computer assisted instruction lesson which would provide a "hands on" experience with a computer while simultaneously indicating some of the instructional capabilities of the medium; second, to determine the relevancy of the lesson to school administrators; and third, to measure the attitudinal effect of the CAI experience provided by the lesson upon attitudes towards the medium.

Purposes of the Study

The purposes of the study were:

1. to provide an acceptable computer assisted instruction experience
2. to determine attitudes of school administrators towards computer assisted instruction
3. to measure the attitudinal effect of a CAI experience
(4) to ascertain the value of the CAI lesson as a means whereby computer knowledge could be provided to school administrators in training
(5) to determine the relationship between computer knowledge and attitude towards computer assisted instruction.

Significance of the Study

This study should provide experience and cognitive knowledge whereby school administrators may become more capable of dealing intelligently with the instructional potential of computers. This study should provide a prototype computerized unit useful in preparation programs of educational administration. This study should further offer a device which can measure attitude towards computer assisted instruction among school administrators. And finally, this study should provide needed information concerning the attitudinal effect a computer assisted instruction experience can have upon school administrators.

General Design

The study evolved sequentially through these five steps: First, a lesson in the CAI medium was created; second, this lesson (CIU) was evaluated relative to its acceptability as a bona fide lesson in CAI; third, an instrument was developed to measure attitude towards computer assisted instruction among school administrators; fourth, school administrators in a preparation program experienced the lesson; and fifth, the lesson was evaluated in terms of its ability to modify attitudes towards computer assisted instruction. The design of this study generally followed the procedures utilized by the Articulated Media Project (4, pp.1-4). In brief, this involved the design, development, field testing and evaluation of prototype materials useful in programs of educational
administration.

A detailed discussion of the procedures used and the instrumentation of this study is provided in the chapter which follows.

Assumptions

The basic assumptions held were:

1. attitudes towards computer assisted instruction should be "favorable" in the sense that they are not conditioned nor controlled by apprehension.

2. attitude modification can best be accomplished through the provision of experience.

3. computerized instruction is a valid method of assisting instruction.

4. knowledge of computer assisted instruction is minimal among school administrators.

5. machine malfunctions will not occur which would negate the findings of the study.

Contentions

The contentions held and tested in the study were:

1. The computerized instructional unit (CIU) provides an acceptable lesson through computer assisted instruction.

2. The CIU experience is acceptable for use in programs of educational administration.

3. The Attitude Instrument measures attitudes towards computer assisted instruction.

4. Participation in the CIU experience will cause more favorable attitudes towards CAI.

5. There is a positive relationship between knowledge of computer applications in education and attitude towards CAI.
Definitions

For purposes of this study, these terms are defined:

attitude: The psychological disposition of a person towards an entity.

computer assisted instruction (CAI): The use of computer housed instructional materials to teach and/or test.

Computerized Instructional Unit (CIU): The lesson created by the researcher and used in this study.

contention: A statement argued for which is based upon a hunch or intuitive conclusion and concerns anticipated events.

inquiry mode: a form of computer assisted instruction in which the student requests information from the computer to assist in the resolution of a "simulated" problem.

tutorial mode: a form of computer assisted instruction wherein instruction is direct from computer "tutor" to the student.

Limitations

Several general limitations of this study were: the scarcity of related studies, the availability of computer time, and the uncertain validity of the attitude measurement device used in the study.

Summary

Chapter I has presented a discussion of the current status of computer assisted instruction with particular attention to the attitudes of members of the education profession. Further presented was a statement of the problem, the purposes of the study, the significance of the study, the design of the study, the assumptions made, the contentions held, a definition of terms, and the limitations which prevailed.
Chapter II presents a detailed explanation of the methodology employed and the instrumentation of the study.

Chapter III presents the data acquired relative to the study contentions, the conclusions reached, and assesses the similarities of the groups designated for comparison in the study.

Chapter IV offers an overall summary of the findings, the recommendations offered by the researcher, and the implications of the study.
CHAPTER II

This is a developmental study. In this chapter is found an explanation of the methodology employed and a detailed description of the instruments developed and utilized.

Methodology

There were four major procedural concerns in this study. First, it was necessary to determine the acceptability of the Computerized Instructional Unit (CIU) as a computer assisted instruction lesson (CAI). Second, there was a need to explain the rationale by which the population sample was selected and was subsequently divided into two groups. Third, it was necessary to explain each contention formulated as it related to a particular concern of the study. And fourth, there was a need to detail the methods employed in data collection and analysis. Each of these concerns is discussed separately below:

Validation of the Computerized Instructional Unit (CIU)

Informal validation of the CIU was accomplished during the use of the unit by numerous visitors and staff at the College of Medicine, The Ohio State University. The researcher observed many of these people as they took the lesson and solicited comments, assisted in difficult sections, and was subsequently able to affect desirable changes in the CIU based upon user response. During this use of the unit, all inputs were recorded automatically upon the student recording tape.1

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1An automatic device which records input from the user and from which data are then available for analysis.
The data thus available were objective in content and permitted modifications to be made. After this trial period of approximately two months and use of the unit by over 50 persons, the unit was considered ready for formal use and evaluation.

Three professors of educational administration and two members of the staff of the University Council of Educational Administration were asked to experience the CIU and to complete questionnaires (see Appendices B and C). The researcher observed their activities and later made slight alterations in the unit and the questionnaires based upon these persons' performance and suggestions. The reactions of these professional educators indicated that the CIU was suitable for use in this study.

Although several persons who were trained in the applications of computers had informally expressed favorable opinions about the CIU, it was considered important to obtain more objective evaluations from other computer trained persons who were not specifically involved with the instructional application of computers. The staff of the Systems Research Department of the College of Medicine was asked to take the CIU after completing a brief background questionnaire which was designed to ascertain their training and experience with computers. Upon completion of the CIU they responded to a questionnaire which was designed to ascertain personal reaction and evaluation of the CIU (see Appendix C).

Subsequent use of the CIU (during the study itself) by students of educational administration (Experimental Group) provided further data which were used to evaluate the unit. Each student was asked to indicate his reaction to the unit upon a questionnaire (see Appendix G). This information and the information provided by the student recording
tape offered an individual record of reaction and performance.

Results of these activities and the evaluation of the CIU are presented and discussed in Chapter III.

Population, Sample, Groups, and Involvement

The general population of this study was defined as advanced students in educational administration. The sample selected from this population included part-time evening students from two advanced classes of educational administration and the resident students in the doctoral program in educational administration. The study design required measurement of attitude modification caused by the Computerized Instructional Unit and participation in the CIU experience meant time spent at the computer terminal site located on the Ohio State University campus. Since the majority of the evening students were employed at some distance from the campus and the resident students were generally available on campus, the sample was divided into two groups predicated upon availability to experience the CIU.

Since the sample was not divided randomly, attention was given to the determination of the similarity of the groups relative to several background factors, as well as attitude towards computer assisted instruction. Results of this comparison are provided in Chapter III.

For purposes of attitude measurement and ease of reference, the evening students were designated as the Control Group and the resident students as the Experimental Group. The former group contained 43 students while the latter contained 28. Five students qualified for both groups and were assigned to the Experimental Group.

Both groups were initially asked to complete the same Background Questionnaire (Appendix D) and the same pre-test version of the Attitude
Instrument (Appendix F). Seven days later each group completed the post-test version of the Attitude Instrument. The CIU experience and completion of the Post CIU Questionnaire (Appendix G) intervened during this time period for the Experimental Group. With these two exceptions the groups were treated identically by the researcher.

Formulation of Contentions

Each contention was stated so that attention would be directed toward a particular concern of the study. The contentions were investigated sequentially due to the developmental nature of the study and the interrelations between contentions. The first contention served as a guide to determine the acceptability of the CIU as a lesson in computer assisted instruction. The second contention allowed for determination of the suitability of the CIU experience for use in the preparation program for school administrators. The third contention directed attention upon the validation of the Attitude Instrument. Contention Four was the primary concern of the study, and focused on the effect of the CIU experience upon attitudes toward computer assisted instruction. A final interest was the determination of the relationship between attitude toward computer assisted instruction and several factors, particularly knowledge of computer applications in education.

Data Acquisition and Analysis

Data were acquired through the instruments developed for use in the study. Analysis of the data was dependent upon the particular contention under consideration. Data relative to Contention One were obtained through subjective evaluations of the CIU provided by computer trained personnel, professional educators, and members of the Experimental Group.
Empirical data were obtained through the use of the student recording tape. Relationship of these data to acceptability of the CIU as a CAI lesson was made possible through the establishment of certain criteria of acceptability. These criteria evolved from a consideration of the properties of CAI and involved the operational, instructional, and general effect of the CIU lesson. Further discussion of these criteria is provided in Chapter III.

Data relative to Contention Two were obtained from the professors and the members of the Experimental Group after each had completed the CIU. These data were analyzed collectively to determine the suitability of the CIU experience for use in programs of educational administration according to both teachers and students.

Contention Three data were acquired through the use of the Attitude Instrument with the student sample using a test-retest approach. Attitude towards CAI was measured through use of responses to two statement inventories within the Attitude Instrument (see Instrumentation section which follows). Analysis of these data was performed using the "t" test method.²

Three sources of data were available which provided the information related to Contention Four, i.e., attitude change. First, the post-test data provided by the Attitude Instrument statement inventories was related for each group to the pre-test scores using the "t" test method. Comparison of differences between these scores for each group provided data relative to the effect upon attitude of the CIU experience. A

²The formula used was 

\[ t = \sqrt{\frac{1}{N_1 + N_2 - 2} \left( \frac{N_1 - N_2}{\frac{1}{N_1} + \frac{1}{N_2}} \right) \left( N_1 + N_2 \right)} \]
further comparison was made utilizing the mean score differences be-
tween groups provided by the two administrations of the Attitude Instru-
ment (pre and post). In brief, attitude was measured using a pre-post
design wherein one group was exposed to the CIU experience while the
other group was not.

A second data source pertinent to Contention Four was provided by
the responses to the Post CIU Questionnaire by the Experimental Group.
Individual respondents indicated through direct expression the attitude
modification caused by the CIU experience. These responses were com-
pared to the difference in attitude revealed by the pre-post test
score on the measures within the Attitude Instrument.

A third source of information used to substantiate the effect of
the CIU experience upon attitude towards CAI were the responses made by
professors and the computer trained personnel to the Post CIU Question-
naire relative to the anticipated attitudinal effect of the CIU exper-
ience. These data were related to the findings of the two sources of
data mentioned previously.

Information pertinent to Contention Five was acquired through the
use of total sample responses to the Background Questionnaire as related
to direct expression of attitude towards CAI (Item \textsuperscript{47} - Attitude Instru-
mament). A chi square analysis\textsuperscript{3} was performed between the factor of atti-
tude towards CAI and the factors of knowledge about computer applications
in education, knowledge of instructional applications of computers, ad-
ministrative experience, and age.

\textsuperscript{3}The formula used was \[ \chi^2 = \frac{N (ad-bc)^2}{(a+b)(a+c)(b+d)(c+d)} \]
Instrumentation

Accomplishment of the purposes of this study necessitated the development of several instruments\(^1\). Of initial importance was the development of a means whereby an introductory experience in CAI could be provided to educational administrators. It was important that the means devised be acceptable as a lesson in computer assisted instruction. The Computerized Instructional Unit (CIU) was created as the means whereby the experience could be provided, and the Post CIU Questionnaire and the student recording tape the devices to measure the acceptability and suitability of the unit.

Measurement of the attitudinal effect of the CIU experience required the development of the Attitude Instrument. The Background Questionnaire was developed to serve as the device whereby the qualifications of persons involved in the study could be ascertained. With the exception of the Background Questionnaire, no identification was required from members of the sample. Each sample member was assigned a number for data analysis purposes but no members knew of this number.

An explanation of each of these instruments follows.

**Computerized Instructional Unit (CIU)**

The Computerized Instructional Unit had its genesis as a consequence of a need for a computer course which would demonstrate the capabilities of the COURSEWRITER III language\(^5\). The course "demo" was created by the

\(^1\)A copy of each instrument used in the study is provided in the Appendix.

\(^5\)Computer language designed by IBM.
researcher to satisfy this need. (The course "demo" later became the CIU). These requirements were established for the unit: (1) it needed to provide an opportunity for a person totally unfamiliar with computers to interact meaningfully with one in an instructional mode; (2) it needed to provide an explanation of some of the capabilities of the computer to assist instruction; and (3) its course content needed to be suitable for persons with diverse backgrounds.

The researcher included within the unit several performance activities to ascertain progressive understanding of the material being presented and posed two multiple choice questions at the conclusion of the unit to determine the learning that had occurred. The content of the CIU presents numerous capabilities of computer assisted instruction as well as some limitations of the medium. These capabilities were demonstrated through required user activity after which direct explanation was provided:

(1) the ease of interface between user and computer.
(2) computer response dependent upon user input.
(3) understanding required before response was possible.
(4) observation required before response was possible.
(5) input stored and recalled on an individual basis.
(6) course progression determined by input.
(7) course progression determined by user.
(8) required input accuracy can be varied.
(9) individual response times can be computed.
(10) the user can communicate with the author.
(11) input formats can be various.

These capabilities of CAI were directly explained:

(1) the availability of user responses to the author.
(2) control of peripheral devices by the computer is possible.

These limitations of CAI were discussed:

(1) scoring of essay responses not yet possible.
(2) human limitations are computer limitations.
The CIU was programmed by the researcher to operate on an IBM 360/40 computer which utilized #1050 terminals as input devices. Terminals were located at a remote distance from the computer itself. The COURSEWRITER III language was used in the tutorial mode. A complete copy of the Computerized Instructional Unit is provided in Appendix A.

Background Questionnaire

Slightly different forms were used for each separate population sample involved in this study. Common information sought included the amount of experience each respondent had in his particular specialty (student sample was asked to indicate administrative and teaching experience). The professors and student sample were asked to indicate knowledge about computer applications in education and their opinions relative to the responsibility of graduate institutions to provide instruction concerning computer applications in education.

Copies of the various background questionnaires are provided in Appendixes B, C, and G.

Post CIU Questionnaire

Several forms of this instrument were used for the different populations involved in the study. Each form requested: (1) evaluation of the CIU relative to its ability to present the basic capabilities of computer assisted instruction; (2) an indication of any mechanical difficulties encountered; (3) an expression of the effect the CIU had upon personal attitude towards computer assisted instruction; (4) an expression of the attitudinal effect anticipated for others; and (5) evaluation of the CIU relative to its suitability for inclusion within programs in educational administration. (This last request was not made of the computer trained personnel.)
Copies of the various forms of the Post CIU Questionnaire are provided in Appendixes D, E, and H.

