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IN INSTRUCTION AT THE UNIVERSITY LEVEL.

LEHIGH UNIVERSITY, ED.D., 1978

STRATEGIES FOR ENHANCING THE USE OF COMPUTERS

IN INSTRUCTION AT THE UNIVERSITY LEVEL

by

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ABSTRACT

STRATEGIES FOR ENHANCING THE USE OF COMPUTERS

IN INSTRUCTION AT THE UNIVERSITY LEVEL

by

Hugh J. McFadden, Jr.

The purpose of the study was to examine those
factors thought to be adversely affecting the acceptance
of computer-based learning systems at the university
level, and to develop and recommend strategies and
policies which would enhance the development and
acceptance of instructional computer use.

In terms of methodology, the sample chosen for
the study consisted of 380 teaching faculty members at
a major eastern university. The university, comprised
of three academic colleges and a graduate school of
education, supports a student body of approximately
4,000 undergraduates and 2,100 graduate students.

A questionnaire consisting of three major parts
was distributed to each of the faculty members. The
first part of the questionnaire collected demographic
data on the participants. The second part presented

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thirty items which formed a set of 'potentially inhibiting' factors to CAI's development and use. The participants were requested to indicate their knowledge/awareness of each factor, and to rate its perceived effect on their use of computer-based learning materials. In the third and final part part of the questionnaire, the participants were requested to recommend strategies for overcoming the inhibitors to CAI's acceptance and use.

A forty-seven percent response rate was achieved. A total of 180 faculty questionnaires were received in usable form. Based upon demographic subdivisions, computer user and non-user, and affiliation within school or college, Chi Square analyses were conducted to determine factors of common faculty concern. Of the thirty items that were originally presented, eighteen were found to be of common concern to all faculty groups. These eighteen factors were subsequently ranked in terms of 'most negative' effect.

The eighteen factors of common faculty concern were fit to the circular cycle of problem areas proposed by Anastasio and Morgan in their 1972 study, "Factors Inhibiting the Use of Computers in Instruction."

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It was found that the majority of faculty concerns
were centered about the lack of skilled personnel
and the lack of proven effectiveness of computer-
based materials. It was therefore concluded that if
the university was to succeed in the area of CAI,
it must first demonstrate its utility and value to
the faculty. It was further concluded that before
CAI could be proven effective, personnel would have
to be trained in areas related to its development
and application. It was therefore recommended that
the university provide incentives and support for
its faculty in developmental CAI work, and that the
university evaluate its progress towards the CAI
objective in a few years' time.

CHAPTER I

INTRODUCTION

Preface

In the past decade, the development and application of computer-based learning materials in the academic realm has fallen far short of the expectations of many educators. While a few select colleges and universities have made extensive use of computer-based learning systems, the vast majority of academic institutions have not accepted computer-based learning systems as a part of their standard instructional program. As computing power becomes more and more accessible to college communities, an increasing number of educators are questioning the potential application of that power in the instructional process.

Statement of the Problem

The purpose of this study was to examine
those factors thought to be adversely affecting the
acceptance of computer-based learning systems at the
university level, and to develop and recommend
strategies and policies which would enhance the
development and acceptance of instructional computer
use.

Need for the Study

Nationwide, the obstacles to the acceptance
and use of the computer in education have revolved
around three broad areas of concern: cost, teacher
acceptance, and the idea that computers may somehow
dehumanize and alienate the student (Bright, 1970).
Numerous studies have been conducted in an effort to
further breakdown and classify these obstacles. The
most noteworthy of these studies being a study that
was conducted by Anastasio and Morgan in 1972. In
their study, Anastasio and Morgan report on the con-
sensus of opinion obtained from thirty-four experts
and authorities in the fields of computing, education,
administration, and law. They conclude that although

the problems of instructional computer use are numerous and complex, they can be said to have three major dimensions: educational, economic, and technical. The educational dimension, relating to the general availability of adequate computer-based materials and the lack of evidence of CAI's effectiveness, was judged to be the most critical. Within the educational dimension, Anastasio and Morgan note a circular interrelationship among obstacles as follows:

> To provide evidence of effectiveness, one must (a) conduct a convincing high-quality demonstration. But (b) to conduct a proper demonstration, one needs good computer-based materials. But (c) to develop good materials, one needs good people who know theories and methods of instruction, and are sensitive to the role of the teacher and problems of the classroom. But (d) to get good people, one needs professional recognition and economic incentives. But (e) to get professional recognition, one needs evidence of the value of the pursuit (see point a), and to get proper economic incentives, one needs a formal production/distribution system (as in textbook publishing) and an active market. But (f) to establish a production/distribution system, one needs a demonstration of effectiveness to convince potential investors and buyers of CAI's value - and we are back at the beginning.

As Anastasio and Morgan have shown, in this dimension, to be judged effective, CAI must first exist, and to exist, all of the problems which hinder its overall development must first be resolved. In their

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conclusions and recommendations, Anastasio and
Morgan contend that this circularity suggests that,
theoretically, an infusion of funds at any one
step might advance overall development by reversing
the cycle. It is also their suggestion that this
circularity indicates that a large-scale program of
funding, at any one step, would have to take these
interdependencies into account. The question that
their study leaves unanswered is, 'At what step in
the the cycle should an infusion of funds and man-
hours be made, such that enough momentum could be
gained to reverse the status quo cycle?' This is a
question that a study with such broad implications
for all levels of instruction cannot attempt to
answer. Anastasio and Morgan cannot suggest a point
of entry into this cycle that is fitting for all
institutions. It is impossible to apply any set or
classification of obstacles in-total to a specific
local setting. If an institution is to identify the
most critical obstacles to CAI's acceptance and use
by its members, it must address this problem in
light of its own local environment. While Anastasio
and Morgan clearly identify obstacles which are common
to most institutions, the rank-ordering of these

obstacles, in terms of priority for resolution, must
be made at the local level.

The study described in this paper has iden-
tified and rank-ordered the problems perceived to be
most critical at one particular university, and has
formulated recommendations for actions that should be
taken to overcome these problems.

Assumptions

The underlying assumption of this study is
that the computer has a beneficial role to play in the
instructional process. This assumption is based
upon certain of the findings presented in the
Anastasio and Morgan (1972) report. In the discussion
of the study's results, they report that the response
to the questions requiring the participants to estimate
the desirability of, and the computers' potential
contribution to a number of presumed educational
benefits that might result from the use of computers
in the instructional process was clear and uniform.
They report substantial agreement that where adequate
facilities and quality course materials are available,
subject matter can be taught more rapidly, meaning-
fully, and thoroughly with the computer's aid. In

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general, they report that the group's opinion was that proper use of the computer in instruction would make education more productive and effective, allow for greater individualization, and provide for greater equality of educational opportunity.

While one cannot assume that all levels of instruction, in all disciplines, could be taught with the computer, one can neither assume that the computer in incapable of making some contribution to the instructional process regardless of the setting or the discipline. The instructional use of the computer can range from computer-based drill and practice to the simulation of experiments in the physical and social sciences. The computer can be used as a sole source of instruction, or it can be used in ancillary support of traditional modes of instruction.

Questions to be Asked

The study addressed the following questions:

(1) What factors may be identified that act to hinder the acceptance and use of computers in instruction?

(2) How are these factors to be ranked in terms of faculty concern and need for resolution?

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(3) Can a specific entry point in the cycle suggested
     by Anastasio and Morgan (1972) be determined?

(4) What strategies or policy changes may be
     recommended that would act to overcome these
     inhibiting factors?

     The following hypotheses were tested to
determine which of the obstacles that were identified
were of common concern to all instructional groups on
the campus. The hypotheses were as follows:

(1) The proportion of factors identified as obstacles
     to instructional computer use by current computer
     users is the same as that identified by non-
     users.

(2) The proportion of factors identified as obstacles
     to instructional computer use is the same for
     all faculties of the university's four major
     disciplines.

Definition of Terms

     Throughout the study, Computer Assisted
Instruction (CAI) was used as a generic term. CAI,
as used in the context of this study, was said to
encompass all aspects of computer use in the instruc-
tional process. CAI was said to include: computer-

assisted instruction, computer-based instruction,

computer-managed instruction, problem solving,

gaming, modeling, and the use of simulations in

support of instruction.

Other terms that are peculiar to the use of

the computer and have been used in this study include:

Hardware - the hardware of a computing system are

   the machines themselves: the central processor, the

   peripheral equipment (card reader, printers, tape

   drives, etc.), and the remote access terminals.

Interactive Computer Terminal - a device that

   permits the user to interact with the computer in

   a conversational manner.

Software - a collection of programs and routines

   which facilitate the programming and operation of

   a computer; e.g., CAI lessons. Programs and other

   routines that are designed to support computer-

   assisted instruction are often times referred to

   as Courseware.

Time Sharing - a technique or system for supplying

   computer services to a number of users at any

   number of physically scattered terminal locations,

   providing rapid response to each user so that it

   appears to each that he alone is using the system.

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Transportability - the ability to take computer
software that is developed for use on one computing
system and install it on another of similar or
different manufacture.

CHAPTER II

REVIEW OF THE LITERATURE

In the review of the literature, two major
areas are examined. The first concerns itself with
an overview of where we are today in terms of the
instructional use of computers, and where the
recognized authorities in this field feel we should
be and will be in the coming years. The second area
and the primary topic of this review is an analysis
of studies previously conducted to determine the
existence of factors which have hindered a more wide-
spread use of instructional computer technology in our
schools.