**Attitude Instrument**

The semantic differential format (method of summed rating\(^6\)), served as the basic structure of the Attitude Instrument. Statements expressed in the literature which pertained to automated instruction and computer assisted instruction as well as statements constructed by the researcher and by Brown (35, appendix 3, 1968) were included on the instrument. Numerous statements were included to serve as distractors and were not used to measure attitude towards computer assisted instruction.

Fifteen statements were designated, *a priori*, as indicators of attitude towards computer assisted instruction. These statements were combined into the *a priori* inventory:

\(^6\)Responses to declarative sentences were permitted on a five point scale which ranged from Strongly Agree to Strongly Disagree.
A PRIORI STATEMENT INVENTORY

<table>
<thead>
<tr>
<th>STATEMENTS</th>
<th>RESPONSE CATEGORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>5a. Computer assisted instruction (CAI) challenges the student to do his best.</td>
<td>SA A U D SD</td>
</tr>
<tr>
<td>6. Teaching machines may tend to force attention toward the machine and away from the student.</td>
<td></td>
</tr>
<tr>
<td>8a. Computer assisted instruction is an impersonal teaching approach.</td>
<td></td>
</tr>
<tr>
<td>10a. Use of teaching machines causes students to feel isolated.</td>
<td></td>
</tr>
<tr>
<td>13a. Teaching machines can individualize instruction more effectively than other methods.</td>
<td></td>
</tr>
<tr>
<td>15. The use of teaching machines is alien to good teaching.</td>
<td></td>
</tr>
<tr>
<td>18. Teaching machines can insure individualized instruction.</td>
<td></td>
</tr>
<tr>
<td>21. Material presented by means of the computer is little more than programmed instruction.</td>
<td></td>
</tr>
<tr>
<td>24a. Computer assisted instruction will improve instructional programs.</td>
<td></td>
</tr>
<tr>
<td>25a. I am uneasy about the use of computers for teaching youth.</td>
<td></td>
</tr>
<tr>
<td>28a. Teaching machines are an inflexible medium.</td>
<td></td>
</tr>
<tr>
<td>30a. Most elementary students would be adversely affected by computerized teaching.</td>
<td></td>
</tr>
<tr>
<td>36. Most secondary students will be adversely affected by computerized teaching.</td>
<td></td>
</tr>
<tr>
<td>37. Computer assisted instruction MUST be understood by every school administrator.</td>
<td></td>
</tr>
<tr>
<td>39. Teaching by machine will tend to dehumanize the curriculum.</td>
<td></td>
</tr>
</tbody>
</table>

*included on both statement inventories.*

SA     Strongly Agree
A      Agree
U      Undecided
D      Disagree
SD     Strongly Disagree
For scoring purposes, values were assigned to each statement according to its favorableness towards automated instruction. Statements 5, 13, 18, 24, and 37 (previous page) were considered favorable and were assigned five points for the Strongly Agree response and one point for the Strongly Disagree response. Agreement with statements 6, 8, 10, 15, 21, 25, 30, 36, and 39 (previous page) was considered to indicate an unfavorable disposition towards CAI. Therefore, these statements were assigned one point for the Strongly Agree response and five points for the Strongly Disagree. This procedure permitted the scores above the median (of 3) to represent favorableness of attitude towards computer assisted instruction.

Several statements were included on the Attitude Instrument which were intended to reveal the presence of apprehension towards computers. These statements were:

1. I am apprehensive about using the computer for EDP (Item 2)
2. I am uneasy about the use of computers for teaching youth (Item 25)
3. I would feel more relaxed taking a course by conventional instruction than by computer assisted instruction (Item 34)
4. Most school administrators are apprehensive about the use of computers for any educational purpose (Item 42)

These four statements were assigned point values in the same manner as previously discussed. In this instance, the greater the apprehension, the higher the resultant score.

The remaining statements on the Attitude Instrument served primarily as distractors to the expression of attitude towards CAI with the exception of Item 47. This item was included to permit a direct expression of attitude towards CAI. A continuum response line presented with this
item was later segmented into six mathematically equal parts and values were assigned ranging from six (Very Favorable) to one (Very Unfavorable). The use of the direct expression procedure was predicated upon the research findings of Holland and Lutz who have concluded:

> If the present study and its predecessors are persuasive than we could abandon the routine use of interest inventories . . . and rely on what students tell us (12, p.14).

It was assumed that reliance upon direct expression would apply to attitude as well as to interest. Item 47 served as the criterion against which the results obtained by the statement inventories within the Attitude Instrument were validated. This same assumption was made relative to the relationship between apprehension expressed on the Attitude Instrument and that indicated on Item 13, part a, of the Post CIU Questionnaire.

A second statement inventory was compiled by using the results obtained from the student sample after four administrations of the Attitude Instrument. Statements were included in this second inventory only if they correlated significantly with direct expression of attitude towards CAI (Item 47) on at least three administrations of the instrument. These statements were designated as the "empirically derived inventory".
EMPIRICALLY DERIVED STATEMENT INVENTORY

STATEMENT RESPONSE CATEGORIES

5a. Computer assisted instruction (CAI) challenges the student to do his best.
8a. Computer assisted instruction is an impersonal teaching approach.
9. I am very interested in learning about computer assisted instruction.
10a. Use of teaching machines causes students to feel isolated.
13a. Teaching machines can individualize instruction more effectively than other methods.
14. Use of the computer for data processing activities is more important than use of the computer for instruction.
23. I would prefer to take a course by computer rather than by conventional instruction.
24a. Computer assisted instruction will improve instructional programs.
25a. I am uneasy about the use of computers for teaching youth.
28a. Teaching machines are an inflexible medium.
30a. Most elementary students would be adversely affected by computerized instruction.
33. I would prefer to take a course by conventional instruction rather than by computer assisted instruction.
39a. Teaching by machine will tend to dehumanize the curriculum.

SITUATIONAL

43. If money were available, how would you rank computer assisted instruction on a school system’s list of priorities?
   High __________ Medium __________ Low __________ Not at all __________

44. If you were offered a position to coordinate and administer the development and application of CAI, how would you react?
   I would accept immediately. ______________________
   I think I would accept. ______________________
   I think I would decline the offer. ______________________
   I would refuse immediately. ______________________

*a included on both statement inventories*
Both inventory scores were correlated with each other and separately with Item 47 to determine the relationship between directly expressed attitude towards computer assisted instruction and the statements pertaining to attitude within the Attitude Instrument. In this manner, the validity of the Attitude Instrument was determined.

Since the Attitude Instrument was to serve as both the pre- and post- test of attitudes towards computer assisted instruction two changes were made in the pre-test version to create the post-test version. A statement was included immediately preceding the first item which directed:

Please forego any attempt to remember how you responded previously. It is important that you indicate how you feel now.\(^7\)

A second modification to the pre-test version was the inclusion of four questions (items 48-51 inclusive) which were to provide information concerning the nature and degree of other experiences which had occurred relative to CAI during the study.

A copy of the Attitude Instrument, indicating the differences between the pre- and post-test versions, is provided in Appendix F.

Summary

This chapter has presented an explanation of the procedures followed and a description of the instruments developed for use in the study. The next chapter presents discussion of the data acquired, analyzes these data relative to each concern of the study, and states the conclusions reached relative to each study contention.

\(^7\)Appendix F
CHAPTER III

In this chapter a discussion is presented of the data acquired relative to the similarity between the groups compared in this study. Following this, there is a discussion of each study contention stated in Chapter I, the data acquired relative thereto, and the conclusions reached.

Group Similarity

Discussion

As explained in Chapter II, the study sample was selected from the general population of school administrators enrolled in advanced administration courses at The Ohio State University. The sample was divided into two groups according to the anticipated availability of the members of each group to take the Computerized Instructional Unit. Since division was not done randomly, it was deemed necessary to ascertain the initial similarity between groups pertinent to selected background factors and attitude towards computer assisted instruction.

Background Similarity

Data provided by the Background Questionnaire (see Appendixes D and E) permitted comparison of the groups on several background factors.

Four factors were compared. The mean years of administrative experience was found to be 4.892 for the Experimental Group and 3.348 for the Control Group. Results of a "t" test analysis indicated a
score of 1.437 when mean scores were compared. Significance with this size sample at the .05 level required a score of 2.01 or higher. The mean age of the Experimental Group was found to be 35.785 while the Control Group mean age was 34.790. A "t" test result of .5673 was revealed between groups which is non-significant at the .05 level.

Expressed knowledge of computer applications in education was obtained using a five point scale representing nine types of computer applications in education (see Item 10, Background Questionnaire). Mean score for the Experimental Group for the nine items was 11.370 while for the Control Group the mean score was 9.317 (45 total possible). Results of a "t" test comparison between groups revealed a relationship of .8302 which was not significant at the .05 level. Using only the two applications (of the nine) which related to instructional applications of computers, i.e., direct instruction and simulation, a "t" test score of -.2178 was obtained which also was not significant.

Ninety-six percent of the Experimental Group and seventy-one percent of the Control Group held Master's Degrees. Thirty-nine percent of the Experimental Group and twenty-six percent of the Control Group indicated they had taken some initiative in learning about computer assisted instruction. There was no significant difference found at the .05 level for any of the factors wherein the "t" test method was used¹.

¹Statistical significance at the .05 level required a "t" score of 2.01 with this size sample.
Percentages did not appear significantly different. The Experimental Group was found to be slightly older, to have more years of administrative experience, to hold more Master's Degrees, and to have taken more initiative in learning about computer applications in education while the Control Group expressed more knowledge about the instructional applications of computers. None of these differences were at significant levels. These findings suggested that the two groups were similar on the background factors measured.

**Attitude Similarity**

The second dimension of similarity deemed important in this study was the attitude of each group towards computer assisted instruction. The pre-test version of the Attitude Instrument (Appendix F) was administered to both groups and the results were compared using the "t" test method. Significant differences occurred on seven individual statements of the summated rating\(^2\) portion of the instrument. These data indicated that the Experimental Group felt:

1. more strongly that opportunities for computer use should be available during preparation programs in educational administration (Item 4).
2. more optimistic about the results of innovations. (Item 17).
3. less convinced that computer use should be free for educators (Item 32).
4. less apprehensive about the use of computerized instruction (Item 25).
5. less concerned that computerized instruction would adversely affect elementary students (Item 30).
6. less concerned that computerized instruction would dehumanize the curriculum (Item 39).

\(^2\)A method whereby response to statements is permitted on a five point scale ranging from Strongly Agree to Strongly Disagree.
(7) less concerned that computerized instruction could effectively replace teachers (Item 40). 

Of these seven statements, four were not considered indicators of attitude towards CAI (Items 4, 17, 32, and 40) while three were included on both attitude statement inventories (Items 25, 30, and 39). There were no significant differences noted on the other nine statements which appeared on both inventories.

The difference between means on each statement inventory and for Item 47 were also computed and compared for the two groups. The means and differences between groups are shown below.

<table>
<thead>
<tr>
<th></th>
<th>MEAN SCORES</th>
<th>DIFFERENCE IN MEAN</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Experimental</td>
<td>Control</td>
<td></td>
</tr>
<tr>
<td>A priori</td>
<td>54.538</td>
<td>50.535</td>
<td>4.003</td>
</tr>
<tr>
<td>Empirical</td>
<td>52.192</td>
<td>50.595</td>
<td>1.597</td>
</tr>
<tr>
<td>Item 47</td>
<td>4.888</td>
<td>4.142</td>
<td>.746</td>
</tr>
</tbody>
</table>

The "t" test analysis indicated there were no statistically significant differences between groups on either of the statement inventories while one item (47) showed significant difference.

Conclusions relative to group similarity

There were no statistically significant differences noted between the groups on the background factors compared nor on the statement inventories which measured attitude towards computer assisted instruction,

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3Appendix F
4Discussed in Chapter II
5Statements included on each inventory are so indicated in Appendix F.
although there were several individual item attitudinal differences revealed by the Attitude Instrument, the groups were considered comparable for purposes of this study.

**Intervening Variables**

Attention was given to the degree to which other exposure to computer application experiences may have intervened between the pre- and post-tests. Items 48-51 on the Attitude Instrument, post-test version, provided an indication of the exposure of the sample. Paraphrased, these questions were asked: Have you discussed computer applications, read about computer applications, or read about or discussed computer assisted instruction. Response was permitted so as to indicate whether the exposure was considerable or slight. Results indicated that fifty percent of the Experimental Group and sixteen percent of the Control Group had discussed computer applications, fourteen percent of the Experimental Group and eleven percent of the Control Group had read about computer applications, and thirty-two percent of the Experimental Group had read or discussed computer assisted instruction while fourteen percent of the Control Group had done so. No members of the Control Group had participated in a CAI experience while all Experimental Group members had (CIU). Three members of the total sample, two from the Experimental Group and one from the Control Group, indicated that their reading exposure to computer applications had been considerable, while the remaining sixty-eight sample subjects either had no exposure or the exposure was considered slight.

The nature and degree of exposure for both groups was judged to be insufficient to influence seriously the results of the study.
No mechanical malfunctions were observed or reported during the use of the CIU by the members of the Experimental Group.

**Contents**

The study contentions served as focal points for data collection. The contentions are presented and discussed in chronological order as each had relevance to a developmental stage of the study. The first contention concerns the assessment of the Computerized Instructional Unit (CIU) relative to its acceptability as a lesson in computer assisted instruction. The second contention directs attention upon the acceptability of the experience provided by the CIU for preparation programs in educational administration. The third contention provides a focus upon validation of the Attitude Instrument used in the study. The fourth contention, in essence the major contention, relates to the attitudinal effect of the CIU experience. The final contention considers the relationship between several background factors and attitude towards computer assisted instruction.

Each contention is discussed and its ramifications examined, the pertinent data obtained are presented and interpreted, and conclusions are reached for each contention.

**Contetion One:** The Computerized Instructional Unit (CIU) provides an acceptable computer assisted instruction (CAI) experience.

**Discussion**

Of initial concern to the researcher was the determination of the acceptability of the computerized instructional unit as the means whereby a CAI experience could be provided. It was felt imperative
that data be acquired relative to computer assisted instruction
through an experience which incorporated a valid CAI lesson. To
assess the CIU it was felt necessary to develop some guidelines
against which it could be measured. The nature of computer assisted
instruction suggested several important considerations.

Computer assisted instruction, as the name implies, is essent-
tially a method whereby an individual is assisted in his learning
through the medium of the computer. The computer serves as the inter-
mediary between the student and the content which is to be learned.
To facilitate this relationship, the computer must be directed (pro-
grammed) to respond appropriately to input from the student. Only
when proper computer programming is provided can this one-to-one
(tutorial) relationship between the student and the course materials
be accomplished.