It is Watson's (1972) observation that it is
fairly evident that the question of whether the com-
puter should be used in education and/or instruction
is now no longer relevant. He contends that a look
at the extent and the variety of current educational

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uses of the computer will quickly dispel the notion that their usage is something that might occur in the distant future. Irrespective of the actual number of students involved, and whether this number is judged to be 'not enough' or 'too many,' the phenomenon of instructional computer use has been growing and is clearly now of a magnitude that it must be taken seriously by educators, government, and industry (Seidel, Hunter, Kastner, and Rubin, 1975). Lagowski (1968) goes one step further contending that any major university which ignores computer-assisted instruction today is only temporarily side-stepping tomorrow's inevitable; because in higher education, educators have passed the point where logistics and problems can be solved by building bigger classrooms, adding more instructors, and doing the same old things, mistakes included, in the same old ways, but on a larger scale. As Kropp (1970) observed, computers in education are a fact now! The relevant question today being not whether computers will be used in our schools, but rather how they will be used.

Despite the fact that computers have arrived on the educational scene, and despite the fact that the role of computers in educational management has a

history comparable to that within the business world, the role of the computer's support of instruction is still very much in its infancy. Within the past thirty years, the usage of computers in education has moved to a point where today nearly every university and more than one-third of all four-year colleges provide at least some computer services for research and/or instructional purposes (Watson, 1972). In addition, many colleges are members of computing networks and have access to remote computer terminals on campus. While computing facilities are presently available on most college campuses, their instructional use has reached very few students. The Carnegie Commission on Higher Education (1972) reported that despite all of the money that colleges and universities have invested in computing within the past thirty years, only about four and one-half percent of the students have had instructional experience with the computer. Seidel et al. (1975) report the following statistics as an indication of the order of investment made in educational computing:

> Exclusive of Title I and some major administrative applications, the United States Office of Education spent an estimated $161 million between 1964 and 1969.

Since 1965 the National Science
Foundation has specifically supported
the development of computer-related
innovational projects with nearly $40
million per year.

In the year 1969-70 an estimated
$142 million was dedicated to instruc-
tional computer use by institutions of
higher learning. This represents thirty
percent of the total $480 million spent
on all computing activities.

Seidel et al. (1975) estimate that the overall

national investment, thus far, in the educational use

of computers, may be as high as $2 billion.

Despite these expenditures, many educators

who are quick to realize the computer's potential as

an administrative work horse, dedicated to student

scheduling, record keeping, and payroll applications,

fail to recognize the computer's potential applica-

tions in the instructional process itself. The

computer has been shown to have many potential

instructional applications both direct and ancillary

(Watson, 1972). At colleges and universities through-

out the country, computers have been applied to the

instructional process in a wide variety of ways.

Current applications vary from simple drill and prac-

tice to sophisticated dialogues and simulations.

Milner and Wildberger (1974) in their paper "How

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Should Computers be Used in Learning" present three

basically different classes of reasons for using the

computer in the instructional process. In effect,

these reasons or justifications are actually examples

of how the computer is being used in instruction.

The reasons that they give are as follows:

> First, there are some uses of a
> computer in instruction for which there
> is essentially no other competitive
> method for accomplishing the same
> results. Second, the computer has
> certain unique characteristics which
> can provide important instructional
> capabilities. Third, there are instances
> where the computer is simply the most
> economical way to perform instruction
> which may be done equally by other methods.

As an example of situations which require

computer support, Milner and Wildberger (1974) cite

instruction 'about' the computer in which the computer

is both subject and tool. Other examples include the

use of computer simulations of real systems or real

world phenomena which are unavailable by other means;

i.e., management systems in which real life mistakes

would be costly, or scientific experiments in which

laboratory errors would be dangerous or deadly.

Instructional management functions such as testing,

prescribing, record keeping, and resource allocation

are said to be examples of the computer's unique benefits to instruction. In the instructional management mode, the computer can provide a single point of contact through which instruction can be delivered, modified, managed, and, most importantly, controlled by the student. The student may retrieve, for example, through a single computer terminal, information on virtually any subject stored in the computer's memory to which he is permitted access; and ultimately this memory can be extended by communications' networks to cooperating data processing libraries throughout the world (National Academy of Science; Markuson, 1972). The economic advantages of instructional computing may be found in instances of high usage systems. Clearly, the routine use of computers (e.g., functions such as drill and practice, instructional management, testing or the programming of instruction) in mass instructional settings makes education less labor intensive, makes it easier to reach a student body that may be dispersed geographically, and facilitates treatment of students with special handicaps or widely differing backgrounds.

The question that inevitably arises is that of the diversity of existing applications. Why has

one institution made a near total commitment to
instructional computing, while another contents
itself with research and problem solving applications?
Why the extremes, when both applications are theoret-
ically possible on the same computing system at the
same time? There is at least one plausible explana-
tion for this phenomenon; this being that an institution
forsees no potential instructional application worth
considering and has chosen to address its resources
to problem solving and research applications. This
may well be a result of the educators' unawareness
of the computer's potentiality. Conservative educators
excuse their unawareness of the potential of this
technology by saying that there is insufficient
research to support the need for capabilities like
learner control and interactive graphics (Milner and
Wildberger, 1974). Unfortunately, this view fails to
take into account problems common to all research
such as the difficulty of devising non-artificial
experiments, the meaning of 'no significant differ-
ences,' and the Hawthorne effect (Milner and
Wildberger, 1974). Jamison, Suppes and Wells (1974)
state:
> . . . most evaluations, particularly
> those considered well controlled, compare

traditional classroom instruction to a
form of computer-assisted instruction
that closely emulates traditional instruc-
tion. It is at least plausible that many
survey conclusions would be overturned
were more imaginative uses of the media
explored, which still permit comparative
evaluation.

Milner and Wildberger (1974) conclude that

the lack of research serves to perpetuate existing

paradigms without necessarily proving their value;

research must first be conducted to determine if

existing non-computerized educational practices

should be perpetuated, and to stimulate the re-

examination of present educational practices.

To be sure, the computer is one possible

means of achieving educational goals. However, it

can also catalyze educational change (Ellis, 1974);

serve as a new intellectual resource (Luehrmann,

1973); and offer the potential to do new things in

education. Regarding this latter point and relating

to the potential for the misuse of the computer,

Papert and Salomon (1972) wrote:

How strange, then, that computers
in education should so often reduce to
using bright new gadgets to teach the
same old stuff in thinly disguised
versions of the same old way.

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It follows that if more effective, creative, and imaginative uses are made of computers, more effective uses of knowledge will emerge.

What then stands between an educational institution that is desirous of instructional computer use and the investigation and/or implementation of computer-based learning systems? It has been shown in various studies that without exception obstacles exist on the local level which act to hinder developmental work in this area. Luskin (1972) concludes that the use of the computer as an educational tool in the majority of schools will become a future reality. Acceleration of the time, however, is dependent upon what can be done to resolve the obstacles which threaten to inhibit this achievement. By raising far-reaching and ambitious questions and by examining the dimensions of these questions in terms of the responses of participating experts in the field, a clearer picture of both the present and the future can be drawn. Suppes (1968) believes that there is no denying that the computer has a role to play in the educational process. However, the orchestrating of the capabilities of the computer to the needs of the highly complex educational

environment may fail, if we do not identify and examine obstacles which affect positive development and have the potential to contribute to the failure of computer-assisted instruction.

As Seidel et al. (1975) have noted, formal studies along these lines appear to be few in number. However, an examination of the findings of the studies that have been conducted indicates that there is a diversity of factors which have been identified as potential inhibitors at many institutions. In their review of seven selected studies conducted between 1970 and 1973, Seidel et al. (1975) caution that the significant implication of this diversity is that all of the obstacles which have been identified are considered potentially important, and that the reader must judge the relative weighting of the barriers for his or her own local situation.

Numerous studies have categorized the obstacles to wide-spread use and acceptance of computers in instruction in terms of their relevance to development, adoption, or dissemination of computer-based learning materials. As part of an overall investigation of computer-based learning on the educational scene in the United States, the Human

Resources Research Organization (1975) surveyed the
literature to explore the nature and extent of
obstacles to the development, adoption, and dissemina-
tion of computer-based curricular innovations. The
works examined in this survey included the following:
(1) "A Study of Factors that have Inhibited a More
Widespread Use of Computers in the Instructional
Process," (Anastasio and Morgan, 1972); (2) "The
Fourth Revolution - Instructional Technology in
Higher Education, A Report and Recommendations,"
(Carnegie Commission on Higher Education, 1972);
(3) "Exchange and Applications for Education - A
National Stalemate," (Denk, 1971); (4) "The Emerging
Technology - The Instructional Use of the Computer in
Higher Education," (Levien, 1972); (5) "An Identi-
fication and Examination of Obstacles to the
Development of Computer-Assisted Instruction,"
(Luskin, 1970); (6) "A Survey Forecast of New
Technology in Universities and Colleges," (Wilcox,
1972); and (7) "An Evaluative Review of Uses of
Computers in Instruction," (Zinn, 1970).

Seidel, Hunter, Kastner, and Rubin (1974)
summarized the results of this organization's survey
in tabular form. The reader should note that since

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the purpose, scope, and methodology of each study were somewhat different, it was necessary for the authors (Seidel et al., 1974) to restate and reclassify the obstacles reported into comparable categories.

In the following presentation, an adaptation of the tabular presentation made by Seidel et al. (1974), the obstacles are presented by major category: Development, Adoption, and Dissemination (demonstration). Within each category, the obstacles are listed alphabetically without a category weighting of the individual barriers. For each obstacle that is presented, the respective 'importance rating' reported in the original seven studies is presented.

The obstacles to the DEVELOPMENT of computer-based learning systems were said to be:

1. Developmental Costs
   a. There is insufficient local funding to
      support the development of computer-
      based learning systems (Considerable:
      Levien).

2. Incentives for Developmental Effort
   a. Educators see little opportunity for
      economic and/or professional rewards
      (Major: Anastasio and Morgan, the
      Carnegie Commission, and Zinn;
      Minor: Levien).
   b. Computer-based programs that are
      developed do not count towards
      research publishing (Major: Denk,
      Luskin, and Zinn; Minor: Levien).

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3. The Lack of Skilled Personnel in the Schools
   a. Most instructors lack the component skills, knowledge of computing as well as a specific discipline, that are required (Major: Luskin; Considerable: Levien).
   b. There is little opportunity for local participation in developmental programs (Considerable: Anastasio and Morgan).
   c. Typically, most instructors require technical training on a one-to-one basis (Major: Denk).
   d. There is a lack of computer program librarians and user services personnel (Considerable: Anastasio and Morgan).
   e. Many of the skills that are required are not clearly defined; schools are not able to project their personnel needs; too few skilled recruits are currently available to the schools (Considerable: Luskin, and Levien).

4. The Mobility of Programs
   a. There is a lack of support services in this area (Major: Denk).
   b. There is a need for information, review, and evaluation of existing support services (Major: Zinn).
   c. The transportability of programs between computing systems is difficult, if not impossible (Major: Denk).

5. Difficulties in Publishing Materials that are Developed
   a. Systems that are developed must be published to reach other teachers (Considerable: Denk).
   b. There is a lack of appropriate methods for protecting the developers' rights (Major: Zinn; Considerable: Anastasio and Morgan, and Luskin).
   c. Most of the programs that have been developed are not sophisticated enough for the current publishing media (Major: Denk).

6. Technological Problems
   a. Existing audio-visual devices are not easily interfaced with computer-based learning systems (Considerable: Luskin).
   b. The availability of technical advice from sources outside of the schools is scarce (Major: Luskin; Considerable: Levien).
   c. The lack of compatibility in computer systems which limits the potential for software sharing (Major: the Carnegie Commission; Considerable: Anastasio and Morgan, and Luskin).
   d. The limited power of the available CAI author languages (Minor: Luskin).
   e. The limited capabilities of available terminal devices (Considerable: Luskin).

7. Other Developmental Factors
   a. Current class sizes and student/teacher ratios are too high to support experimentation in the classroom (Minor: Levien).
   b. The diversity of schools and academic programs throughout the country (Considerable: Anastasio and Morgan).
   c. The number of junior faculty [too few] (Minor: Levien).
   d. The number of senior faculty [too many] (Considerable: Levien).

The obstacles to the ADOPTION of CAI were

described as follows:

1. Cost
   a. The lack of local funding (Major: Levien, and Luskin).
   b. The lack of external funds to augment local budgets (Major: Levien, and Luskin).
   c. The fact that, to date, CAI has not been proven to be cost effective (Major: Anastasio and Morgan; Considerable: Luskin).

2. The Lack of Computer-based Learning Materials
   a. Available, published materials are poor in quality (Major: Anastasio and Morgan, and the Carnegie Commission; Considerable: Levien).
   b. Current documentation is either poor or is missing (Major: Luskin, and Denk).
   c. There is no standardized curriculum for computer-based systems (Considerable: Luskin, and Zinn).
   d. Some of the programs that have been developed have been improperly class-ified as obsolete (Considerable: Denk).
   e. Computer-based systems cannot be fit to a wide variety of pedagogical techniques and instructional strategies (Consider-able: Anastasio and Morgan; Minor: Luskin).

The following were reported as obstacles to the DEMONSTRATION of CAI's effectiveness, and the DISSEMINATION of computer-based learning materials:

1. Attitudes
   a. The negative attitude of many school administrators (Considerable: Levien, and Luskin; Minor: Wilcox).
   b. A fear of role reduction by the faculty (Major: the Carnegie Commission, Luskin, Wilcox; Considerable: Anastasio and Morgan; Minor: Levien).
   c. The reluctance of the public to support experimentation (Minor: Levien, and Luskin).
   d. The students' fear of the unknown (Minor: Levien, and Luskin).
   e. A general uncertainty of the effectiveness of CAI (Considerable: Anastasio and Morgan).

2. Costs
   a. CAI is often seen as an add-on cost (Major: Anastasio and Morgan).
   b. To date, the cost effectiveness of CAI has not been proven (Major: Anastasio and Morgan; Considerable: Luskin; Minor: Denk).

c. CAI involves a high capital investment (Major: Anastasio and Morgan).
d. Insufficient local funds are available for new programs (Major: Levien, Luskin, and Wilcox).

3. Incentives for Development
   a. There are few incentives for dissemination of software (Major: Anastasio and Morgan).
   b. There are few incentives for the production, distribution, and revision of software documentation (Major: Zinn).

4. The Lack of Proven Effectiveness
   a. There is an insufficient number of evaluative measures in this area (Considerable: Anastasio and Morgan, and the Carnegie Commission; Minor: Luskin).
   b. There have been too few broad programs for experimentation (Considerable: Anastasio and Morgan).
   c. The lack of evidence that computer-based learning materials are more effective than other materials (Major: Anastasio and Morgan, and the Carnegie Commission; Considerable: Wilcox).
   d. There are too few examples of high quality use (Major: Anastasio and Morgan, and the Carnegie Commission).

5. The Lack of Organizational Structure
   a. There is no central agency for the exchange of software products (Major: Denk; Considerable: Anastasio and Morgan).
   b. There is little centralization of resources for training purposes (Major: Zinn).
   c. Existing systems for software distribution are poor (Major: Denk; Considerable: Luskin).

6. The Lack of Skilled Personnel
   a. The availability of skilled recruits is limited (Considerable: Levien).
   b. Expertise in this area requires the development of many component skills, a knowledge of computing processes,

pedagogical techniques, and specific
academic disciplines (Major: the Carnegie
Commission, and Levien; Considerable:
Anastasio and Morgan, and Luskin).

c. Schools that are faced with limited
personnel resources are reluctant to
retrain faculty (Major: Denk; Consider-
able: Anastasio and Morgan).

d. The schools can provide little in terms
of technical support and user services
(Major: Denk).

As this review indicates, the potential
obstacles cut across the entire educational spectrum.
Developmental barriers range from the lack of
economic and professional incentives to the lack of
skilled personnel and funding to produce the needed
materials. Adoption is hampered by gaps in our
knowledge of instructional strategies, lack of
documentation, and lack of integration into the
existing curricula. Adoption is also hindered by the
lack of personnel skilled in computer applications,
and the negative attitudes of those who fear a lack
of status coupled with a lack of incentives for
them to dedicate their time to the integration of
computer-based learning materials. While dissemina-
tion is also subject to many of the obstacles affecting
development and adoption, it is hindered by the added
problems of transportability between computing systems,

the lack of organized software clearing houses, and numerous legal and financial publishing difficulties.

Although various studies have attempted to identify and isolate specific problem areas, it must be noted that the obstacles to computer use in education are so intertwined that it often times is impossible to separate them. Anastasio and Morgan (1972) address this interaction of obstacles in terms of a circularity of analyses. In their conclusions and recommendations, Anastasio and Morgan describe this cirularity in terms of one factor's effect on the next. Anastasio and Morgan contend that the circularity of potential problem areas suggests that, theoretically, an infusion of funds at any one of the steps might advance overall development by reversing the cycle.

Suppes (1968) identified three stages in the development of computer-assisted instruction:

> Phase I being the use of computer-assisted instruction in a serious operational sense, with students being processed daily and organized around major research centers.

> Phase II consists of demonstration efforts operated by various schools. In this attempt there is no effort made to

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reach the total school population, but
rather small demonstration groups.

Phase III occurs when schools attempt
to make computer-assisted instruction an
operational part of their regular school
program, and to have such teaching methods,
where appropriate, reach every student in
specific courses.

Luskin (1972) reports that on a nationwide

scale the status of computer-assisted instruction

appears to be skewed towards Phases I and II, with

numerous obstacles inhibiting effective transition to

Phase III. Luskin (1972) cautions that it should be

noted that exploration and experimentation at all

levels is occurring in all segments of education.

He goes on to state that if the three-phase develop-

ment pattern set forth by Suppes is to be accepted,

it would appear that it is important, at this time,

to begin to identify the inhibitors to the entry of

computer-assisted instruction into Phase III.

Furthermore, it is imperative that work be done to

reduce the degree of obstruction that is created by

problems in transition to Phase III, while continued

research and development activities in Phases I and II

pave the way. If the results of investigations in

Phases I and II prove to be encouraging, it would be

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rather unfortunate for computer-assisted instruction
to be retarded during transition to Phase III.

Silberman and Filep (1968) report that
although computer-assisted instruction has been
researched to a significant extent over the preceeding
ten years, it clearly remains in its infancy. It is
their contention that computer-assisted instruction
is not now a practical tool ready for widespread
implementation in schools, and that many of the
problems that require solution prior to widespread
application have yet to be tackled by researchers.
The time projections set forth by Seidel et al. (1975)
assert that expectations are for widespread instruc-
tional computer use to take place first in higher
education, with the time projection centering around
1985. If these projections are to be realized, the
need for additional studies is quite immediate.

As previously stated, the use of instructional
computer technology in our schools is limited to a
few select institutions and systems. Therefore, the
number of educators, experts if you will, actively
involved in this field is meager in comparison with
this nation's total teaching complement. Unfortunately,
the studies that are cited in this review were conducted

within this small subpopulation of authorities and experts in computing. While they present the perceptions and opinions of those most closely associated with this field of technology, they are limited in that they deal with the "do's" and not with the "do not's." These studies assume that those who use computer technology in their instruction are knowledgeable as to why certain of their colleagues do not. While the perceptions of experts may reflect the current state of the art, one cannot assume that these perceptions are a true representation of the feelings and concerns of those who are not actively involved in the field of instructional computing.