Directions to the student regarding how he enters his input also
play a part in the proper operation of this medium. This was of parti-
cular importance in the present study, since the student was learning
the capabilities of CAI through the medium of CAI. This required
numerous performance activities by the student as he reacted to instruc-
tions within the course itself. Failure to provide adequate directions
to the student might result in a denial of the one-to-one relationship.
This property of computer assisted instruction can be thought of as the
operational dimension and requires that there be assessment of any CAI
lesson relative to the degree to which this one-to-one relationship is
established and maintained.

Another important consideration in computer assisted instruction is
the adequacy of the course design itself. The course must be so designed
so that individual frames realize their individual objectives, and so that appropriate feedback is provided for each student input. Failure to provide for appropriate feedback can result in the denial of individual frame objectives, the one-to-one relationship, and if serious enough, of the primary objective of the entire lesson. This property of CAI can be thought of as the instructional dimension.

Although these two dimensions may be considered separately for research purposes, in reality they operate concurrently to provide a total effect. Measurement of the total effect of a lesson can focus upon the degree to which the primary objective of the lesson is realized, and upon the receptivity of each participant to the experience.

The dimensions of computer assisted instruction discussed suggest that attention be directed toward the operational and instructional components of a CAI lesson as well as upon their combined effect. Specifically in this study, the operational dimension was measured according to the degree to which the CIU provided a one-to-one relationship. The instructional dimension was measured through an analysis of individual frames within the CIU. The effect of the CIU experience upon attitude towards CAI was measured using the reactions of participants in the experience.

Data Acquisition and Analysis

Prior to the formal evaluation of the CIU it was used by numerous visitors, staff, and computer specialists who visited the computer installations at the College of Medicine, The Ohio State University. During this use of the CIU, the researcher was able to identify and modify several frames based upon suggestions and performance records.
Informal reaction to the unit indicated that the computerized instructional unit provided adequately for the operational and instructional contingencies while providing a favorable total experience.

Formal evaluation began with the involvement of computer trained personnel, professors of educational administration, and students of educational administration (the Experimental Group). Data were obtained through the reactions of all three groups to a Post CIU Questionnaire (see Appendixes B, C, G), the automatic recording of student responses, and direct observation by the researcher.

**Operational Acceptability**

Responses to the questions posed in the Post CIU Questionnaire pertinent to the operational dimension of the CIU for all three groups are shown below:

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you experience any mechanical malfunctions?</td>
<td>2</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Were any directions or explanations in the instructional unit not clear(^b)?</td>
<td>6</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\)Post CIU Questionnaire  
\(^b\)Not asked of professors

These data indicate that mechanical malfunctions occurred for two of the forty-one respondents while directions and explanation within the CIU were clear for all but six respondents.

Since the researcher was present as each member of the Experimental Group interacted with the CIU, he was able to observe if any specific
operational difficulties occurred. In one section of the CIU there was a denial of the one-to-one relationship. Frame "begin-5-7" asked, "Can you EOF"? Seven of the members of the Experimental Group answered, 'yes'. Immediately thereafter the course directs: "Perform one now please." None of the seven could comply. At this point it was necessary for the researcher to intervene so that these seven people could continue. This development may be attributed to an inadequacy in directions, misunderstanding by the students, or intentional erroneous input. In the first two instances, the directions to the students or programming of the computer would be solely at fault, while in the latter instance students could be somewhat to blame. Responses to Item 5 of the Post CIU Questionnaire (see Appendix G) revealed that fifteen students knowingly entered incorrect responses. Such responses may have occurred at frame "begin-5-7" and resulted in the breakdown in relationship between the student and the computer course. In any event, the CIU must be considered somewhat operationally inadequate since no provisions were made for this eventuality.

**Instructional Acceptability**

Since the CIU was designed as a lesson through which the capabilities of computer assisted instruction were to be taught, each individual input was considered a response to an instructional frame. Separate frame analysis was made possible through the availability of initial responses recorded automatically on the student recording tape. These

---

6. The reader will find it beneficial to follow this discussion by using the copy of the CIU provided in Appendix A.

7. Due to unexpected technical difficulties, subsequent responses were not available.
data were collected and categorized for purposes of the study. Three categories were established: "correct", "incorrect", and "accommodated". Responses were assigned to the first two categories when they were anticipated and for which specific appropriate feedback was provided. Responses were assigned to the "accommodated" category if they were not anticipated and a general coaching feedback was provided. Table 3 below presents the data provided by the student recording tape when related to the three categories.

Table 3: Experimental Group Initial Responses to each Frame of the Computerized Instructional Unit

<table>
<thead>
<tr>
<th>FRAME Label-Problem-Line-Topic</th>
<th>RESPONSE CATEGORY</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>begin-1-7-EOB</td>
<td>28 0 0</td>
<td>28</td>
</tr>
<tr>
<td>begin-2-4-COLOR</td>
<td>21 4 3</td>
<td>28</td>
</tr>
<tr>
<td>begin-3-1-NAME</td>
<td>24 3 1</td>
<td>28</td>
</tr>
<tr>
<td>begin-4-2-COURSE NAME</td>
<td>21 0 7</td>
<td>28</td>
</tr>
<tr>
<td>begin-5-7-EOB</td>
<td>18 0 3</td>
<td>21a</td>
</tr>
<tr>
<td>begin-10-0-CONTINUE</td>
<td>28 0 0</td>
<td>28</td>
</tr>
<tr>
<td>go-1-1-PRESIDENT</td>
<td>23 0 5</td>
<td>28</td>
</tr>
<tr>
<td>go-2-0-CITY</td>
<td>7 21 0</td>
<td>28</td>
</tr>
<tr>
<td>go-3-5-RESPONSIBILITY</td>
<td>5 17 6</td>
<td>28</td>
</tr>
<tr>
<td>go-5-9-HELP</td>
<td>21 4 3</td>
<td>28</td>
</tr>
<tr>
<td>go-6-1-CONTINUE</td>
<td>26 2 0</td>
<td>28</td>
</tr>
<tr>
<td>Man-1-28-ENJOY</td>
<td>28 0 0</td>
<td>28</td>
</tr>
<tr>
<td>Hurry-1-0-DEMO</td>
<td>3 7 18</td>
<td>28</td>
</tr>
<tr>
<td>Half-1-4-FORMATS</td>
<td>16 10 2</td>
<td>28</td>
</tr>
<tr>
<td>Half-2-0-MORE</td>
<td>28 0 0</td>
<td>28</td>
</tr>
<tr>
<td>Total-1-10-REVIEW</td>
<td>23 0 5</td>
<td>28</td>
</tr>
<tr>
<td>Tired-1-0-COMMENT</td>
<td>28 0 0</td>
<td>28</td>
</tr>
<tr>
<td>Tired-2-0-SIGN OFF</td>
<td>22 6 0</td>
<td>28</td>
</tr>
</tbody>
</table>

*a seven members of the Experimental Group were unable independently to enter a response.*
Since the student recording tape provided only initial responses it was not possible to trace subsequent progression after an "incorrect" or "accommodated" response was received. This difficulty was overcome somewhat since the researcher observed each participant as responses were made. It was observed that subsequent responses tended to accumulate increasingly in the "correct" category after feedback was provided.

The "correct" responses to each frame indicate that the individual frame objectives were generally met. In three instances sufficient errors occurred to warrant attention. At frame "go-2-0" the students were asked to respond to this question:

"What is the name of the city where the Washington Monument is located?"

A response was categorized as "incorrect" if the designation "D.C." was included. Each of the 21 "Incorrect" responses had included it.

Seventeen "incorrect" responses were initially prompted by frame "go-3-5" in response to a question which sought a decision concerning to whom responsibility for an error in the previous feedback could be attributed. It was judged that these responses indicated that the content of the instructional frame was not sufficiently clear.

The ten "incorrect" responses at frame "half-1-1*" were not unexpected since this frame required identification of the types of question formats demonstrated in the previous course material. This frame served as a culminating test of content understanding. It was observed that subsequent responses tended to accumulate in the "correct" category after feedback was received.

The pattern of responses elicited by frame "hurry-1-0" presented
an unusual picture. Frame "hurry-1-0" posed this multiple choice question:

Utilizing only your experience thus far with the computer program, please type the letter of EACH statement below which is true.

The computer can be programmed to . . .
(a) explain words or terms.
(b) understand all the world's languages.
(c) recall and print what the student has typed.
(d) respond using the student's name.
(e) keep a time record.
(f) correct errors made by the author.
(g) be used only by highly trained personnel.
(h) allow for user errors.
(i) cause learning to occur.
(j) give immediate feedback.

A "correct" response required seven specific letters be entered in alphabetical order. This only occurred on three initial occasions. A response was placed in the "incorrect" category when seven letters were entered in alphabetical order but wherein one or more letters were incorrect. The "accommodated" category included input which was not seven letters in length and/or were not in alphabetical order. The degree of difficulty encountered by students at this frame suggested that there was perhaps some confusion and difficulty engendered by the response format itself.

At the other frames where the "accommodated" category was used, the student responses generally contained typing errors and hence were not considered a reflection upon course content. Data provided by participant responses to Item 5 of the Post CIU Questionnaire suggested a further explanation for several of the "incorrect" and "accommodated" responses. Item 5 asks:

Did you enter any responses you knew were wrong?
Fifteen of the twenty-eight respondents revealed that they had done so. With the exception of frames "hurry-1-0" and "go-3-5" the responses to the CIU appeared to be within acceptable limits. This would indicate that the instructional intent of the majority of the frames was realized.

Experience Acceptability

The primary objective of the CIU was to provide cognitive understanding of some of the capabilities of CAI. The CIU was structured so that this objective could be attained through actual individual participation in a CAI experience. Measurement of the degree of realization of this objective was accomplished in several ways. First, each participant responded to this item (No. 6) on the Post CIU Questionnaire.

The primary objective of this unit was to teach some of the basic capabilities of computer assisted instruction. What letter grade would you assign the unit in meeting this objective?

Combined results obtained from computer trained personnel, professors, and members of the Experimental Group showed an average letter grade of B+ with a range from A to D (see Appendixes B, C, and G). The computer personnel and the members of the Experimental Group were also asked to indicate the numerical score they would assign the CIU. A mean score of 8.62 (of a possible 10) resulted.

Second, provisions were made within the CIU itself to test understanding through performance, direct questions pertaining to content, and a direct question concerning general reaction to the CIU experience. Responses to the frames (see Table 3) which necessitated student performance activities (frames "begin-1-7", "begin-2-4", "begin-5-7", "go-5-9", "half-2-0", "total-1-20", "tired-1-0", and "tired-2-0") revealed that a majority of respondents understood well enough to demonstrate their understanding. Responses to the direct questions of
content, presented at frames "hurry-1-0" and "half-1-4", further indicated that learning had occurred. In response to the direct question concerning general reaction to the total experience: "Did you enjoy this experience?" (frame "man-1-28"), all respondents replied affirmatively. A further indication of the general acceptability of the CIU can be inferred by the responses to frames "begin-10-1" and "go-6-1" where students were offered the opportunity to discontinue the lesson. Only at the second opportunity did two of the 26 participants so indicate.

A further indication of the acceptability of the CIU experience was ascertained through Item 13 of the Post CIU Questionnaire which is reproduced below including the responses obtained:

ITEM 13

Please circle the appropriate letter(s) to indicate your feeling relative to the instructional unit. Use this scale:

SA If you strongly agree with the statement.
A If you tend to agree with the statement.
U If you are undecided.
D If you tend to disagree with the statement.
SD If you strongly disagree with the statement.

RESPONSES

<table>
<thead>
<tr>
<th>a. My participation in the instructional unit has made me less apprehensive towards computers.</th>
<th>6 15 0 4 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. I now more fully understand the operational capabilities of computer assisted instruction.</td>
<td>11 12 1 3 1</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>c. I am interested in learning more about computer assisted instruction.</td>
<td>17 19 1 1 0</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>d. I feel this experience was beneficial.</td>
<td>19 9 0 0 0</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>e. I felt frustrated by this experience.</td>
<td>0 4 0 6 18</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>f. I was very pleased with this experience.</td>
<td>16 10 0 2 0</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>g. I would like to take more courses taught by computerized instruction.</td>
<td>9 13 4 1 1</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>h. I was disappointed with this experience.</td>
<td>0 1 0 8 19</td>
</tr>
</tbody>
</table>
As shown, the majority of participants expressed satisfaction with the experience (parts a, f, and h); indicated that they had learned as a result of the experience (parts b and d); and expressed a continuing interest in computer assisted instruction (parts c and g).

The data relative to experience acceptability indicate that the experience provided by the CIU was both beneficial and pleasant.

Conclusion - Contention One

As a lesson which used the medium of computer assisted instruction, the CIU was found to have one operational weakness (frame "begin-5-7") and 17 satisfactory frames. Two content weaknesses were uncovered (frames "hurry-1-0", and "go-3-5") while 16 frames were acceptable. With the exception of frame "begin-5-7" the CIU elicited responses which were provided for by the unit. As the means whereby an experience in CAI was provided, the CIU was found to meet its primary objective in an acceptable manner. The weaknesses noted were judged not to have had a significant effect upon total reaction to the experience. Therefore, the CIU can be accepted as a lesson using computer assisted instruction.

Contention Two: The CIU experience is acceptable for programs in Educational Administration.

Discussion

As indicated in Chapter I, observers generally concur that a need exists to familiarize school administrators with the educational application of computers. There is almost general agreement expressed that educational administrators have not been adequately exposed to CAI and consequently are not sufficiently knowledgeable about the instructional
potential of the computer.

Contension Two allows attention to be directed upon the CIU as the means whereby both cognitive understanding and actual experience in computer assisted instruction can be provided to school administrators.

Data Acquisition and Analysis

Data pertinent to this contention were acquired in this manner. Prior to use of the CIU by the Experimental Group, three experienced and practicing professors of educational administration and two members of the staff of the University Council of Educational Administration were asked to take the CIU. Following this experience each was asked:

How suitable is this unit for inclusion within preparation programs in Educational Administration?  

A continuum answering device was provided which permitted response to range from "Very Suitable" to "Unsuitable". This continuum was later segmented mathematically and values were assigned from six (Very Suitable) to one (Unsuitable). The mean score which resulted was 5.4.

These participants were also asked:

If this unit were available would you encourage students to use it?

All five respondents replied affirmatively.

The Experimental Group members were also asked, after completing the CIU:

How suitable is this unit for use within preparation programs in Educational Administration?