A second limitation of the studies cited herein is that they present findings based upon surveys conducted among representatives of all levels of instruction. These studies cite the concerns of elementary teachers as well as those of university professors; they present problems found in private institutions as well as those common to public instruction. While the application of these studies' findings may be limited at the local level or at a particular level of instruction, they do present a foundation upon which subsequent studies might be

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based. They present problems that might or might not
be common to a particular setting, and they force
educators to question their results in light of
known local conditions.

CHAPTER III

PROCEDURES

Introduction

Chapter III presents a discussion of the
actual study itself. This chapter addresses the
procedures that were employed, the population that
was surveyed, the questionnaire that was used, and
the statistical treatment of the data.

The Sample

The study was conducted at Lehigh University,
Bethlehem, Pennsylvania. Lehigh University is a
privately endowed, coeducational institution com-
prised of three academic colleges and one school.
Major disciplines at Lehigh University include:
the College of Arts and Sciences, the College of
Engineering and Physical Sciences, the College of
Business and Economics, and the School of Education.

Approximately 4,000 undergraduates and 2,100 graduate students attend Lehigh University.

The sample for this study consisted of the 380 full and part-time members of the university's faculty. Faculty names were drawn from an official faculty roster obtained from the President's Data Base Coordinator, Office of the Provost.

The Procedures Employed

A survey questionnaire, developed for use in this study, was presented to all members of the teaching faculty. The questionnaire was distributed through the university's campus mail. The participants were given three weeks in which to complete and return the questionnaire.

Two and a half weeks after the original mailing, a follow-up letter was sent to all participants. This letter requested that the questionnaire be completed and returned if this had not already been done. By its very nature, the survey was anonymous with respect to individual names. While demographic data was collected on each of the participants, the questionnaire was so designed that it could be completed and returned without having to

identify one's self. The labels used for mailing purposes were so placed that they could easily be removed if the participant so desired. This was the case with most returns. Therefore, it was necessary to direct the follow-up letter to all participants.

In certain cases, a preliminary review of the returns indicated a weak response from specific academic areas. As a final follow-up, key members of these departments were personally contacted and requested to solicit additional returns from their colleagues. The follow-up letter and the personal contacts yielded a return of an additional 15 percent of the total.

The Data Gathering Instrument

The survey instrument that was developed for use in this study was designed to meet four distinct needs: ·

(1) To solicit demographic data on the respondents;

(2) to ascertain the respondents' awareness of the topics being presented;

(3) to record the respondents' perceived effects of certain stated factors; and

(4) to solicit the respondents' recommendations for

actions that should be taken to further enhance the adoption and acceptance of computer-based learning methods and materials on the campus.

The questionnaire was divided into three sections. A copy of the questionnaire has been included as Appendix A of this paper.

In Section I, the demographic data: faculty affiliation by school and department, teaching status, years teaching experience, and respondent type - computer user or non-user, was collected. This data was collected to facilitate the subsequent subdivision of the sample for Chi Square analyses.

In Section II, thirty statements of possible cause and effect were presented. The respondents were requested to react to each item in two ways. First, they were requested to rate their personal knowledge of the item (factor) being presented. The ratings were made on a scale ranging from one to three (one - no knowledge; two - some knowledge; and three - quite knowledgeable). Secondly, each respondent was to indicate the extent to which the given factor affected his or her use of the computer in instruction at Lehigh University. The effect that the individual perceived was to be rated

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on a scale of from one to five, ranging from one -
Very Negative Effect to five - Very Positive Effect;
the other points on the scale included: two -
Negative Effect, three - No Effect, and four -
Positive Effect.

In the third and final section of the ques-
tionnaire, the respondents were requested to address
the question, 'What needs to be done to tap more
fully the potential contribution of the computer to
the instructional process?' It was suggested that
they list three or more areas in which additional
effort would enhance the growth, in value and
acceptance, of computer-assisted instruction in the
future at Lehigh University. It was further
requested that a time frame for the implementation of
each suggestion be provided.

The items selected for inclusion in Section II
of this instrument were drawn from a pool of 'factors
or obstacles' judged to be of major or considerable
importance in the studies conducted by Anastasio and
Morgan (1972) and Wilcox (1972). A total of thirty
items was selected from the original pool of fifty-
five items. The item selection was made on the
basis of prestudy testing of the instrument. The

intent of this pretesting was to develop an instrument

with a reliability adequate to the purpose. It was

determined that the reliability should fall within

the acceptable range of survey instrument reliabilities

set forth by Helmstadter (1970). Helmstadter's

suggested range of reliability coefficients for this

type of test is from .47 to .98, with a median of .79.

The instrument employed in this study yielded a Guttman's

Lambda-3 (split-half) Index of Reliability of .85, and

a Coefficient Alpha Index of Reliability of .862.

Given these results, the questionnaire's reliability

was judged suitable for use.

For purpose of this study, the face or content

validity of the items used in previous studies e.g.,

Luskin (1972), Anastasio and Morgan (1972), Wilcox (1972),

was accepted.

The Treatment of the Data

The data collected in this study were analyzed

using programs contained in the Statistical Package for

the Social Sciences (SPSS) (Nie, Bent and Hull, 1970).

Specifically, the data analysis was conducted using

SPSS Version 4.0 (Emory University Computing Center,

1972), running under the control of the VMOS-10

Operating System on a UNIVAC 70/3 Series computing system. The facilities of the Bloomsburg State College Computer Services Center and those of the Lehigh University Computing Center were used in this data analysis.

The SPSS program CODEBOOK, MARGINALS, and CROSSTABS were employed in the demographic subdivision of the data and in the formulation of contingency tables for the subsequent statistical treatment.

Each of the thirty items presented in Section II of the questionnaire was subject to the following statistical treatment.

The Chi Square Test for 'k' Independent Samples (Siegel, 1956) was used to test the null hypotheses:

(1) The proportion of factors identified as obstacles to instructional computer use by current computer users is the same as that identified by non-users.

(2) The proportion of factors identified as obstacles to instructional computer use is the same for all faculties of the university's four major disciplines.

The non-parametric Chi Square Test for 'k'
Independent Samples was chosen in lieu of the Analysis
of Variance or F-test, because certain of the
assumptions underlying the F-test could not be met.
It was unrealistic to assume that the observations
were drawn from normally distributed populations
having the same variance, or that the research
involved an interval measurement of the variables in
question.

It is Siegel's (1956) contention that when
frequencies in discrete categories, either nominal
or ordinal, constitute the data of research, the
Chi Square test may be used to determine the signifi-
cance of the differences among 'k' independent groups.
The Chi Square Test for 'k' Independent Samples is a
straightforward extension of the Chi Square Test for
Two Independent Samples. In general, this test is
the same for both two and 'k' independent samples.

Using Siegel's formula, the hypothesis that
'k' samples do not differ among themselves may be
tested.

Under the null hypothesis, the sampling
distribution of χ^2, as computed by this formula, can
be shown to be approximated by a Chi Square distribution

with degrees of freedom (df) = (k-1)(r-1), where:
k = the number of columns, and r = the number of rows.

At the .05 level of probability, the critical values of Chi Square are 9.488 with four degrees of freedom (null hypothesis #1), and 21.026 with twelve degrees of freedom (null hypothesis #2). If the calculated value of χ^2 exceeds the critical value at the .05 level of probability, one can reject the null hypothesis that the variables are independent at a confidence level of .95.

CHAPTER IV

PRESENTATION OF THE DATA

Introduction

A total of 380 questionnaires were mailed to
the faculties of the three colleges and one school
that comprise Lehigh University. Initially, 123
questionnaires, or 32.36 percent of the original
mailing, were returned. An additional fifty-seven
questionnaires, 15.0 percent of the total, were
returned subsequent to the mailing of follow-up
letters and personal solicitation of returns from key
departmental representatives. The final returns
totalled 180 questionnaires representing a return of
47.36 percent of the original mailing.

The data that was collected was then analyzed
in response to the four questions that were posed in
this study:

(1) What factors may be identified that act to hinder the acceptance and use of computers in instruction?

(2) How are these factors ranked in terms of faculty concern and need for resolution?

(3) Can a specific entry point in the cycle suggested by Anastasio and Morgan (1972) be determined?

(4) What strategies or policy changes may be recommended that would act to overcome these inhibiting factors?

Demographic Data

A total of 180 individuals responded to the questionnaire. By school and colleges the returns were as follows:

	#	% of Total
Arts and Sciences	72	40.0
Business & Economics	19	10.6
Engineering and Physical Sciences	60	33.3
Education	29	16.1

By 'user class' the returns were divided:

	#	% of Total
Computer Users	95	52.8
Non-users	85	47.2

One hundred and fifty-six or 86.7 percent of the respondents listed their teaching status as full-time; part-time status accounted for twenty-four individuals or 13.3 percent of the total.

The 'Years teaching experience at Lehigh University' ranged from one year or less to thirty years. The mean years of teaching experience was 8.8 years.

One additional step was taken to demographically describe the sample. In Section II of the questionnaire, each respondent was requested to rate his or her personal knowledge of the individual factors that were presented. The ratings were made on a three point scale: 1 = no knowledge; 2 = some knowledge; and 3 = considerable knowledge. While no claim is made that this instrument served as a cognitive measure of overall computing knowledge, it did serve as a means of collecting and reporting

individuals' perceptions of knowledge and awareness. These perceptions could then be used to further describe the sample, and, more importantly, could be used to pinpoint faculty groups that report a knowledge or awareness far below that of their colleagues.

The ratings obtained on each of the items were summed and then averaged by the number of items to which an individual responded, thus yielding an 'average knowledge rating' for the instrument as a whole. In the following table, the mean knowledge rating is presented for each school and college and is broken out by user class. It must be noted that the presentation of this data is purely descriptive in nature and concerns itself solely with a numerical description of each group. No conclusions are, or should be, extended beyond the groups described herein. One cannot assume that an individual who rates his knowledge of a factor as 'none' or 'some' is any less affected by that factor than is an individual who rates himself 'quite knowledgeable.' While an individual's personal knowledge of a given factor might be low, one cannot assume that the individual's perception of that factor's effect is not based upon

information obtained from those who are knowledgeable.

OVERALL KNOWLEDGE OF THE FACTORS PRESENTED:

	#	Mean Score
Arts and Sciences	72	1.617
Users	26	1.908
Non-users	46	1.453
Business and Economics	19	1.867
Users	11	1.879
Non-users	8	1.850
Engineering and the Physical Sciences	60	1.863
Users	48	1.924
Non-users	12	1.619
Education	29	1.507
Users	10	2.007
Non-users	19	1.244
Combined Faculties	180	1.708
Users	95	1.923
Non-users	85	1.467

As one would expect, computer users typically rated their knowledge somewhat higher than that of non-users. For users as a whole there is very little difference between the ratings tallied for each of the colleges and the school. However, for non-users the range of ratings is considerable. The mean rating

obtained for all non-users was 1.467; the non-users

in the School of Education were reported at 1.244,

while the non-users in the College of Business and

Economics obtained a rating of 1.850. It might be

noted that although the non-users in the College of

Business and Economics scored the highest (1.850) of

any non-user group, the score of their user colleagues

(1.879) was the lowest reported for any user group.

The greatest variation found between a user/non-user

group was that in the School of Education. In this

school, users reported a knowledge of 2.007, nearly

a full point above that reported by the non-users

(1.244).

Statistical Treatment

In response to Hypothesis #1 - 'The proportion

of factors identified as obstacles to instructional

computer use by current computer users is the same

as that identified by non-users,' and Hypothesis #2 -

'The proportion of factors identified as obstacles

to instructional computer use is the same for all

faculties of the university's four major disciplines,'

the following analysis is presented.

Summary tables of the raw data collected are

included as Appendix B of this paper. The tables reflect raw counts and cell percentages by school and college, and by user/non-user class for each of the thirty items in Section II of the questionnaire. Data is presented for both the knowledge and effect scales.

For Hypothesis #1, at the .05 level of probability, the critical value of Chi Square required to reject the null hypothesis is 9.488 with four degrees of freedom. For Hypothesis #2, at the .05 level of probability, the critical value of Chi Square required to reject the null hypothesis is 21.026 with twelve degrees of freedom. The Chi Square analysis of the thirty questionnaire items yielded the following results:

Item #1 - The amount of university funding available
           to you for development and use of computer-
           based learning materials.
   Hypothesis #1: Chi Square = 17.037, 4 d.f.
                   Action: REJECT
   Hypothesis #2: Chi Square = 17.339, 12 d.f.
                   Action: ACCEPT

Item #2 - The amount of external funding available
           to you for research and development in
           the area of computer-assisted instruction.
   Hypothesis #1: Chi Square = 0.978, 4 d.f.
                   Action: ACCEPT
   Hypothesis #2: Chi Square = 9.828, 12 d.f.
                   Action: ACCEPT

Item #3 - The economic and professional rewards that
          you may derive from developmental work in
          this area.
   Hypothesis #1:   Chi Square = 3.770, 4 d.f.
                    Action: ACCEPT
   Hypothesis #2:   Chi Square = 19.197, 12 d.f.
                    Action: ACCEPT

Item #4 - The degree to which computer-based materials
          that you develop count towards your research
          publishing.
   Hypothesis #1:   Chi Square = 5.996, 4 d.f.
                    Action: ACCEPT
   Hypothesis #2:   Chi Square - 43.294, 12 d.f.
                    Action: REJECT

Item #5 - The availability of computer programming
          talent within your department.
   Hypothesis #1:   Chi Square = 1.734, 4 d.f.
                    Action: ACCEPT
   Hypothesis #2:   Chi Square = 8.569, 12 d.f.
                    Action: ACCEPT

Item #6 - The availability of a centralized pool of
          programming talent on campus.
   Hypothesis #1:   Chi Square = 2.039, 4 d.f.
                    Action: ACCEPT
   Hypothesis #2:   Chi Square = 11.039, 12 d.f.
                    Action: ACCEPT

Item #7 - The extent and degree of technical training
          required of one new to computer-assisted
          instruction.
   Hypothesis #1:   Chi Square = 1.858, 4 d.f.
                    Action: ACCEPT
   Hypothesis #2:   Chi Square = 10.979, 12 d.f.
                    Action: ACCEPT

Item #8 - The services available to you as an instructor
          through computer programming librarians and
          other user services personnel.
   Hypothesis #1:   Chi Square = 3.131, 4 d.f.
                    Action: ACCEPT
   Hypothesis #2:   Chi Square - 11.725, 12 d.f.
                    Action: ACCEPT

Item #9 - The facilities and mechanisms available
for introducing new faculty members to the
computing resources on campus.
Hypothesis #1: Chi Square = 3.423, 4 d.f.
              Action: ACCEPT
Hypothesis #2: Chi Square = 19.029, 12 d.f.
              Action: ACCEPT

Item #10 - The level of technical support that is
available to you in developing computer-
based materials.
Hypothesis #1: Chi Square = 6.196, 4 d.f.
              Action: ACCEPT
Hypothesis #2: Chi Square = 25.105, 12 d.f.
              Action: REJECT

Item #11 - The transportability of programs that you
develop between other colleges and
universities.
Hypothesis #1: Chi Square = 11.549, 4 d.f.
              Action: REJECT
Hypothesis #2: Chi Square = 13.702, 12 d.f.
              Action: ACCEPT

Item #12 - The outlets available for distributing and
publishing computer materials that you
develop.
Hypothesis #1: Chi Square = 0.815, 4 d.f.
              Action: ACCEPT
Hypothesis #2: Chi Square = 6.561, 12 d.f.
              Action: ACCEPT

Item #13 - The existing mechanisms for protecting
the patents and copyrights for materials
that you develop.
Hypothesis #1: Chi Square = 2.437, 4 d.f.
              Action: ACCEPT
Hypothesis #2: Chi Square = 9.426, 12 d.f.
              Action: ACCEPT

Item #14 - The computing system (Control Data
Corporation 6400 Computer) currently in
use at Lehigh.
Hypothesis #1: Chi Square = 27.790, 4 d.f.
              Action: REJECT
Hypothesis #2: Chi Square = 37.867, 12 d.f.
              Action: REJECT

Item #15 - The centralization of computer resources
         on campus.
  Hypothesis #1: Chi Square = 8.980, 4 d.f.
                  Action: ACCEPT
  Hypothesis #2: Chi Square = 16.431, 12 d.f.
                  Action: ACCEPT

Item #16 - The programming languages that are
         currently available for developing computer-
         assisted programs and packages.
  Hypothesis #1: Chi Square = 5.191, 4 d.f.
                  Action: ACCEPT
  Hypothesis #2: Chi Square = 23.262, 12 d.f.
                  Action: REJECT

Item #17 - The location of the interactive computer
         terminals (teletypes, CRT's, etc.) on
         campus.
  Hypothesis #1: Chi Square = 14.674, 4 d.f.
                  Action: REJECT
  Hypothesis #2: Chi Square = 24.885, 12 d.f.
                  Action: REJECT

Item #18 - The accessibility of the interactive
         computer terminals on campus.
  Hypothesis #1: Chi Square = 18.907, 4 d.f.
                  Action: REJECT
  Hypothesis #2: Chi Square = 22.332, 12 d.f.
                  Action: REJECT

Item #19 - The physical capabilities (input/output)
         of the interactive computer terminals on
         campus.
  Hypothesis #1: Chi Square = 18.751, 4 d.f.
                  Action: REJECT
  Hypothesis #2: Chi Square = 21.927, 12 d.f.
                  Action: REJECT

Item #20 - The quality of the documentation that is
         available for existing computer programs.
  Hypothesis #1: Chi Square = 14.649, 4 d.f.
                  Action: REJECT
  Hypothesis #2: Chi Square = 27.415, 12 d.f.
                  Action: REJECT

Item #21 - The traditional nature of instruction at
           Lehigh University.
   Hypothesis #1: Chi Square = 2.683, 4 d.f.
                   Action: ACCEPT
   Hypothesis #2: Chi Square = 12.587, 12 d.f.
                   Action: ACCEPT

Item #22 - A fear of being reduced to a button-pushing
           or clerical role by the computer.
   Hypothesis #1: Chi Square = 2.224, 4 d.f.
                   Action: ACCEPT
   Hypothesis #2: Chi Square = 9.454, 12 d.f.
                   Action: ACCEPT

Item #23 - A lack of understanding of the computer's
           potential role in the instructional process.
   Hypothesis #1: Chi Square = 4.452, 4 d.f.
                   Action: ACCEPT
   Hypothesis #2: Chi Square - 13.385, 12 d.f.
                   Action: ACCEPT

Item #24 - Cautiousness and uncertainty as to the
           potential effectiveness of CAI when
           compared with traditional teaching
           methods.
   Hypothesis #1: Chi Square = 3.695, 4 d.f.
                   Action: ACCEPT
   Hypothesis #2: Chi Square = 8.662, 12 d.f.
                   Action: ACCEPT

Item #25 - The attitude of administrators towards
           the use of the computer in instruction.
   Hypothesis #1: Chi Square = 10.535, 4 d.f.
                   Action: REJECT
   Hypothesis #2: Chi Square = 18.138, 12 d.f.
                   Action: ACCEPT