---

8 Appendix C, Item 5
9 Loc. cit. Item 7
10 Appendix G, Item 8
The same continuum answering device and method of scoring explained previously were used. Mean score obtained from this group was 5.0 (possible 6). This group also responded to this question:

Would you encourage other students to use this unit?\(^{11}\)

Twenty-six of the twenty-eight respondents replied affirmatively. Previously presented were the results obtained from Item 13 of the Post CIU Questionnaire which indicated that the CIU experience was beneficial and pleasant.

**Conclusion - Contention Two**

Professors and students of educational administration who participated in the CIU experience concurred that the experience provided cognitive understanding, was enjoyable, and was generally effective in relieving apprehension while creating a more favorable opinion of CAI. These data affirm the contention that this Computerized Instructional Unit provides an acceptable experience for use in programs of educational administration.

**Contestation Three:** The Attitude Instrument Provides a Valid Measure of Attitude Towards Computer Assisted Instruction

**Discussion**

Although the literature describes several attitude instruments,

\(^{11}\)Loc. cit. Item 9
none were found which were designed to ascertain attitudes towards com-
puter assisted instruction from those who were generally unfamiliar
with the medium while having relevance to the role of the school admini-
strator. Most instruments assumed either recent exposure to the
medium or some knowledge of computer capabilities and did not address
themselves to the kinds of considerations required of the school admini-
strator who would determine the utilization of the computer as an in-
structional medium. The Attitude Instrument developed for use in this
study included statements which had particular relevance to the school
administrator's role and recognized the lack of knowledge about computer
assisted instruction which was presumed to exist.

As discussed previously (Chapter II) several statements were de-
signated, a priori, as reflectors of attitude towards CAI. These state-
ments were presented in a format which provided a response designation
ranging from Strongly Agree to Strongly Disagree.\footnote{Method of summed rating (10, p.149-171).} Declarative state-
ments were used since it was felt that direct commitment to beliefs
would be obtained more easily in this way. The statements included in
the a priori inventory are shown in Table 4.
TABLE 4
A PRIORI STATEMENT INVENTORY

<table>
<thead>
<tr>
<th>Statement</th>
<th>RESPONSE CATEGORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer assisted instruction (CAI) challenges the student to do his best.</td>
<td>SA A U D SD</td>
</tr>
<tr>
<td>Teaching machines may tend to force attention toward the machine and away from the content.</td>
<td></td>
</tr>
<tr>
<td>Computer assisted instruction is an impersonal teaching approach.</td>
<td></td>
</tr>
<tr>
<td>Use of teaching machines causes students to feel isolated.</td>
<td></td>
</tr>
<tr>
<td>Teaching machines can individualize instruction more effectively than other methods.</td>
<td></td>
</tr>
<tr>
<td>The use of teaching machines is alien to good teaching.</td>
<td></td>
</tr>
<tr>
<td>Teaching machines can insure individualized instruction.</td>
<td></td>
</tr>
<tr>
<td>Material presented by means of the computer is little more than programmed instruction.</td>
<td></td>
</tr>
<tr>
<td>Computer assisted instruction will improve instructional programs.</td>
<td></td>
</tr>
<tr>
<td>I am uneasy about the use of computers for teaching youth.</td>
<td></td>
</tr>
<tr>
<td>Teaching machines are an inflexible medium.</td>
<td></td>
</tr>
<tr>
<td>Most elementary students would be adversely affected by computerized instruction.</td>
<td></td>
</tr>
<tr>
<td>Most secondary students will be adversely affected by computerized teaching.</td>
<td></td>
</tr>
<tr>
<td>Computer assisted instruction MUST be understood by every school administrator.</td>
<td></td>
</tr>
<tr>
<td>Teaching by machine will tend to dehumanize the curriculum.</td>
<td></td>
</tr>
</tbody>
</table>

* Included on both statement inventories.

SA Strongly Agree
A Agree
U Undecided
D Disagree
SD Strongly Disagree
A second statement inventory was organized which included those statements which correlated (.50) with directly expressed attitude towards CAI (Item 47) on at least three of the four times responses were obtained. The .50 level was used since for a sample of the size used in this study, a correlation of .50 is significant at the .05 level and further, a correlation of .05 or higher indicates that each independent variable has at least a 25 percent overlap with the dependent variable. Statements meeting these requirements became the empirically derived statement inventory shown below.
TABLE 5

EMPIRICALLY DERIVED STATEMENT INVENTORY

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>RESPONSE CATEGORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>5a. Computer assisted instruction (CAI)</td>
<td>SA  A  U  D  SD</td>
</tr>
<tr>
<td>challenges the student to do his best.</td>
<td></td>
</tr>
<tr>
<td>8a. Computer assisted instruction is an impersonal teaching approach.</td>
<td></td>
</tr>
<tr>
<td>9. I am very interested in learning about computer assisted instruction.</td>
<td></td>
</tr>
<tr>
<td>10a. Use of teaching machines causes students to feel isolated.</td>
<td></td>
</tr>
<tr>
<td>13a. Teaching machines can individualize instruction more effectively than other methods.</td>
<td></td>
</tr>
<tr>
<td>14. Use of the computer for data processing activities is more important than use of the computer for instruction.</td>
<td></td>
</tr>
<tr>
<td>23. I would prefer to take a course by computer rather than by conventional instruction.</td>
<td></td>
</tr>
<tr>
<td>24a. Computer assisted instruction will improve instructional programs.</td>
<td></td>
</tr>
<tr>
<td>25a. I am uneasy about the use of computers for teaching youth.</td>
<td></td>
</tr>
<tr>
<td>28a. Teaching machines are an inflexible medium.</td>
<td></td>
</tr>
<tr>
<td>30a. Most elementary students would be adversely affected by computerized instruction.</td>
<td></td>
</tr>
<tr>
<td>33. I would prefer to take a course by conventional instruction rather than by computer assisted instruction.</td>
<td></td>
</tr>
<tr>
<td>39a. Teaching by machine will tend to dehumanize the curriculum.</td>
<td></td>
</tr>
<tr>
<td>43. If money were available, how would you rank computer assisted instruction on a school system's list of priorities?</td>
<td></td>
</tr>
<tr>
<td>High _____ Medium _____ Low _____ Not at all _____</td>
<td></td>
</tr>
<tr>
<td>44. If you were offered a position to coordinate and administer the development and application of CAI, how would you react?</td>
<td></td>
</tr>
<tr>
<td>I would accept immediately___________</td>
<td></td>
</tr>
<tr>
<td>I think I would accept____________________</td>
<td></td>
</tr>
<tr>
<td>I think I would decline the offer_________________</td>
<td></td>
</tr>
<tr>
<td>I would refuse immediately_________________</td>
<td></td>
</tr>
</tbody>
</table>

aIncluded on both statement inventories.
Two situational questions met these requirements although neither was felt, a priori, to reflect directly upon attitude towards computer assisted instruction but were included so as to relate "real" administrative contingencies to CAI developments. The two questions were:

If money were available, how would you rank computer assisted instruction on a school system's list of priorities? (Item 1 + 3).

If you were offered a position to coordinate and administer the development and application of CAI, how would you react? (Item 1 + 1 + ).

Two other "situational" questions (Items 45, 46) were not related significantly to attitude towards CAI.

As discussed in Chapter II, it was assumed that response to a direct question concerning attitude would provide a valid indication of individual attitudes (12). Item 47 on the Attitude Instrument asks the respondent to indicate his attitude towards computer assisted instruction upon a continuum ranging from Very Favorable to Unfavorable. This continuum was segmented mathematically into six equal parts and values were assigned from six (Very Favorable) to one (Unfavorable). The score thus obtained was used as the criterion against which the a priori and empirically derived statement inventories were validated.

Data Acquisition and Analysis

The validity of the Attitude Instrument statement inventories was determined through correlation of each inventory with directly expressed attitude towards computer assisted instruction (Item 47). The correlations thus derived are shown in Table 6.
Table 6: Correlation Coefficients of Attitude Measures

Correlation between Attitude Statement Inventories and Directly Expressed Attitude* Towards Computer Assisted Instruction

<table>
<thead>
<tr>
<th>Statement Inventory</th>
<th>Test Administration</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-</td>
<td>Post-</td>
</tr>
<tr>
<td>a priori inventory</td>
<td>.769</td>
<td>.804</td>
</tr>
<tr>
<td></td>
<td>.616</td>
<td>.763</td>
</tr>
<tr>
<td>Empirically derived</td>
<td>.842</td>
<td>.818</td>
</tr>
<tr>
<td></td>
<td>.592</td>
<td>.799</td>
</tr>
</tbody>
</table>

Correlation between a priori inventory and empirically derived inventory

|                           | .912                | .936       | Experimental |
|                           | .952                | .945       | Control      |

*Item 47 on the Attitude Instrument
For the Experimental Group correlations between Item 47 and the a priori inventory were .769 and .804 on the pre- and post-administrations of the Attitude Instrument respectively. Thus the average correlation for the Experimental Group between these two measures was .7865. The correlation for the Control Group was .616 and .763 on the pre- and post-test versions respectively for an average correlation between the directly expressed attitude towards CAI (Item 47) and the a priori statement inventory of .6895. The combined correlation averages for both groups on all four administrations of the Attitude Instrument was .738 between these two factors.

For the Experimental Group correlations between Item 47 and the empirically derived inventory were .842 and .818 on the pre- and post-test administrations of the Attitude Instrument respectively. The average correlation was .829 for the Experimental Group. The correlations for the Control Group between directly expressed attitude towards CAI (Item 47) and the empirically derived inventory were .592 and .799 on the pre- and post-test versions respectively. Thus the average correlation for the Control Group was .695. After four administrations of the Attitude Instrument the correlation between the empirically derived inventory and direct expression of attitude towards computer assisted instruction (Item 47) was .762.

For the Experimental Group the correlation between the two statement inventories was .912 and .936 on the pre- and post-test administrations respectively. Thus the average correlation for the Experimental Group for the statement inventories was .9235. For the Control Group the correlations between the two statement inventories was .952 and
.945 on the pre- and post-tests respectively. The average correlation for the Control Group on the two statement inventories was hence .9475. The correlation of these two statement inventories after four administrations of the Attitude Instrument was .935.

Conclusion - Contention Three

The strength of the correlations obtained indicates that the statement inventories measure essentially the same dimension as Item 47, i.e., attitude towards computer assisted instruction and as such are a valid measure of this attitude.

Contention Four: The CIU experience will cause participants to develop more favorable attitudes towards computer assisted instruction.

Discussion

There is general agreement expressed in the literature that apprehension towards computers exists among members of the education profession -- not the least of whom are school administrators (see Chapter I). There was one writer who even contended that this apprehension had become so great for some individuals that "intelligent inquiry" was not possible (30, p.401). A major purpose of this study was to ascertain whether the involvement in a CAI experience, wherein knowledge and first-hand experience with the medium were provided, would relieve apprehension towards computer assisted instruction.

Appendix P shows the data from which the correlations were obtained.
The study was designed so that the effect of the CIU experience could be isolated. Two provisions were made in this regard. First, data collection from the sample (Background Questionnaire and both administrations of the Attitude Instrument) was accomplished during a seven-day period. This was done to eliminate as much as possible intervening exposures to computer assisted instruction through discussion, reading, or experience. Second, the Experimental Group experienced the CIU between administrations of the Attitude Instrument so that the CIU effect would be reflected by the difference on Pre-Post test scores. Since the Attitude Instrument had not been previously validated, a questionnaire was provided each member of the Experimental Group immediately following completion of the CIU experience (Post CIU Questionnaire). This was done to obtain directly expressed attitude modification and to provide data useful in the evaluation of the CIU lesson itself. With the exception of the CIU experience and the completion of the Post CIU Questionnaire, the two groups were treated identically by the researcher.

Data Acquisition and Analysis

Data were acquired relative to apprehension and attitude towards CAI since these aspects appeared to be interrelated in the sense that apprehension would cause negative attitudes to be formed. These two concerns were treated separately.

Apprehension

Item 13, part a, on the Post CIU Questionnaire sought a direct indication of the effect of the CIU experience upon individual apprehension. This statement was presented in the summed rating format:
My participation with the instructional unit has made me less apprehensive towards computers.

Twenty-one respondents indicated less apprehension after the CIU experience, while seven indicated that no change had occurred. Four statements were included within the Attitude Instrument which were intended to reveal apprehension. These were the four statements:

I am apprehensive about using computers for EDP activities (Item 2).

I am uneasy about the use of computers for teaching youth (Item 25).

I would feel more relaxed taking a course by conventional instruction than by computer assisted instruction (Item 34).

Most school administrators are apprehensive about the use of computers for any educational purpose (Item 42).

The difference between scores for these statements on the pre-post administrations of the Attitude Instrument revealed that eleven scores increased (more apprehensive), seven scores decreased, (less apprehensive), and ten scores did not change.

Individual comparison was made between the expressed modification indicated by Item 13a and the score difference revealed by these four statements. Results of this comparison revealed that nine respondents confirmed their expression on Item 13a while nineteen did not (Appendix N). Since there was no consistency between these two measures it was judged that the statements did not measure apprehension towards computer assisted instruction. If apprehension were affected by the CIU experience, this was only confirmed through direct expression on a group basis.
The attitudinal effect of the CIU experience was measured statistically through a comparison of "t" score differences using the results of the pre- and post-test versions of the Attitude Instrument. As shown in Appendixes I and J no statistically significant differences occurred on any individual statements for either group. Comparison between pre- and post-test scores for each statement inventory for each group failed to reveal any statistically significant change for either group at the .05 level.

In an attempt to determine the direction of change for each group, comparison was made between the mean scores for each group on the pre- and post-test statement inventories and Item \( \text{U} \). These comparisons and the direction of change are indicated in Table 7.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Pre-Test Mean</th>
<th>Post-Test Mean</th>
<th>Difference in Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>A priori</td>
<td>54.538</td>
<td>54.769</td>
<td>+ .231</td>
</tr>
<tr>
<td>Empirical</td>
<td>52.192</td>
<td>52.269</td>
<td>+ .077</td>
</tr>
<tr>
<td>Item 47</td>
<td>4.888</td>
<td>4.923</td>
<td>+ .035</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measure</th>
<th>Pre-Test Mean</th>
<th>Post-Test Mean</th>
<th>Difference in Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>A priori</td>
<td>50.535</td>
<td>49.071</td>
<td>- 1.464</td>
</tr>
<tr>
<td>Empirical</td>
<td>50.595</td>
<td>49.071</td>
<td>- 1.214</td>
</tr>
<tr>
<td>Item 47</td>
<td>4.142</td>
<td>4.190</td>
<td>+ .028</td>
</tr>
</tbody>
</table>

+ increase
- decrease

\(^{15}\) Significance with the sample size used required 2.01 at the .05 level
For the Experimental Group an increase in mean score occurred on both statement inventories indicating a more favorable attitude towards computer assisted instruction. For the Control Group a decrease in mean score occurred on both statement inventories. This indicates a less favorable attitude towards CAI by the Control Group. Both groups showed a slight increase in mean score on Item 47 with the Experimental Group being slightly greater.