Item #26 - The competition between instructional
           users and other users for computer
           resources.
   Hypothesis #1: Chi Square = 8.597, 4 d.f.
                   Action: ACCEPT
   Hypothesis #2: Chi Square = 12.562, 12 d.f.
                   Action: ACCEPT

Item #27 - The means and procedures available to you
        to facilitate the interchange of CAI
        program materials on campus.
  Hypothesis #1:   Chi Square = 7.718, 4 d.f.
             Action: ACCEPT
  Hypothesis #2:   Chi Square = 9.925, 12 d.f.
             Action: ACCEPT

Item #28 - The quality of computer-based learning
        materials, in your discipline, currently
        available at Lehigh.
  Hypothesis #1:   Chi Square = 4.694, 4 d.f.
             Action: ACCEPT
  Hypothesis #2:   Chi Square = 15.423, 12 d.f.
             Action: ACCEPT

Item #29 - An uncertainty as to who on campus should
        acquire and distribute software, and
        provide the required training and related
        services.
  Hypothesis #1:   Chi Square = 2.763, 4 d.f.
             Action: ACCEPT
  Hypothesis #2:   Chi Square = 21.793, 12 d.f.
             Action: REJECT

Item #30 - The existing channels of communications
        between present computer users and the
        non-users.
  Hypothesis #1:   Chi Square = 5.231, 4 d.f.
             Action: ACCEPT
  Hypothesis #2:   Chi Square = 18.844, 12 d.f.
             Action: ACCEPT

Twenty-two factors were accepted on the first
hypothesis, the hypothesis that certain factors are of
common concern to both computer users and non-users.
Twenty-one factors were accepted on the second
hypothesis, the hypothesis that certain factors are
of common concern to each of the four faculties. In
response to the question of factors of common concern

to all instructional groups on campus, both users and non-users, independent of faculty affiliation, it was found that eighteen factors could be accepted on both hypotheses. These are the factors of greatest concern. These are factors of common concern to all groups on campus.

Section II of the questionnaire was left open-ended so that the respondents could add additional factors that they felt had been overlooked. Although thirteen additional factors were added, none of the thirteen could be said to be of common concern to all groups on campus; they are presented here for their face value only. Without exception, the additional factors were rated as having a negative effect on the respondent's use of instructional computing systems. The additional factors that were added are as follows:

(1) The instability of the Control Data Corporation (CDC) 6400 computer.

(2) The continual changes to the operating system.

(3) The current computing system is not suited to use in the social sciences.

(4) Insufficient facilities for class demonstrations.

(5)   Insufficient consulting services.

(6)   The lack of CAI training opportunities.

(7)   Difficulty in obtaining released time for work

in the area of CAI development.

(8)   General lack of interest in CAI.

(9)   Lack of data bases for use by the social sciences.

(10) Poor graphic capabilities.

(11) Calculators are now replacing the need for

computers in many areas.

(12) The offishness and self-serving attitude of

Lehigh's information sciences staff.

(13) The existing gap between the potential benefits

of CAI and the available hardware and software

at Lehigh.

The test of hypotheses presented in the previous section answered the question, 'Which of the obstacles that were identified were of common concern to all of the instructional groups on campus,' however, it did not indicate a ranking of these obstacles in terms of their importance to the faculty.   In response to the question, 'How are these factors to be ranked in terms of faculty concern and need for resolution,' the following data are presented.

The method employed in ranking the 'most negative' factors was to combine the total number of responses indicating NEGATIVE or VERY NEGATIVE effect on each item, and to list these counts from highest to lowest. All thirty items have been ranked, and the items are presented in rank order. From the ranking of the total thirty items that were presented in the questionnaire, the eighteen items found to be of common concern to all faculties and to users and non-users alike were extracted and ranked accordingly. In the following table these eighteen factors are flagged with an asterisk in the rightmost column. To the right of each asterisk is a number indicating that factor's rank within the subgroup of eighteen factors.

ITEM	....NUMBER OF RESPONSES....			
	VERY NEG.	NEGATIVE	TOTAL	RANK
Quality of CAI materials...	31	35	66	1 *(1)
Required training...	18	47	65	2 *(2)
CAI effectiveness...	20	36	56	3 *(3)
Uncertainty of who is responsible...	19	36	55	4
Channels of communications...	26	28	54	5 *(4)

ITEM	...NUMBER OF RESPONSES....			
	VERY NEG.	NEGATIVE	TOTAL	RANK
Understanding of computer's role...	18	31	49	6 *(5)
Technical support...	16	30	46	7½
Means of introducing new faculty...	19	27	46	7½ *(6)
Traditional nature of instruction...	12	33	45	9½ *(7½)
Competition for resources...	10	35	45	9½ *(7½)
Documentation...	13	25	38	11
Accessibility of terminals...	7	29	36	12
Terminal locations...	11	23	34	13½
University funds...	14	20	34	13½
Central pool of programmers...	11	22	33	15 *(9)
Research Credit...	17	12	29	16½
Programming talent in department...	15	14	29	16½ *(10)
Terminal I/O...	7	21	28	18½
External funds...	15	13	28	18½ *(11)
Available services...	7	20	27	20 *(12)
Rewards derived...	12	14	26	21½ *(13½)
Means of CAI exchange...	7	19	26	21½ *(13½)
Attitude of administrators...	7	18	25	23½

ITEM	...NUMBER OF RESPONSES....			
	VERY NEG.	NEGATIVE	TOTAL	RANK
Centralized resources...	3	22	25	23½ *(15)
Transportability...	8	16	24	25½
Role reduction...	9	15	24	25½ *(16)
Languages available...	10	10	20	27½
Publishing outlets...	6	14	20	27½ *(17)
Copyright protection...	8	9	17	29½ *(18)
Current computer...	6	11	17	29½

The final data presented in this chapter is
that collected in Section III of the questionnaire.
In that section the respondents were requested to
suggest actions that should be taken to enhance the
development and acceptance of computer-based
instructional methods and materials at Lehigh
University. Secondly, they were requested to furnish
a time frame for the implementation of their
suggestions. A total of 165 suggestions, representing
thirty-two distinct areas for improvement, were supplied.
The following faculty recommendations are presented in
rank order, the most frequently cited appearing first.

After each recommendation, the number of respondents
supporting that recommendation is shown in parentheses.
The list is as follows:

(1) The University should support an on-going series
of faculty seminars, workshops, and training
programs geared to the needs of the non-technically
oriented computer user who is interested in
instructional computer applications. (24)

(2) The interactive, time-sharing, terminal facilities
should be expanded to include more terminals and
more terminal locations. (17)

(3) The University should appoint a CAI specialist
who is experienced in both theory and applica-
tions. (17)

(4) The University should stage a demonstration of
CAI's use and effectiveness. (15)

(5) The documentation of available software should
be made more comprehensive and more readable. (8)

(6) The University should acquire more versatile
computer terminals capable of supporting a wide
range of graphic options. (8)

(7) The University should support the released time
of faculty members for study, development and

implementation of computer-based learning
materials.   (7)

(8)   The Computing Center should provide a staff of
technically oriented programmers in support of
instructional applications.   (7)

(9)   Rewards, in the form of grants, should be
furnished by the University for those involved
in CAI development.   (7)

(10)   Efforts should be made to formalize and maintain
channels of communications among and between
users, non-users, administrators, and computer
support personnel.   (7)

(11)   A comprehensive CAI author language, or similar
utility, should be made available on campus.   (5)

(12)   The University should initiate an upgrading of
the physical facilities housing the computer
work areas.   (4)

(13)   The University should publish a newsletter
highlighting progress in CAI developments and
applications both on campus and elsewhere.   (4)

(14)   The possibility should exist to link with a
network of other computing systems.   (4)

(15)   The computing system should be more suited to
interactive, time-sharing, applications.   (4)

(16) The University should offer applications ccurses
      that would bridge the gap between the theory and
      the practice of CAI.   (3)

(17) Applicants for faculty positions should be
      evaluated in light of their knowledge and use
      of computer-based learning systems.   (2)

(18) Efforts should be made to insure that materials
      developed at Lehigh are transportable to other
      schools.   (2)

(19) A PLATO facility should be made available at
      Lehigh University.   (2)

(20) Portions of the operating day should be
      scheduled for specific, specialized applications.
      (2)

(21) The Computing Center should acquire and support
      models and simulations suited to use in the
      social sciences.   (2)

(22) The University should support automated test
      scoring and grading services.   (2)

(23) The Computing Center should acquire and support
      CAI materials in support of developmental and
      remedial language programs.   (2)

(24) The physical resources of the CDC 6400 computer
      should be upgraded.   (2)

(25) A mechanism should exist to allow the integration of CAI programs and test scoring facilities. (1)

(26) The current language processors and compilers should be replaced with 'student-oriented' software. (1)

(27) A formal software library exchange system should be established between Lehigh and similar schools. (1)

(28) The University should recognize developmental work in CAI as a substitute for research publishing. (1)

(29) Instructors and students should be freed from their dependence on computer consultants in solving their problems; the computer should be made to supply better diagnostics. (1)

(30) All faculty members should be required to take an introductory computer processing course. (1)

(31) Library Services should be totally automated as a demonstration of the computer's potential use and effectiveness. (1)

(32) The computing system should be made to support an interface with scientific data gathering instruments. (1)

Without exception, the time frame for the implementation of these recommendations was stated as being in the late 1970's and the early 1980's.

CHAPTER V

SUMMARY AND CONCLUSIONS

Restatement of the Problem

The purpose of the study was to examine those factors thought to be adversely affecting the acceptance of computer-based learning systems at the university level, and to develop and recommend strategies and policies which would enhance the overall development and implementation of instructional computer use.

Restatement of the Procedures

The study was conducted with the faculties of the three colleges and one school that comprise Lehigh University. The study involved the use of a survey questionnaire. The participants were presented with a series of statements detailing conditions, situations,

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or factors that could have an effect on one's use of the computer in instruction. Each participant was requested to rate his or her knowledge of the item in question, and then to indicate the perceived effect that the factor had on his or her use of the computer in instruction. In addition, the participants were requested to furnish recommendations for actions that might be taken to further enhance instructional computing on their campus.

The non-parametric Chi Square Test for 'k' Independent Samples (Siegel, 1956) was used to evaluate the differences in responses made by users and non-users of the computing system, and by the four individual faculties of the institution.

Major Findings

The test of hypotheses indicated that there were no significant differences between the proportion of negative effects perceived by computer users and that perceived by non-users on twenty-two of the thirty factors that were presented, and that there were no significant differences between the proportion of negative effects perceived by the four faculties on twenty-one of the factors. In all, there were eighteen

factors accepted on both hypotheses. These eighteen

factors were said to be of common concern to all

instructional groups on the campus. The eighteen

factors were then ranked in terms of faculty concern,

or most negative effect. The factor reporting the

greatest number of negative responses was found to be,

'The lack of available computer-based learning materials

in specific academic disciplines.' This is not

surprising in that this is the foundation upon which

the cycle that was suggested by Anastasio and Morgan

(1972) was based, and that an institution's shortcomings

at any of the cycle's steps would most certainly first

surface at this point.

In the analysis of the factors found to be of

greatest common concern to the university's faculties,

it was found that only three of the eighteen factors

that were identified did not fit specific steps in

the Anastasio and Morgan cycle. These included, 'The

traditional nature of instruction at Lehigh University,'

'The existing competition between academic users and

other computer users,' and 'The centralization of

computing resources on the campus.' The reader will

note that these are factors of local control, and as

such would not likely have been previously reported as

matters of common national concern. The remaining

fifteen factors were found to be specific to five of

the six cyclical steps proposed by Anastasio and Morgan.

The concentration of the faculties' concern was cen-

tered at step 'c' in the cycle, relating to the need

of knowledgeable theoriticians and practitioners in

computer-based applications. Seven of the eighteen

factors related to this particular step; the seven

factors included, 'The technical training that is

required,' 'The existing facilities available for

faculty training,' 'Existing communications between

users and non-users,' 'The availability of programming

talent at the departmental level,' 'Limitations on the

availability of a central programming pool,' 'Services

available to faculty,' and 'Existing means of faculty

interchange of materials on campus.' A second area

of faculty concern surfaced at step 'e', concerning

proof of CAI's effectiveness. Four factors were found

to be specific to this step; they included,

'Misunderstandings of the computer's potential role

in the instructional process,' 'Uncertainty of CAI's

potential effectiveness,' 'Limited developmental

funds,' and 'Fears of faculty role reduction.' The

remaining four factors that could be fit to the cycle

included, 'The quality of available materials,'
'Rewards to be derived,' 'Existing distribution out-
lets,' and 'The existing means of copyright protection.'

If one is to accept the cycle proposed by
Anastasio and Morgan (1972), and if one accepts their
rationale of circularity, one step's effect on the
next - the last step's effect on the first, one must
also accept the fact that entry at a specific step
must be carefully considered if success is to be
achieved. There is no guarantee that success is
possible if entry into the cycle is at random. The
faculties at Lehigh University expressed two major
concentrations of concern. The primary concern being
that of a lack of skilled personnel; the secondary
concern being proof of CAI's effectiveness. These
concerns were identified through an analysis of the
faculties' responses to items presented in the survey
instrument. Supportive of these two major concerns
are several of the recommendations made by faculty
members for actions that should be taken to further
enhance the acceptance of instructional computer use
at Lehigh University. Exemplary suggestions included,
'The support of on-going faculty training seminars
and workshops,' 'The appointment of a CAI specialist,'

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'The support of faculty released time,' 'The offering

of developmental grants,' and 'The establishment of more

formal channels of communications between current users

and non-users, administrators, and professional support

personnel.' Given the faculties' concerns and their

suggestions for actions that might be considered, it

is obvious that Lehigh University need not enter the

cycle at a random point. A specific entry point can

be recommended.

Conclusions

The primary intent of this study was to

identify a point in the cycle at which the university

might invest manpower and resources to overcome the

status quo or to actually break the cycle. Given the

two concentrations of faculty concern that have been

previously described, it is this author's opinion

that only one logical entry point exists. Regardless

of institutional commitments, investment of funds,

manpower, and the like, it is impossible for an

institution to enter the cycle at step 'e', proof of

CAI's effectiveness. To paraphrase Anastasio and

Morgan, 'To be proven effective, CAI must first exist.'

It is also impossible to enter the cycle at step 'c',

knowledgeable people. If such people do not currently

exist on a campus, there are but two ways of obtaining

them. The institution must provide incentives for

the recruitment of new faculty, or for the retraining

of the existing faculty complement. Specifically,

this leads us to step 'd' in the cycle, 'To get good

people one needs professional recognition and economic

incentives.' The faculties' concerns reported in this

study show the university to be at a stalemate.

Neither of the two areas of prime faculty concern

can be addressed without provision for incentives.

The internal development of existing faculty members

and the recruitment of new faculty cannot occur until

such time as provisions are made for their professional

development in this area. Looking to the future, there

can be no local proof of CAI's effectiveness and utility

until the instructional faculty becomes directly

involved with its local development and application.

If CAI is to be given a reasonable chance of success

on the campus, its evolution is dependent upon the

university's willingness to foster faculty experimenta-

tion and development. It is this author's opinion

that Lehigh University must resolve the problems

common to step 'd', if it is truly committed to the

future development of computer-based instruction. If
the university invests at this step, it is then in an
ideal position to evaluate its progress within a few
years' time. The evaluation of an institution's entry
into the cycle is in itself a function of the cycle.
If an institution should make a commitment at step 'd',
support of rewards and recognition, it is then in a
position to evaluate its progress at step 'e', an
evaluation of the value of the pursuit, and a
determination of whether the materials that have been
developed are suitable for general production and
distribution. The proof is easily found in the
internal use and the external interest expressed in
the materials that are developed.

This study is not unique in that it has
explored an area addressed in earlier studies, nor is
it unique in that it has explored the problems that
are inherent in the adoption of computer-based
learning systems. It is, however, unique in that it
has localized concerns that were previously presented
as being national in scope. It is also unique in
that it has addressed the concerns of those who are
not now exploring the applications of computer-based
learning systems as well as those of experienced

practitioners in the field. The study is unique in that Lehigh University, its problems and its concerns, is unique.

While the findings of this study cannot logically be extended beyond Lehigh University, they do establish a basis upon which subsequent studies may be based. They provide an example of local concerns in light of national problems. Although the results of this study cannot be extended to include all institutions, they demonstrate that the Anastasio and Morgan cycle is not endless and that it can have a logical entry point.

A Discussion and Recommendations

This study addressed four distinct questions; three of these questions have been answered. We have seen factors of common concern to all constituencies on campus, we have seen these factors ranked in terms of greatest effect, and we have identified a logical starting point for remedial action. However, we have not addressed the question of a strategy for future actions.

In the time that has elapsed since this study was completed, Lehigh University has gone to great

effort and expense to upgrade its computing facilities. Certain of the changes parallel recommended changes suggested by the faculty in this study. The computing resources of the CDC 6400 computer have been upgraded, time-sharing services have been improved, and the resource competition between academic and other users has been reduced. These changes were a result of the acquisition of a second computing system to be used in support of academic applications. Additional terminals and remote computing facilities have been added to the existing network. The physical facilities of the computing center itself have been improved through recent renovations.

Lehigh University has developed a computing environment in which academic experimentation and development could flourish. However, despite these physical improvements, little has been done to foster a professional environment in which instructors might explore the many facets of instructional computing applications.

Given the findings of this study, knowing the concerns of the faculty, and having discovered a potential entry point in the Anastasio and Morgan cycle, the author suggests the following for

consideration.

Lehigh University should undertake a
feasibility study addressing the concepts of faculty
released time and professional development in
instructional computing. The University should poll
its faculties to determine who among them is willing
and eager to explore this area. Having identified
these individuals, the University should support
their training or re-training, their experimentation,
and their developmental work. A committee should be
appointed to closely monitor the experimental and
developmental processes and should periodically report
the progress that is observed to the faculties. When
the University is certain that sufficient time has been
allowed for experimentation and development, it should
then make a final determination of the success or failure
of the venture and should distribute its full support
accordingly.

There is no guarantee of success in instruc-
tional computing at Lehigh University, nor can a
guarentee be made for any other college or university.
However, the possibilities for success are present,
and they cannot be realized in the absence of supported
experimentation.

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APPENDIX   A

<u>Questionnaire</u>

<u>QUESTIONNAIRE</u>

A STUDY OF STRATEGIES FOR ENHANCING THE USE OF

COMPUTERS IN INSTRUCTION AT LEHIGH UNIVERSITY

The purpose of the study in which you are asked to participate is to identify those factors which affect the use of computers in the instructional process at Lehigh University, and to suggest strategies for the future development and enhancement of instructional computing.

The attached questionnaire is being distributed to all faculty members at Lehigh University. This questionnaire consists of three groups of questions. The first series of questions will serve to indicate the extent and nature of each respondent's experience with instructional computer use at Lehigh. The second and third groups of questions represent the first step in the exploration of the difficulties encountered or anticipated in the development of computer-assisted instruction at Lehigh.

The responses and recommendations of both users and non-users alike are essential to the successful completion of this study. Your cooperation will be greatly appreciated.

It should be noted that, throughout this questionnaire, the term computer-assisted instruction (CAI) will be used as a generic term. CAI will be said to include: computer-based instruction, computer-assisted instruction, computer-managed instruction, and also problem solving, gaming, modeling and simulations used in the instructional process.