Since the groups differed somewhat initially on mean scores on each statement inventory and on Item 47 (see Table 1), a comparison between groups was made using the post-mean scores. Results of this comparison are indicated below

Table 8: Post-Test Mean Score Differences Between Groups on Attitude Statement Inventories and Item 47.

<table>
<thead>
<tr>
<th>Mean Scores</th>
<th>Experimental</th>
<th>Control</th>
<th>Difference in Mean</th>
<th>Between Groups</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>A priori</td>
<td>54.769</td>
<td>49.071</td>
<td>5.698</td>
<td>2.505&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Empirical</td>
<td>52.269</td>
<td>49.071</td>
<td>3.198</td>
<td>2.428</td>
<td></td>
</tr>
<tr>
<td>Item 47</td>
<td>4.923</td>
<td>4.190</td>
<td>.733</td>
<td>2.469</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>"t" significance at the .02 level requires a "t" of 2.30 with this size sample.

As revealed above, comparison between groups using the post-test mean scores on each attitude measure indicated an increase in mean score difference on all three measures in favor of the Experimental Group. Results of the "t" test analysis revealed significance at the .02 level on each measure.

Table 9 below was compiled to indicate the difference between groups when pre- and post-mean scores were compared on each of the attitude measures.
TABLE 9: Mean Numerical Change Between Pre- and Post-Tests

<table>
<thead>
<tr>
<th>Attitude Measure</th>
<th>Mean Difference Between Groups</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Test Difference</td>
<td>Post-Test Difference</td>
</tr>
<tr>
<td>A priori</td>
<td>+ 4.003</td>
<td>+ 5.698</td>
</tr>
<tr>
<td>Empirical</td>
<td>+ 1.597</td>
<td>+ 3.198</td>
</tr>
<tr>
<td>Item 47</td>
<td>+ .746</td>
<td>+ .733</td>
</tr>
</tbody>
</table>

+ Higher score for Experimental Group
- Higher score for Control Group

These data reveal that the Experimental Group increased its favorable position relative to the control group by 1.695 points on the *a priori* inventory and by 1.601 points on the empirically derived inventory. Results on Item 47 show a slight decrease in favorableness for the Experimental Group when compared to the Control Group.

Comparison between groups using individual Items 1 through 47 on the post-test version of the Attitude Instrument revealed eighteen statements on which significant difference occurred. Included in these statements were five of the seven statements found significantly different on the initial comparison of the two groups.

When allowances were made for initial differences in attitude towards computer assisted instruction the Experimental Group was shown to have become more favorably disposed towards CAI than would have been expected if the CIU experience had not intervened.

Confirmation of this attitude change was provided by data acquired through a direct question on the Post CIU Questionnaire. Item 10 asks:

How did this experience in computer assisted instruction affect you? Did it cause your attitude towards CAI to be more favorable,, less favorable,, or remain unchanged?"
Seven respondents felt their attitude towards CAI was "unchanged" by the CIU experience, one felt "less favorable", and twenty felt "more favorable" as a result of the experience. These results tend to confirm the directional change finding and the post-test inventory differences between groups.

A further confirmation of favorable attitude change as a result of the CIU experience can be inferred from data provided by the professors and computer personnel involved in the study. Their responses to the Post CIU Questionnaire showed seven of the thirteen respondents felt their own attitudes towards CAI had become more favorable after the CIU experience while six felt there had been no attitudinal change. Of the six who reported no attitude modification, only one was of the professor group and five were of the computer trained personnel group.17

The professors were also asked if they would anticipate attitudinal change to occur among students after the CIU experience, and if so, in what direction this change would be.18 The professors concurred that favorable modification would occur.

An effort was made to ascertain the relationship between individually expressed attitude modification (Item 10, Post CIU Questionnaire) and responses to the Attitude Instrument statement inventories and Item 10. Each member of the Experimental Group was placed in a category according to his response to Item 10 of the Post CIU Questionnaire. These categories were established: "more favorable", "less favorable", and

17Contention Five conclusions appear relevant here.
18Appendix C, Item 10
"unchanged". Differences between pre- and post-test scores on each statement inventory and Item 47 were then computed. The consistency of individual responses to these attitude measures and directly expressed attitude modification were derived. The group results are shown below:

TABLE 10: Relationship Between Directly Expressed Attitude Change and Measured Attitude Change.

<table>
<thead>
<tr>
<th>Directly Expressed Attitude Change\a</th>
<th>Measured Attitude Change\b</th>
<th>a priori inventory</th>
<th>Empirical inventory</th>
<th>Item 47</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>MORE FAVORABLE</td>
<td></td>
<td>9</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>(increased score)\c</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LESS FAVORABLE</td>
<td></td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>(decreased score)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNCHANGED</td>
<td></td>
<td>1</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>(no score change)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTALS</td>
<td></td>
<td>10</td>
<td>18</td>
<td>9</td>
</tr>
</tbody>
</table>

\aResponse to Item 10, Post CIU Questionnaire
\bChange between pre-post administrations of the Attitude Instrument related to anticipated scores.
\cAnticipated score modification.
\dThree incomplete returns
+Confirmed
-Denied

19 Appendix M reveals the individual relationships derived.
For the twenty respondents in the "more favorable" category, expressed attitude modification was affirmed nine times on the a priori inventory, eight times on the empirically derived inventory, and eight times on Item 47. A denial of expressed "more favorable" attitude occurred eleven times on the a priori inventory, nine times on the empirically derived inventory, and twelve times on Item 47. The table further shows similar results to have occurred within the categories of "unchanged" and "less favorable". It can be concluded that there was no individual consistency between expressed attitude modification and measured attitude modification.

Conclusion - Contention Four

No change in attitude towards CAI was reflected at significant levels for either group using pre-post tests. No individual consistent relationship was found between directly expressed attitude modification and response to the statement inventories or to Item 47. As indicated by direct expression of attitude modification, the CIU caused the majority of the members of the Experimental Group to become more favorable towards computer assisted instruction. The direction of change between the pre- and post-test versions of the Attitude Instrument on the statement inventories indicated a more favorable attitude towards CAI was caused by the CIU experience.

Apprehension was decreased according to direct expression but this was not confirmed by statements within the Attitude Instrument.

In light of these findings, it can be concluded that the CIU experience caused non-significant favorable attitude modification towards computer assisted instruction.
Contestation Five: Knowledge about educational computer applications has a positive relationship with attitude towards computer assisted instruction.

Discussion

Numerous writers have suggested that once more knowledge of computers becomes available to school administrators, their attitudes towards computer involvement in educational matters will become more receptive. Contention Five was formulated to ascertain the validity of this belief relative to attitudes towards the use of the computer as an instructional tool. In order to equate properly the significance of relationship between knowledge of computer applications in education with attitudes towards CAI, several other factors were also compared with this attitude to determine their relationship. The factors of age and administrative experience were selected to be compared in a like fashion as knowledge of computer applications in education with attitude towards computer assisted instruction.

Data Acquisition and Analysis

The amount of knowledge about computer applications in education possessed by members of the total student sample was obtained through subjective individual estimation rather than through objective testing. The format of Item 10 which provided the data, is reproduced below.
ITEM 10
Background Questionnaire

Indicate below how knowledgeable you consider yourself in the use of computers for educational purposes. (Place a check mark in each appropriate space).

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>KNOWLEDGE</th>
<th>If you marked columns 3 thru 5, where did you get this knowledge?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>5 4 3 2 1 0</td>
<td>Reading Experience Discussion</td>
</tr>
<tr>
<td>Budgeting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade Reporting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruction (direct)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scheduling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test Scoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5 = extensive knowledge; 4 = more than average; 3 = some knowledge; 2 = not much; 1 = little; 0 = absolutely none.

From this information, two knowledge factors were developed. The first included all expressed knowledge of computer applications in education while the second only included scores relative to specific knowledge of the instructional application of computers. This second knowledge factor included only the scores on the simulation and direct instruction sections of Item 10. Data pertinent to the factors of age and administrative experience were ascertained through direct questions on the Background Questionnaire. The relationship between these four factors and expressed attitude towards computer assisted instruction (Item 47 - Attitude Instrument) using the pre-test version of this instrument was obtained by dichotomizing each factor at the sample mean and performing a chi square analysis.
The relationship between knowledge of computer applications in education and attitude towards computer assisted instruction yielded a result of 4.70 which was significant at above the .05 level.20 A similar result was obtained, as expected, for the factor of knowledge of instructional applications of computers and attitude towards CAI (result=4.70). Chi square analysis for administrative experience and attitude towards CAI yielded a result of 1.54 which was not significant at the .05 level. Chi square analysis for the factor of age and attitude towards CAI yielded a result of 1.41 which was not significant at the .05 level.

A related concern was also considered, i.e., the relationship between directly expressed attitude modification caused by the CIU and expressed general knowledge of computer applications in education. Each member of the Experimental Group was placed in a change category based upon response to Item 10 of the Post CIU Questionnaire. An individual knowledge of computer applications score was provided through response to Item 10 of the Background Questionnaire. These individual knowledge scores were summed and a total for each attitude modification category was obtained. Those members of the Experimental Group who indicated a "more favorable" disposition towards CAI after the CIU experience were found to have an average knowledge score of 9.7 points while those in the "unchanged" category had an average knowledge score of 17.9 points.

20Chi square significant at the .05 level requires a relationship of 3.841 for a 2X2 table.
21Appendix 0 provides the data matrixes from which the chi square was obtained.
Conclusions - Contention Five

Contention Five has been affirmed by the study. The data clearly establish a relationship between knowledge of computer applications in education and favorable attitude towards computer assisted instruction. No such relationship was found to exist between the factors of age or administrative experience and attitude towards CAI.

A related conclusion warranted by the findings is that the attitudinal effect of the CIU experience can be expected to be greater for those with less knowledge about computer applications in education.

Summary

This chapter has presented the data obtained and conclusions reached relative to group similarity, intervening variables, and the contentions of the study. The final chapter presents a summation of the major findings of the study, their implications, and offers suggestions to those who would undertake continued investigations.
CHAPTER IV
SUMMARY, FINDINGS, AND CONCLUSIONS

Summary

The purpose of this study was to determine the effect upon attitude towards computer assisted instruction an experience in CAI would have upon experienced school administrators. To realize this purpose it was necessary that a computer assisted instruction lesson be created, that an attitude measurement device useful in a pre-post format be developed, and that the validity of each be ascertained.

In this study, contentions were formulated relative to (1) the effect of the Computerized Instructional Unit (CIU) upon the attitudes of school administrators towards computer assisted instruction, (2) the acceptability of the lesson (CIU) as an experience for programs in educational administration, (3) the validity of the lesson as a computer assisted instruction experience, (4) the validity of the attitude measures, and (5) the relationship between computer knowledge and attitude towards computer assisted instruction.

Two groups were created from a total sample of 71 advanced students in educational administration. One group, the Experimental Group (28 subjects) took the lesson (CIU) while the other group, Control Group (43 subjects) did not. Both groups completed a pre- and post-test version of the attitude measurement device as well as a background questionnaire. The Experimental Group responded to a
questionnaire immediately following the CIU experience pertinent thereto.

The attitudinal effect of the CIU experience was determined through a comparison of pre- and post-scores on the attitude measures for each group and a direct expression of attitude modification by the Experimental Group. The acceptability of the CIU as an experience for use in preparation programs of educational administration was determined through information provided by professors and students of educational administration who had completed the Computerized Instructional Unit.

Evaluation of the Computerized Instructional Unit as an example of computer assisted instruction was accomplished through a separate frame analysis and through personal evaluation offered by computer trained personnel, professors, students, and others who had taken the unit. Validation of the attitude measures was accomplished through a correlation of results obtained by these measures with a direct expression of attitude towards computer assisted instruction.

Findings

The findings of this study were:

1. The CIU experience caused attitudes towards computer assisted instruction to become more favorable but not at a statistically significant level.

2. The CIU experience caused expressed apprehension towards computer assisted instruction to be decreased.

3. The CIU experience was found to be acceptable for use in preparation programs of educational administration.

4. The CIU lesson was shown to contain one operational and two instructional weaknesses while providing an acceptable total experience in computer assisted instruction.
5. The attitude measures were found to be significantly related (above the .70 level) to direct expression of attitude towards computer assisted instruction.

6. A relationship was revealed between knowledge of computer applications in education and attitude towards CAI which indicated that the more knowledgeable individuals possessed a more favorable attitude towards computer assisted instruction.

7. A relationship was revealed between attitude modification caused by the CIU and knowledge of computer applications in education which indicated that more attitudinal modification occurred among those who were less knowledgeable.

General Conclusions

From the study findings, it was possible to conclude that the experience provided by the CIU lesson generally caused more favorable attitudes towards computer assisted instruction, that the statement inventories measure attitude towards computer assisted instruction, and that the CIU is a valid experience in computer assisted instruction which has relevance to school administrators.

RECOMMENDATIONS AND IMPLICATIONS

Recommendations

Recommendations are made relative to the use of the instruments of this study and the need for further research.

Study Instruments

These suggestions are made to those who would use the computerized instructional unit (CIU) created for this study.

1. Correct the weaknesses within the unit revealed by the study.¹

¹The author has made alterations in the CIU based upon the results of this study. The revised course is stored on the computer at The University Hospital, The Ohio State University. Course title is "demo".
2. Use the CIU as an introductory experience for those unfamiliar with computer applications, particularly with computer assisted instruction.

These suggestions are made to those who would use the attitude measurement device developed for this study.

1. Modify the statement content if the intent is to use the instrument with persons other than school administrators.

2. Divide the population on the basis of the results obtained on the first administration of the attitude instrument if a post-test is contemplated and measurement of the effect of an intervening experience is desired.

Finally, suggestions arising from this researcher's experience, are made to those who would become involved in the assessment of computer assisted instructional lessons.

1. Evaluate the instructional, operational, and total effect of any computerized lesson.

2. Consider the attitudinal ramifications as well as the cognitive aspects of any computerized lesson.

3. Examine each lesson to insure that alterations can be made to suit the local situation.

4. Prepare in advance for any contingencies which might arise due to mechanical difficulties.

**Needed Research**

These recommendations are made to those who would conduct related research. The scarcity of studies of the attitudinal effect of computerized instruction suggests several studies which could profitably be undertaken:
1. a study to replicate the present study to verify the findings obtained.

2. a study similar to the present study but wherein practicing school administrators would experience the CIU.  

3. a study to ascertain the attitudinal influence of this CIU experience upon teachers at various levels of professional development.

4. a study to determine the level of apprehension among school administrators relative to other professionals.

5. a study to determine the attitudes of parents, teachers, and students before and after a CAI experience.

6. a study of the influence specific lesson content has upon the attitude of participants towards CAI.

Related studies might be undertaken to ascertain the most profitable ways to provide familiarity with computer assisted instruction to practicing administrators who do not have immediate access to a college campus or to a central computer installation. In addition, it would be of value to determine the factors which contribute to attitude formation towards this medium. Finally, research and development activities wherein various administrative task areas would be taught via computer appear worthy of pursuit.

**Implications**

The results of this study have implications for school administrators, teachers, and the institutions which prepare these profes-

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2Although this study involved experienced school administrators, it cannot be concluded that the results obtained would be duplicated among the general population of school administrators since the participants in the CIU experience had all undergone selection-screening procedures before admission to the doctoral program in educational administration.
sions. There are implications also for those interested in the expansion of computerization in education.

This study has shown that experienced school administrators can become more knowledgeable and receptive towards computers in a relatively short time through an actual experience with the medium. The results of such involvement should permit a more rational consideration of the potential and present limitations of the computer as an instructional device.

The results of this study indicate that the computer itself can serve as the medium through which knowledge about computer capabilities can be taught in a non-technical fashion. It would appear that computerized tutorial lessons could be developed which would indicate the application of computers in the areas of school plant, budgeting, transportation, scheduling, legal implications, etc.

Through the use of computer terminals located some distance from the computer itself, the university could serve as the center for the development and dissemination of computerized instruction for administrators in the field. Such an approach to continuing education would appear to hold promise for developing a closer relationship between theory and practice while providing a service for administrators. The use of remote terminals by administrators should relieve some of their apprehension towards computer assisted instruction while increasing their understanding of current developments. University personnel could be engaged in the development of lessons which recognize the needs of the practicing administrators.

The value of the computer as an instructional medium is enhanced by its ability to record and maintain individual records of each student
input. The fact that these data then can be made available to the teacher and/or author permits activities which focus upon the teaching process itself.

Recognition and utilization of this capability is expanded through the inquiry mode of instruction (simulation). In this instructional mode a student is engaged, via computer, in the analysis and resolution of problems within a "real life" situation. Although "simulation" activities have been achieved satisfactorily in other ways, the capability of the computer to store input and trace progression on an individual basis would suggest that it should be used for this mode of instruction. This mode might also be found beneficial as a means whereby screening of candidates for placement within an advanced program could be objectively accomplished through an appraisal of the individual's decision making process.

The study has established that attitudes are more influenced by the Computerized Instructional Unit among those less familiar with the application of computers. This suggests that early use of the CIU with students will result in greater attitude modification. This further infers that students at all levels should be given the opportunity to use computers and learn their educational applications during preparation programs. The recommendations of Tobias (53) and Hamblen (38), that exposure to automated instruction should be early in preparation programs, received substantiation from this study. Exposure to computer applications in education should be arranged by the computer industry for school administrators early in their assumption of administrative duties. Both teachers and administrators need to develop attitudes towards the innovation (CAL) which will permit continued investigation of computer
potential as an instructional medium.

Concluding Statement

Although the present study has provided some needed information, it has only considered a few ramifications of computer assisted instruction. The author feels that continued efforts to validate this instructional medium must be made if the full potential of the computer is to be realized. The capability of the computer to accommodate individuals and its usefulness in the study of the teaching-learning process insist that professional educators become familiar with the medium.
APPENDIXES
APPENDIX A

Computerized Instructional Unit
Welcome to a demonstration of computer capabilities.

This program is designed to enable you to appreciate some of the potential of computer assisted instruction. To begin, it is necessary for you to be able to communicate with the computer.

Locate on the terminal keyboard (top left) the key labeled "ALTNCODING". Also locate the '5' key. Depress and hold the ALTNCODING key while you depress the '5' Key. Release them together and observe what happens.

Fine! You just made contact with the computer by causing it to print this statement. These same keys must be depressed when you have finished any response and wish to proceed. You should also have noticed that a light went on whenever the computer was ready to accept your response. Type the COLOR of the light that comes on at the top right of the keyboard when this statement is finished.
This GREEN proceed light is your signal that the computer is awaiting your response.

Although you did not type only the word 'green' the author has anticipated this since this is your first time using the computer. In the future however, be careful in entering your response. Please proceed.

The color of the light is green and for your use of the computer you might observe each time if you can read the word 'proceed'.

If you can, then you may enter your response. Proceed.

This light should always be on when the keyboard terminal is plugged in.

The light desired is located to the immediate left of the 'power' light and down one row. Try again.

If this light is on you should notify the person who assisted in having you start this program. The color of the light to its immediate left is the color desired. Try again.

Please look at the top right of the keyboard at the light which is behind the word 'proceed'. Type the COLOR of that light.

Since you can now communicate with the computer let's discover some of the capabilities of this technological tool.

Please type your first name, a space and your last name. (Remember to wait for the green light and to depress the alt+ code key and the '5' key together when you finish).
Since you have established your identity as
b0
(line feed)
Please try again to enter your name using only small
letters.
Well, your name apparently doesn't have any vowels.
b0/b5
pr
You can now attest to the fact that the computer need not
be completely
impersonal. Perhaps you will give the computer program a
name also.
Which of these names would you select?
Cobol
Fortran
GIGO
Terminal
IBM 360
Coursewriter 3
Cobol
cobol
b0/b4
Cobol is a computer programming language which stands for
common
business oriented language.
(line feed)
pr
Fortran
fortran
b0/b4
Fortran is a computer programming language used primarily
by
scientific personnel.
(line feed)
pr
Terminal
terminal
b0/b4
'Terminal' is the name usually given to denote the type­
writer keyboard
you are using now to communicate with the computer.
pr
GIGO
gigo
b0/b4
GIGO is a layman's term for garbage in which results in
garbage out. This
reflects the importance of the material which is given to
the computer.
(line feed)
pr
IBM 360
ibm 360
b0/b4
IBM 360 is a third generation computer. This program is running thanks to an IBM 360, Model 40.

Coursewriter III is the language developed by IBM to make possible the type activities you are presently experiencing.

Please be certain that you typed only one of the six names given. Also consider that you capitalized those letters that should have been capitalized. Try again to enter your choice.

The previous question offered alternatives each of which is a common term to computer personnel. Cobol and Fortran are computer languages as is Coursewriter III. IBM 360 is the number of the computer which is handling this program. The terminal is the typewriter input device while GIGO means garbage in results in garbage out. As a computer finds it easy to do, I did not react emotionally to the name you gave me, but your choice of names was limited wasn't it? Let's continue.

Can you EOB? (Type 'yes' or 'no' and then depress the ALTN CODING key and the '5' key simultaneously).

EOB is the name given to the process of depressing the altn coding key and the '5' key simultaneously. EOB means 'end of block' to computer personnel and you might think of it as meaning end of your response.
Very good! Through actual participation you have already learned several basic capabilities of computer assisted instruction using Course-writer III. First you have learned that the computer can accept a response and then can use it in future communication. (This occurred when you entered your name). Isn't that correct?

Second, you participated in a multiple choice situation wherein you selected a name for the computer. Was the name you selected. You were then given some information about your choice almost instantly (immediate feedback).

Third, you learned the meaning and operational function of a basic technical operation — EOB. (Henceforth to end your communication to the machine please use EOB). Perform one now please.

Would you like to learn more about the operational function and capabilities of computer assisted instruction? (Type the word 'yes' or 'no' and then EOB).

Fine. Let's then proceed.

The author will usually permit the student to discontinue working when he so desires. Since this program is being used as a research instrument, he would like you to continue for another fifteen minutes approximately.

If you must stop, then ask the proctor to do so for you.

Fine. Since computer assisted instruction is designed to cause learning to occur, perhaps it would be wise to discover how successful this program has been with you during the past minutes.
Please type either the word 'yes' or the word 'no'.

Please answer this question. Who was the President of the United States in 1967? (Type both the first and last name only).

Lyndon Johnson

Correct. Lyndon Baines Johnson was the President in 1967. Let's try another easy recall question.

Johnson

You were asked to give both his first and last name. It might help if you were reminded that his last name begins Johnson --.

LBJ

No initials please. Try again.

B.

Please just type his first and last name.

This question was made purposely easy so as to demonstrate one of the computer capabilities. Try again to answer the question.

Please type 'Lyndon Johnson' in order to proceed.

Wrong!! There is NO such place!!

Confused!! Upset!! Of course the Washington Monument is in Washington, D.C. The response you received from the computer was intentionally presented in order to demonstrate the principle of GIGO. This principle states that when an inaccurate program is written then inaccurate computer activities will result.

Which of these would you consider to be responsible for the error in the previous response? (Type only one letter which precedes your selection and then EOB).
a) the computer
b) the author
c) the typist (or sometimes the key punch operator)
d) both the computer and the author
e) both the author and the typist.
f) both the computer and the typist.
g) all three (computer, author, typist)

Absolutely correct. You didn't blame the computer probably because you realize it (the poor thing) only does what it is told. You correctly included both humans mentioned since it could be the fault of either or both.

No. The computer can't be held responsible. Would you blame your car for not rolling down its own windows? Try another answer.

You are partially correct. It could be the fault of either the typist or the author but both would usually be somewhat to blame on the grounds of carelessness. Since you did not blame the computer you may proceed.

Only half of your answer is correct. Try again.

The computer cannot be held responsible for what it cannot control. Remember that the computer only does what humans tell it and proceed.

Please enter a small case letter from a-f to indicate your choice.

Type the letter 'e' in lower case in order to proceed. The foregoing multiple choice question was presented to emphasize the importance of the human in the proper utilization of this technological tool.

If you made an error (by typing b, c, or g) on the previous question you were automatically brought to this point. If you typed a, d, or f you were required to try another response before you could proceed. Through proper programming such variation is easily accomplished.

It should also be clear that the computer cannot correct the author but just does what it is told to do.
What might happen if you were asked a question whose answer you couldn't even hope to guess? For example, what if you were asked a question such as this? How many eggs could be placed in a bushel basket without breaking any? Please guess -- type any answer. That was an interesting guess. More interesting might be how you arrived at that number. Enough of that let's get on with the demonstration.

b0/c20

pr

When it is likely that the student has no idea and would only be guessing for a correct response, the computer language offers strong assist. All the student (you in this instance) does in situations of this kind is to type the word 'help' after which he receives the correct answer from the computer. The student then must enter the correct answer in order to proceed. Let's see if you understand the procedure.

Assume that you have no idea as to how many eggs (unbroken) could be placed in a bushel basket and you wanted to know. What would you do? (Don't forget to follow all the directions given above.)

7893

Official egg counters are difficult to procure and therefore it was necessary to hire tomato bushel basket loaders to load the eggs in the bushel baskets. Their figure was 7893.

Perhaps you would like at this point to discontinue the demonstration. Would you like to continue? Answer with either 'yes' or 'no'.

Fine. Let's take a moment to summarize.

Under normal circumstances the author would permit the student to stop when he so desired. However, since this program is being utilized for research purposes, he will continue you on in the program for another ten minutes approximately. If you must stop now, talk to the monitor.
Fine. You have been taking this course for \text{minutes/b3}.

Before you leave would you take a few minutes to indicate how successful this program has been in its primary mission, i.e., to cause learning to be assisted by computerization? There are two questions which relate only to the material presented in this demonstration program.

Please type either 'yes' or 'no' and press the RETURN key.

Three additional computer capabilities have been indicated. First, it should be clear that the student may request 'help' whenever necessary. This capability can be denied by the author if he deems it wise to do so.

Second, it has been shown that the student can alter his path through the course. (You may recall you were given the opportunity to discontinue working with the program earlier. This same capability can be utilized with course content).

Third, you may have inferred that you might be able to keep a record of your performance simply by removing the paper currently in the typewriter roller. This you are encouraged to do since the same material has been placed on computer tape for the author's appraisal. You will be given an opportunity to do so at the conclusion of the program.

Only a few of the most basic capabilities of computer assisted instruction have been demonstrated but even these few can be combined in many profitable ways by creative personnel. The need for creative personnel cannot be overemphasized. Individual differences must be recognized.

and accommodated within the computer program.
Since this concludes the demonstration program the author would like to ascertain how successful he has been in causing learning to occur.

During the past minutes.

Hence he requests that you answer a few questions about this program.

Did you enjoy this experience? (Answer yes or no please).

Utilizing only your experience thus far with this computer program please type the letters of EACH statement below which is true.

The computer can be programmed to...

a) explain words or terms.

b) understand all the world's languages.

c) recall and print what the student has typed.

d) respond using the student's name.

e) keep a time record.

f) correct errors made by the author.

g) be used only by highly trained personnel.

h) allow for user errors.

i) cause learning to occur.

j) give immediate feedback.

Well done. Evidently the computer can provide instruction so that learning may occur.

You have either not been paying much attention or you need to start over.

Think through the question in light of what is typed on the paper on the typewriter roller. Try again.

Remember GIGO and the mention made of specific computer language. Try again.
You used the program without receiving very much technical explanation. Also you have not considered the principle of GIGO. Try again.

There were specific computer languages discussed and the technical training you received was certainly not large. Try again.

Consider -- does the computer understand English, German, etc. without being programmed to do so? Try again.

Remember the comments which were made about GIGO. Try again.

You used this computer program with very little technical instruction. Try again.

Seven of the items are correct. When entering your letters do not put spaces between them and use only lower case. Try again.

Be certain that you entered seven letters in lower case. Try again to enter the correct seven letters.

Apparently there is a serious problem in communication. Type the letters acdehij in that order in entering your response.

Several design formats for questions which are available to authors of a computer assisted instruction program have been utilized. Consider each of the statements below in light of your experience ONLY on this demonstration program and select the one type design which was NOT utilized.

1) student selected response type questions without a guide.

2) physical performance type activities to prove understanding.

3) internal control of student course progression.

4) essay type question with immediate scored response.

5) multiple choice type question using numbers, letters, or words.

6) forced observation type activity before response was permitted.
Yes, this capability was not utilized in this program. It might be of interest that rapid progress is being made in developing this computer capability. Already experimental programs have been designed and are being tested whereby essay responses can be accepted and scored by the computer. Even now, in this program essay type responses are accepted (and recorded) but the scoring has not been perfected.

To respond correctly it took you seconds.

If you would like to see an explanation for any of the other alternatives from the previous question please type its number. (Only one number at a time please). If you do not then type the word 'no'.

You selected a response without any guide to the questions about the eggs, the Washington Monument, and the President of the United States in 1967. Please type another number.

You were required to prove you understood EOB by physically performing it. Please select another response number.

If you recall after the answer to the question concerning whose responsibility it was for the response error, you were told that several controls were operative to bring the student to the next statement. This was an example of internal control of
student course progression. Select another response number.

Numbers are being utilized in the present question as responses, words were used in the selection of a computer name, and letters were utilized in the question which immediately precedes this one. Try another. response number.

You were obliged to observe the green 'proceed' light before being permitted to proceed. This same operation can be used effectively with visual slide displays, tape recording control, and textbook perusal. Try another response number.

Type a number from 1-6 in order to proceed.
The correct numbered response is 4. Type the number 4 in order to proceed.

You as the student selected a response without any guide to the questions about the eggs, the Washington Monument, and the President of the United States in 1967. If you would like to have another alternative explained, type its number. If you do not, type no.

You were forced to prove your understanding in order to perform an EOB. If you would like to have another alternative explained type its number. If you do not, type no.

If you will recall after the answer to the question concerning whose responsibility it was for the response error, you will remember you were told that several controls were operative to bring the student to the next part of the program. This was
2-30 internal control of student course progression. If
2-20 you would like to have
2-21 another alternative explained, type its number. If
2-21 you do not,
2-22 type no.
2-23 wa 4
2-24 ty This was the correct response to the question. If
2-24 you would like
2-25 to have another alternative explained, type its num-
2-25 ber. If you
2-26 do not, type no.
2-27 wa 5
2-28 ty Numbers were used in the present question, words were
2-28 used in the
2-29 selection of a computer name, and letters were used
2-29 in the question
2-30 just preceding this one in the test. If you would like
2-30 to have
2-31 another alternative explained, type its number. If
2-31 you do not,
2-32 type no.
2-33 wa 6
2-34 ty You were forced to observe the green proceed light
2-34 before being
2-35 permitted to proceed. This same procedure can be used
2-35 with visual
2-36 displays, tape recordings, or textbook readings. If
2-36 you would
2-37 like to have another alternative explained, type its
2-37 number.
2-38 If not, type no.
2-39 un Please type a number from 1-6 or type the word no.
2-40 un Please type the word 'no'.
total
1-0 qu The two preceding questions were asked of those people
1-0 who were allowed
1-1 to discontinue their relationship with the program when
1-1 given the
1-2 opportunity to do so previously. Since you have continued
1-2 through
1-3 the total program you will receive a reward. You will
1-3 not be given
1-4 a quiz question covering this last portion of the program.
1-5 Instead you may have a copy of the capabilities (six in
1-5 number)
1-6 which, when added to your previous material, will provide
1-6 a complete
1-7 record of the computer capabilities demonstrated as well
1-7 as your
1-8 personal response thereto. To acquire the review
1-8 materials simply
1-9 type the word 'review'. If you want to stop without
1-9 this material
1-10 type the word 'no'.

Other computer capabilities of computer assisted instruction which were shown included

1) the use of the 'help' procedure to secure any correct answer.
2) the unemotional patience of the computer.
3) the availability of student responses to the student and the author.
4) the ability to record the amount of time necessary to answer a question.
5) the availability of a permanent record for the student of his performance. (Be sure to take yours when you finish).
6) the potential of communication between the student and the author.

This last capability will be demonstrated at this time.

If you have any questions, comments, or suggestions (pro or con) about this program, please type them so that improvements can be made. You may enter them by following this procedure: 1) type two @ signs,
2) enter your statements until you reach the end of the typewriter line, then
3) enter an EOB. You may repeat this procedure until you have finished your remarks. Then 4) type the word 'finished' and EOB.

Your comments have been recorded on the computer tape for the use of the author. Thank you for spending the past minutes with us.
2-7 please type 'sign off' when the green light comes on.
2-8 un Please type 'sign off' and press the 'return' key.
end
APPENDIX B

Computer Personnel Questionnaires
APPENDIX B

COMPUTER PERSONNEL BACKGROUND
AND
COURSEWRITER III - DEMO COURSE - QUESTIONNAIRE

In an effort to evaluate the demo course, you are requested to answer this brief questionnaire as candidly and completely as possible.

PLEASE COMPLETE THE SECTION TO THE DOTTED LINE BEFORE YOU TAKE THE DEMO.

Your position title is ___________ General career field

Experience with computers [5.87] years. Have you had special training?

Yes [8] No [0]

Experience with CAI applications [2.5] years. Have you had training in CAI?

Yes [0] No [8]

Have you taken demonstration programs by computer? Yes ___ No __

How familiar are you with CAI (Circle the most appropriate number).

Very Familiar [MEAN = 2] Slightly Familiar

5 4 3 2 1

When using a computer terminal, how do you feel?

Very comfortable [MEAN = 3.75] Ill at ease

5 4 3 2 1

What value would you say CAI has?

Great value [MEAN = 4.25] Limited value

5 4 3 2 1

Would you feel competent to discuss the differences between Programmed Instruction and CAI? Yes _____ No _____

PLEASE NOW TAKE THE DEMO COURSE, YOU MAY SIGN ON AS "s2/demo EOB". WHEN YOU FINISH THE DEMO, PLEASE COMPLETE THE NEXT QUESTIONS.

1. How long were you taking the demo course? [27] minutes.

2. Did you sign off before the complete course was presented? Yes _____ No _____

3. Were you alone at the terminal when taking the program? Yes _____ No _____

4. Have you seen a PrintOut of the entire course? Yes _____ No _____

5. Did you have any difficulty following directions within the course? Yes [28] No [6]

If yes, please indicate where.

a1 = reading error
1 = vagueness of question

*Referenced Chapter III.

Results are indicated in brackets.
6. How suitable would you rate this Demo course to INTRODUCE people to the capabilities of CAI using Coursewriter III?
   Very suitable [MEAN = 4.37] Unsuitable
   5 4 3 2 1

7. Do you think that persons less knowledgeable concerning computers will feel more at ease with computers after use of this demo?
   Yes [8] No [0]

8. What do you think is the value of CAI after using this demo?
   Great value [MEAN = 4.10] Limited value
   5 4 3 2 1

9. Do you feel this Demo course altered your attitude towards CAI?
   Was this change towards a more [3] or less [0] favorable attitude?

10. Did you experience any machine malfunctions? Yes [0] No [8]

11. How well does this Demo course compare with other demo programs you have used? [MEAN = 3.20]
    Very well 5 4 3 2 1

12. If you were asked to grade the entire Demo course, what grade would it receive?
    A B C D E

13. What numerical score would you assign the Demo course?
    10 9 8 7 6 5 4 3 2 1 0 [MEAN = 8.25]

14. Please use the reverse side of this sheet to record any suggestions you might have for the improvement of the Demo course, this questionnaire, and indicate your personal reactions towards either.

THANK YOU FOR YOUR TIME AND COOPERATION.

*Referenced Chapter III

Results are shown in brackets
APPENDIX C

Professor Questionnaires
APPENDIX C

BACKGROUND PROFESSORS QUESTIONNAIRE

PLEASE BE AS CANDID AND COMPLETE AS POSSIBLE.

1. What is your present position? ________________________________

2. How long have you held that position? [9.4] years.

3. Have you ever taught a course in Educational Administration?
   [5] Yes [0] No

4. What courses have you taught in the past two years?

5. What do you consider your area(s) of special competency or interest?

6. How familiar are you with computer applications in education?
   (Circle the most appropriate number below).
   Very familiar Slightly familiar
   5 4 3 2 1 [1] [3] [1]

7. With which computer applications in education are you at all familiar?
   (Place a check mark after each).
   Scheduling _____ Transportation _____ Stimulation _____
   Grading _____ Budgeting _____ Instruction _____
   Accounting _____ Test Scoring _____ Research _____

8. Using the list in the previous question, please indicate after each check mark with the capital R if your familiarity is primarily a result of reading – or with a capital U if your familiarity is primarily a result of use or personal responsibility for the use of the computer for this activity.

   If yes, what was the topic presented? ______________________
   In what year did this take place? ______________________

10. How do you feel about using computers to assist instruction?
    Very favorable Receptive Undecided Not receptive Unfavorable
       [0] [5] [0] [0] [0]

Results are shown in brackets.
11. If asked to take responsibility for the development and implementation of Computer Assisted Instruction on your campus what would be your reaction?
   
   I would welcome the opportunity [4]____
   
   I would rather do something else [1]____
   
   I would not entertain the possibility ______

PLEASE REACT TO THESE STATEMENTS

"Computer assisted instruction has great potential".
   Strongly agree Agree Undecided Disagree Strongly disagree
   ___ ___ ___ ___ ___

"Educational administrators must be knowledgeable about the data processing capabilities of computers".
   Strongly agree Agree Undecided Disagree Strongly disagree
   ___ ___ ___ ___ ___

"Educational administrators must be knowledgeable about the instructional capabilities of computers".
   Strongly agree Agree Undecided Disagree Strongly disagree
   ___ ___ ___ ___ ___

"The data processing applications are more important than the instructional applications of computers".
   Strongly agree Agree Undecided Disagree Strongly disagree
   ___ ___ ___ ___ ___

"Schools of education have definite responsibilities to instruct school administrators about computer applications in education". +
   Strongly agree Agree Undecided Disagree Strongly disagree
   ___ ___ ___ ___ ___

+not asked of two respondents.
POST CIU PROFESSORS
QUESTIONNAIRE

1. How long did it take you to complete the Unit? [33.6']

2. Did you experience any mechanical malfunctions? [0] [5]
   Yes No

3. Were you alone at the terminal? [5] [0]
   Yes No

4. The major objective of this unit was to teach some of the basic
capabilities of Computer Assisted Instruction. What grade would
you assign this unit in meeting this objective?

   A  B  C  D  F
   [2] [3] [0] [0] [0]

5. How suitable is this unit for inclusion within preparation programs
in Educational Administration?
   Very Suitable Unsuitable
   [x x xxx] /

6. How could the unit be made more suitable?

7. If this unit were available, would you encourage students to use
it? Yes [5] No [0]

8. After using this unit, is your attitude towards Computer Assisted
Instruction... More favorable Unchanged Less favorable

   [4] [1] 

9. How would you rate this unit as an instructional device? 

   10 9 8 7 6 5 4 3 2 1 0
   [1] [1] [1]

10. Do you think student attitudes towards Computer Assisted Instruction
would be influenced by interaction with this unit? [4] No [0]. If yes, in what direction would you expect the attitude change to
be?

   More favorable Less favorable
   [4] 

11. Is there a need for similar units in preparation programs in
Educational Administration? Yes [4] No [0]

Results are shown in brackets
12. Should any directions with the instructional unit be changed?
   Yes _____  No _____

13. Were any questions on this questionnaire unclear?
   Yes _____  No _____

*Referenced Chapter III
*a not asked of two respondents
*b one respondent did not complete the form.
APPENDIX D

Experimental Group Background Questionnaire
APPENDIX D
EXPERIMENTAL GROUP RESPONSES
BACKGROUND QUESTIONNAIRE

1. Have you had administrative experience in education? [25] [3]
   Yes No

2. Please check those positions you have held.
   Superintendent________________________
   Asst. Superintendent__________________
   Director of Instruction_________________
   Secondary Principal____________________
   Elementary Principal___________________
   Asst. Secondary Principal______________
   Asst. Elementary Principal_____________
   Department Chairman__________________
   Other (Please specify)__________________

3. Have you had teaching experience? [28] [0]
   Yes No

4. What subjects have you taught? At what level?
   ________________________________ ________
   ________________________________ ________
   ________________________________ ________

5. What academic degrees do you hold? BA[1] MA[27] PhD[0] Specialist[0]

6. How many hours post BA or post MA do you have? _____ semester hours
   or _____ quarter hours

7. Your age [35.8] Years of Administrative experience. [4.89]

8. Do you anticipate holding a school administrative position within
   (or during) the next five years? _____ _____
   Yes No

9. Have you ever witnessed a computer demonstration? [8] [20]
   Yes No

   If so, what was the computer application (topic) presented and in
   what year?
   ________________________________  __________________
   ________________________________  __________________

   TOPIC  YEAR
10. Indicate below how knowledgeable you consider yourself in the use of computers for educational purposes. (Place a check mark in each appropriate space).

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>KNOWLEDGE</th>
<th>If you marked columns 3 thru 5 - where did you get this knowledge?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budgeting</td>
<td>[0]</td>
<td></td>
</tr>
<tr>
<td>Grade Reporting</td>
<td>[1]</td>
<td></td>
</tr>
<tr>
<td>Instruction (direct)</td>
<td>[0]</td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>[2]</td>
<td></td>
</tr>
<tr>
<td>Scheduling</td>
<td>[3]</td>
<td></td>
</tr>
<tr>
<td>Simulation</td>
<td>[4]</td>
<td></td>
</tr>
<tr>
<td>Test Scoring</td>
<td>[5]</td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td>[6]</td>
<td></td>
</tr>
</tbody>
</table>

5=extensive knowledge; 4=more than average; 3=some knowledge; 2=not much; 1=little; 0=absolutely none.

11. Have you ever written a paper (not necessarily published) about computers and/or their application?  [1]  [27]  Yes  No

12. Have you on your own, attempted to learn about computer assisted instruction?  [11]  [17]  Yes  No

13. Have you ever volunteered to use a computer for self-instruction?  [0]  [28]  Yes  No

Please enter below your phone numbers
HOME ______________________________________
WORK _____________________________________
NAME _____________________________________

(No information will be released without your approval on your individual response to any of the foregoing questions).

Thank you for your cooperative assistance.

Results are shown in brackets.
APPENDIX E

Control Group Background Questionnaire
APPENDIX E
CONTROL GROUP RESPONSES
BACKGROUND QUESTIONNAIRE

1. Have you had administrative experience in education? [26] [17]
   Yes No

2. Please check those positions you have held.
   Superintendent
   Asst. Superintendent
   Director of Instruction
   Secondary Principal
   Elementary Principal
   Asst. Secondary Principal
   Asst. Elementary Principal
   Department Chairman
   Other (Please specify)

3. Have you had teaching experience? [42] [1]
   Yes No

4. What subjects have you taught? At what level?

5. What academic degrees do you hold? BA[12] MA[31] PhD[0] Specialist[0]

6. How many hours post BA or post MA do you have? ______ semester hrs.
   or ______ qtr. hours.

7. Your age ______ Years of administrative experience.[3.279]
   [5.423 of 26 above in 1]

8. Do you anticipate holding a school administrative position within
   (or during) the next five years? ______ Yes ______ No

9. Have you ever witnessed a computer demonstration? [14] [29]
   Yes No
   If so, what was the computer application (topic) presented and...
   in what year?
   TOPIC ____________________________ YEAR __________
10. Indicate below how knowledgeable you consider yourself in the use of computers for educational purposes. (Place a check mark in each appropriate space).

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>KNOWLEDGE</th>
<th>If you marked columns 3 thru 5 - where did you get this knowledge?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>5 4 3 2 1 0</td>
<td>Reading Experience Disc.</td>
</tr>
<tr>
<td>Budgeting</td>
<td>2 1 1 1 0 26</td>
<td></td>
</tr>
<tr>
<td>Grade Reporting</td>
<td>2 5 8 1 8 17</td>
<td></td>
</tr>
<tr>
<td>Instruction (direct)</td>
<td>1 1 6 1 7 25</td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>2 1 5 4 10 10</td>
<td></td>
</tr>
<tr>
<td>Scheduling</td>
<td>1 3 6 6 2 9 15</td>
<td></td>
</tr>
<tr>
<td>Simulation</td>
<td>2 3 2 1 0 24</td>
<td></td>
</tr>
<tr>
<td>Test Scoring</td>
<td>2 3 4 3 6 23</td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td>1 0 1 2 8 29</td>
<td></td>
</tr>
</tbody>
</table>

5=extensive knowledge; 4=little more than average; 3=some knowledge; 2=not much; 1=little; 0=absolutely none.

11. Have you ever written a paper (not necessarily published) about computers and/or their application? [2] [41] Yes No

12. Have you on your own, attempted to learn about computer assisted instruction? [9] [34] Yes No

13. Have you ever volunteered to use a computer for self-instruction? [0] [43] Yes No

Please enter below your phone no.
HOME__________________________________________
WORK__________________________________________

NAME__________________________________________

(No information will be released without your approval on your individual response to any of the foregoing questions).

Thank you for your cooperative assistance.

Results are shown in brackets.
APPENDIX F

Attitude Instrument
APPENDIX F
MEASUREMENT STATEMENTS INDICATED
ATTITUDE QUESTIONNAIRE

This instrument has been designed to permit you to indicate how you feel about certain statements. PLEASE RESPOND TO EACH ITEM. Avoid the use of the "Undecided" alternative unless it is absolutely necessary. Circle the letter(s) which most closely express your reaction to each statement. Use this scale:

SA If you strongly agree with the statement.
A If you tend to agree with the statement but not strongly.
U If you are undecided.
D If you tend to disagree with the statement but not strongly.
SD If you strongly disagree with the statement.

The only correct answer is the one which expresses how YOU feel.

Please forgo any attempt to remember how you responded previously. It is important that you indicate how you feel NOW.

1. Educational data processing (EDP) - the use of computers for SA A U D FD scheduling, grade reporting, accounting, etc. MUST be understood by every school administrator. 

2. I am apprehensive about using computers for EDP activities. SA A U D SD

3. Teaching machines will replace teachers. SA A U D SD

4. University programs in Educational Administration must include opportunities for personal use of computers. SA A U D SD

5. Computer assisted instruction (CAI) challenges the student to do his best. SA A U D SD

6. Teaching machines may tend to force attention toward the machine and away from the content. SA A U D SD

7. I don't have much difficulty discarding the old and accepting the new. SA A U D SD

8. Computer assisted instruction is an impersonal teaching approach. SA A U D SD

9. I am very interested in learning about computer assisted instruction. SA A U D SD

10. Use of teaching machines causes students to feel isolated. SA A U D SD

11. University programs in Educational Administration MUST provide courses in computer applications in education. SA A U D SD

12. I am not interested in discussions about how life will be in fifty years. SA A U D SD

13. Teaching machines can individualize instruction more effectively than other methods. SA A U D SD

14. Use of the computer for data processing activities is more important than use of the computer for instruction. SA A U D SD

*a priori inventory statements
+empirically derived statements
*Only included on post administration of Attitude Instrument
15. The use of teaching machines is alien to good teaching.  
16. Schools should use computers for scheduling.  
17. If you start changing things greatly, you usually make things worse.  
18. Teaching machines can insure individualized instruction.  
19. School administrators have a responsibility to influence teachers to accept and use new teaching aids and methods.  
20. Schools should use computers for grade reporting.  
21. Material presented by means of the computer is little more than programmed instruction.  
22. Schools should use computers for cost accounting.  
23. I would prefer to take a course by computer rather than by conventional instruction.  
24. Computer assisted instruction will improve instructional programs.  
25. I am uneasy about the use of computers for teaching youth.  
26. Most teachers hesitate to accept the use of computers for instruction.  
27. I like to know something will work before I take a chance on it.  
28. Teaching machines are an inflexible medium.  
29. To humanize the curriculum requires that instruction be individualized.  
30. Most elementary students would be adversely affected by computerized instruction.  
31. I don't like to start a project unless I have a good idea it will turn out satisfactorily.  
32. Computer companies should provide free use of computers to educators.  
33. I would prefer to take a course by conventional instruction rather than by computer assisted instruction.  
34. I would feel more relaxed taking a course by conventional instruction than by computer assisted instruction.

*Statements included in the a priori inventory  
+Statements included in the empirically derived inventory
35. The school administrator is the instructional leader. SA A U D SD

36. Most secondary students will be adversely affected by computerised teaching. SA A U D SD

37. Computer assisted instruction MUST be understood by every school administrator. SA A U D SD

38. A person is naturally apprehensive towards things about which he is not knowledgeable. SA A U D SD

39. Teaching by machine will tend to dehumanise the curriculum. SA A U D SD

40. Teaching machines could effectively replace teachers. SA A U D SD

41. Most school administrators are receptive towards the use of computers for instruction. SA A U D SD

42. Most school administrators are apprehensive about the use of computers for any educational purposes. SA A U D SD

SITUATIONAL

43. If money were available, how would you rank computer assisted instruction on a school system's list of priorities?
   High _______ Medium _______ Low _______ Not at all _______

44. If you were offered a position to coordinate and administer the development and application of CAI, how would you react?
   I would accept immediately. ______
   I think I would accept. ______
   I think I would decline the offer. ______
   I would refuse immediately. ______

45. At a meeting of your school's administrative staff, the superintendent asks someone to present a "state of the art" message concerning computer assisted instruction to the Board of Education in two months. Would you .........
   volunteer immediately? ______
   accept if asked directly? ______
   decline if asked directly? ______
   decline immediately? ______

*Statements included in the a priori inventory
+Statements included in the empirically derived inventory
46. In a later meeting of your school's administrative staff, the superintendent announces the employment of a CAI administrator. He then asks for volunteers to assist this person. Would you ....
  volunteer immediately? _______  
  accept if asked directly? _______  
  decline if asked directly? _______  
  decline immediately _______  

47. Please indicate on the continuum your attitude towards the use of computers for instructional purposes.

Very Favorable

<table>
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48. Since you responded to the first questionnaire, have you discussed computer applications?  _____  yes  _____  no  
If so, was this discussion short ____ or lengthy ____?

49. Since you responded to the first questionnaire, have you read about computer applications?  _____  yes  _____  no  
If so, would you say this reading was slight ____ or considerable ____?

50. Since you responded to the first questionnaire, have you read about or discussed computer assisted instruction?  _____  yes  _____  no  
Would you say this exposure was slight ____ or considerable ____?

51. Since the first questionnaire, have you participated in a demonstration of Computer assisted instruction?  _____  yes  _____  no  

Please indicate below your Phone numbers at

HOME ____________________________  
WORK ____________________________  

Thank you for your participation

(Only included on post administration of the Attitude Instrument.)
APPENDIX G

Experimental Group Post CIU Questionnaire
EXPERIMENTAL GROUP RESPONSES
POST CIU QUESTIONNAIRE

1. How long did it take you to complete the unit? [29.8] minutes.

   Yes No

3. Were you alone at the terminal except for the proctor? [13] [1]
   Yes No

4. Were any directions or explanations in the instructional unit not clear? [4] [24]
   If so, please indicate where. (Use reverse).
   Yes No

5. Did you enter any responses you knew were wrong? [15] [13]
   Yes No

6. The primary objective of this unit was to teach some of the capabilities of computer assisted instruction. What letter grade would you assign the unit in meeting this objective? (Please circle grade).
   A B C D E
   [19] [8] [0] [1] [0]

7. What numerical score would it receive? 10 9 8 7 6 5 4 3 2 1
   [16][4][7]

8. How suitable is this unit for use within preparation programs in Educational Administration? (Use the continuum below).
   Very Suitable Very Unsuitable
   [13] 9 2 2 0 1

9. Would you encourage other students of Educational Administration to take this unit? [26] [2]
   Yes No

10. How did this experience in computer assisted instruction affect you? Did it cause your attitude towards CAI to be more favorable[20] less favorable[1] or remain unchanged[7]?

11. Do you see a need for similar instructional units in programs in Educational Administration? [26] [2]
    Yes No

12. At what levels do you think computer assisted instruction would be suitable?
    Elementary Secondary Jr. High Undergraduate Graduate None
    YES [19] [27] [26] [25] [23] [0]
    NO [9] [1] [2] [3] [5] [28]
    (Check each that applies)
13. Please circle the appropriate letter(s) to indicate your feeling relative to the instructional unit. Use this scale:

SA  If you strongly agree with the statement.
A   If you tend to agree with the statement.
U   If you are undecided.
D   If you tend to disagree with the statement.
SD  If you strongly disagree with the statement.

a. My participation in the instructional unit has made me less apprehensive towards computers.

b. I now more fully understand the operational capabilities of computer assisted instruction.

c. I am interested in learning more about computer assisted instruction.

d. I feel this experience was beneficial.

e. I felt frustrated by this experience.

f. I was very pleased with this experience.

g. I would like to take more courses taught by computerized instruction.

h. I was disappointed with this experience.

Please indicate your phone numbers at

HOME__________________________________________

WORK__________________________________________

Thank you for your time and cooperation.

Results are shown in brackets.
APPENDIX H

Pre-Attitude Test Results
### APPENDIX H
#### PRE-ATTITUDE EXPERIMENTAL (a)

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| 7    | 4.03 | .83 | 3.86 | 1.86| .846|
| 8    | 3.46 | 1.13| 3.09 | 1.21| 1.292|
| 9    | 4.22 | .75 | 4.07 | .93 | .713|
| 10   | 3.85 | .81 | 3.48 | .96 | 1.629|
| 11   | 3.92 | 1.08| 3.53 | 1.03| 1.539|
| 12   | 1.53 | .83 | 1.53 | .50 | .005|
| 13   | 3.64 | 1.02| 3.21 | 1.12| 1.642|
| 14   | 2.82 | 1.15| 3.14 | 1.14| -1.139|
| 15   | 4.32 | .66 | 4.07 | .76 | 1.416|
| 16   | 4.14 | .90 | 4.12 | .80 | .139|
| 17   | 1.53 | .50 | 1.90 | .82 | -1.216c|
| 18   | 2.42 | 1.16| 2.88 | 1.02| -1.726|
| 19   | 4.35 | .73 | 4.16 | .85 | .967|
| 20   | 4.03 | .80 | 3.95 | .81 | 1.418|
| 21   | 2.82 | 1.15| 2.60 | .95 | .859|
| 22   | 4.14 | .52 | 3.93 | .88 | 1.147|
| 23   | 2.55 | 1.08| 2.34 | .78 | .924|
| 24   | 3.92 | .76 | 3.65 | .78 | 1.470|
| 25   | 3.96 | 1.03| 3.37 | 1.02| 2.370c|
| 26   | 3.75 | .84 | 3.83 | .57 | -.518|
| 27   | 2.67 | 1.21| 2.97 | 1.11| -1.045|
| 28   | 3.67 | 1.12| 3.69 | .80 | .083|
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| 30   | 4.14 | .65 | 3.60 | .85 | 2.850e|
| 31   | 2.71 | 1.21| 3.21 | 1.14| -1.738|
| 32   | 2.32 | 1.05| 2.90 | 1.17| -2.138c|
| 33   | 3.10 | 1.13| 3.23 | .97 | .497|
| 34   | 2.89 | 1.16| 3.18 | 1.03| -1.112|
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| 39   | 3.96 | .88 | 3.39 | 1.00| 2.447d|
| 40   | 1.32 | .47 | 1.62 | .57 | -2.335d|
| 41   | 2.67 | .90 | 2.53 | .79 | .703|
| 42   | 2.60 | 1.19| 2.72 | 1.00| -.431|
| 43   | 3.14 | .65 | 2.95 | .72 | 1.122|
| 44   | 2.46 | .88 | 2.55 | .73 | -.486|
| 45   | 2.67 | .72 | 2.81 | .66 | -.811|
| 46   | 3.17 | .66 | 3.09 | .58 | .533|
| 47   | 4.89 | 1.06| 4.19 | 1.14| 2.555d|

**a** N=28  
**b** N=43  
**c** .05  
**d** .02  
**e** .01  

*significant level*
APPENDIX I

Experimental Group Attitude Test Results
### APPENDIX I

#### EXPERIMENTAL (a)

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level of significance
APPENDIX L

Statement Differences
APPENDIX L

STATEMENT DIFFERENCES REVEALED
BY
POST-TEST COMPARISON BETWEEN GROUPS

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*Significant on pre-attitude test comparison between groups*
APPENDIX M

Group Expressed and Measured Attitude Modification
## APPENDIX M

**INDIVIDUAL RELATIONSHIPS BETWEEN EXPRESSED MODIFICATION CATEGORIES AND ATTITUDE MEASURES**

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*Post CIU Questionnaire, Item 10*
APPENDIX N

Individual Expressed and Measured Attitude Modification
## APPENDIX N

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<sup>a</sup>Item 13a, Post CIU Questionnaire  
<sup>b</sup>Attitude Instrument Statements
APPENDIX 0

Contingency Tables
APPENDIX O
2X2 CONTINGENCY TABLES
Selected Background Factors
and
Attitude Towards CAI

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<td>B</td>
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A Above sample mean of factor
B Below sample mean of factor
F Above sample mean of attitude towards computer assisted instruction.
U Below sample mean of attitude towards computer assisted instruction.
a Formula for $\chi^2$ used was $\chi^2 = \frac{N(ad-bc)^2}{(a+b)(a+c)(b+d)(c+d)}$
APPENDIX P

Attitude Measures Correlations
### APPENDIX P

**PRE-POST TEST**

**CORRELATIONS BETWEEN ATTITUDE MEASURES**

<table>
<thead>
<tr>
<th>Group/Administration</th>
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<th>SD</th>
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**X** = *A Priori* statement inventory  
**Y** = Empirically derived statement inventory  
**Z** = Item 47
BIBLIOGRAPHY

Books


Periodicals