Completed questionnaires should be returned no later than May 20, 1976. The questionnaires should be returned in the original mailing envelope. Questionnaires should be routed through the campus mail, and addressed to:

COMPUTER SURVEY
c/o Dr. LeRoy J. Tuscher
School of Education

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I. To aid in the analysis of the data gathered in this study, you are requested to supply the following information:

(1) Please identify your faculty affiliation:

College of Arts and Sciences......... _____
College of Business and Economics.... _____
College of Engineering............... _____
School of Education.................. _____

(2) Department: _____

(3) Teaching Status:

Full-Time.... _____

Part-Time.... _____

(4) Years of teaching experience at Lehigh University:

_____ .

(5) Have you, as an instructor, used the Lehigh University computing system in your teaching and/or course-related work? YES   NO

* *

II. Why have computers not been more widely used in the instructional process at Lehigh University?

The following items are presented as factors that can have an effect on the development and acceptance of computer use in instruction.

After reading each item:

(1) Please rate your knowledge of the point in question. The rating will be made on the following scale:

1 - No knowledge in this area.
2 - Some knowledge in this area.
3 - Quite knowledgeable in this area.

(2) Using the following scale, then rate each item in terms of its perceived effect on your use of the computer in _instruction_ here at Lehigh University:

1 - A very negative effect.
2 - A slightly negative effect.
3 - No effect.
4 - A slightly positive effect.
5 - A very positive effect.

If you feel that your response to any item, on either scale, requires clarification or explanation, please feel free to comment on that item.

Please respond to all of the items that are presented.

Knowledge Scale	Effect Scale
1. No knowledge in this area.	1. A very negative effect.
2. Some knowledge in this area.	2. A slightly negative effect.
3. Quite knowledgeable in this area.	3. No effect.
	4. A slightly positive effect.
	5. A very positive effect.

	knowledge	effect
1. The amount of university funding available to you for the development and use of computer-based learning materials.	1 2 3	1 2 3 4 5
2. The amount of external funding available to you for research and development in the area of computer-assisted instruction.	1 2 3	1 2 3 4 5
3. The economic and professional rewards that you may derive from developmental work in this area.	1 2 3	1 2 3 4 5
4. The degree to which computer-based materials that you develop count towards your research publishing.	1 2 3	1 2 3 4 5

		knowledge	effect

5. The availability to you of computer programming talent within your department.

1 2 3   1 2 3 4 5

6. The availability of a centralized pool of programming talent on campus.

1 2 3   1 2 3 4 5

7. The extent and degree of technical training required if you are new to computer-assisted instruction.

1 2 3   1 2 3 4 5

8. The services available to you as an instructor through computer program librarians and other user services personnel.

1 2 3   1 2 3 4 5

9. The facilities and mechanisms available for introducing new faculty members to the computing resources on campus.

1 2 3   1 2 3 4 5

10. The level of technical support that is available to you in developing computer-based materials.

1 2 3   1 2 3 4 5

11. The transportability of programs that you develop between other colleges and universities.

1 2 3   1 2 3 4 5

12. The outlets available for distributing and publishing computer materials that you develop.

1 2 3   1 2 3 4 5

13. The existing mechanisms for protecting patents and copyrights for materials that you develop.

1 2 3   1 2 3 4 5

14. The computing system (Control Data Corporation 6400 Computer) currently in use at Lehigh.

1 2 3   1 2 3 4 5

	knowledge	effect

15. The centralization of computer resources on campus. 1 2 3 1 2 3 4 5

16. The programming languages that are currently available for developing computer-assisted instructional programs and packages. 1 2 3 1 2 3 4 5

17. The location of the interactive computer terminals (teletypes, CRT's, etc.) on campus. 1 2 3 1 2 3 4 5

18. The accessibility of the interactive computer terminals on campus. 1 2 3 1 2 3 4 5

19. The physical capabilities (input/output) of the interactive computer terminals on campus. 1 2 3 1 2 3 4 5

20. The quality of the documentation that is available for existing computer programs. 1 2 3 1 2 3 4 5

21. The traditional nature of instruction at Lehigh. 1 2 3 1 2 3 4 5

22. A fear of being reduced to a "button-pushing" or clerical role by the computer. 1 2 3 1 2 3 4 5

23. A lack of understanding of the computer's potential role in the instructional process. 1 2 3 1 2 3 4 5

24. Cautiousness and uncertainty as to the potential effectiveness of CAI when compared with traditional teaching methods. 1 2 3 1 2 3 4 5

25. The attitude of administrators towards use of the computer in instruction. 1 2 3 1 2 3 4 5

26. The competition between instructional users and other users for computer resources. 1 2 3 1 2 3 4 5

27. The means and procedures available to you to facilitate the interchange of CAI program materials on campus. 1 2 3 1 2 3 4 5

28. The quality of computer-based learning materials, in your discipline, currently available at Lehigh. 1 2 3 1 2 3 4 5

29. An uncertainty as to who, on campus, should acquire and distribute software, and provide the required training and related services. 1 2 3 1 2 3 4 5

30. The existing channels of communications between present computer users and the non-users. 1 2 3 1 2 3 4 5

This list is by no means inclusive of all possible factors. Please add, at this point, any items that you feel have been overlooked. Please rate the items that you add.

* *

III. What needs to be done to tap more fully the potential contribution of the computer to the instructional process?

List three or more areas in which additional effort would enhance the growth, in value and acceptance, of computer-assisted instruction in the future at Lehigh.

Indicate, if possible, a time projection for the implementation of each suggestion that you make; e.g., given an

appropriate level of effort, would you expect that your suggestion could be implemented in the 1970's, 1980's, 1990's, 2000's or later?

Use additional sheets if necessary.

1.

2.

3.

APPENDIX   B

Contingency Tables

For each of the thirty items presented in Section II of the questionnaire, summary tables in the following format are presented:

KNOWLEDGE or EFFECT

School or College	NONE	SOME	CONSIDERABLE
Users	# (%)	# (%)	# (%)
Non-users	# (%)	# (%)	# (%)

where: # is the respective total for the cell, and

(%) is the percent of total response to that item that is represented by that cell.

ITEM # 1   KNOWLEDGE

The amount of university funding available to you for the development and use of computer-based learning materials.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	7	4.0%	12	6.8%	7	4.0%
Non-Users	24	13.6%	17	9.7%	3	1.7%
BUSINESS						
Users	2	1.1%	7	4.0%	2	1.1%
Non-Users	4	2.3%	3	1.7%	1	0.6%
ENGINEERING						
Users	10	5.7%	29	16.5%	9	5.1%
Non-Users	6	3.4%	5	2.8%	1	0.6%
EDUCATION						
Users	2	1.1%	6	3.4%	2	1.1%
Non-Users	12	6.8%	5	2.8%	0	
TOTAL						
Users	21	11.9%	54	30.7%	20	11.4%
Non-Users	46	26.1%	30	17.0%	5	2.8%

The amount of external funding available to you for research and development in the area of computer-assisted instruction.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	14	8.0%	7	4.0%	5	2.9%
Non-Users	35	20.0%	9	5.1%	0	
BUSINESS						
Users	3	1.7%	6	3.4%	1	0.6%
Non-Users	5	2.9%	3	1.7%	0	
ENGINEERING						
Users	21	12.0%	16	9.1%	11	6.3%
Non-Users	6	3.4%	6	3.4%	0	
EDUCATION						
Users	5	2.9%	4	2.3%	1	0.6%
Non-Users	14	8.0%	2	1.1%	1	0.6%
TOTAL						
Users	43	24.6	33	18.9%	18	10.3%
Non-Users	60	34.3%	20	11.4%	1	0.6%

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ITEM # 3   KNOWLEDGE

The economic and professional rewards that you may derive
form developmental work in this area.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	8	4.6%	13	7.5%	5	2.9%
Non-Users	16	9.2%	25	14.4%	3	1.7%
BUSINESS						
Users	3	1.7%	4	2.3%	3	1.7%
Non-Users	2	1.1%	5	2.9%	1	0.6%
ENGINEERING						
Users	11	6.3%	22	12.6%	14	8.0%
Non-Users	5	2.9%	7	4.0%	0	
EDUCATION						
Users	3	1.7%	4	2.3%	3	1.7%
Non-Users	9	5.2%	7	4.0%	1	0.6%
TOTAL						
Users	25	14.4%	43	24.7%	25	14.4%
Non-Users	32	18.4%	44	25.3%	5	2.9%

ITEM # 4   KNOWLEDGE

The degree to which computer-based materials that you develop count towards your research publishing.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	6	3.4%	13	7.4%	7	4.0%
Non-Users	20	11.4%	20	11.4%	4	2.3%
BUSINESS						
Users	4	2.3%	2	1.1%	4	2.3%
Non-Users	1	0.6%	5	2.9%	2	1.1%
ENGINEERING						
Users	9	5.1%	15	8.6%	24	13.7%
Non-Users	4	2.3%	5	2.9%	3	1.7%
EDUCATION						
Users	3	1.7%	2	1.1%	5	2.9%
Non-Users	13	7.4%	3	1.7%	1	0.6%
TOTAL						
Users	22	12.6%	32	18.3%	40	22.9%
Non-Users	38	21.7%	33	18.9%	10	5.7%

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ITEM # 5   KNOWLEDGE

The availability to you of programming talent within your department.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	2	1.1%	6	3.4%	18	10.3%
Non-Users	8	4.6%	20	11.4%	16	9.1%
BUSINESS						
Users	1	0.6%	2	1.1%	7	4.0%
Non-Users	1	0.6%	4	2.3%	3	1.7%
ENGINEERING						
Users	1	0.6%	13	7.4%	34	19.4%
Non-Users	4	2.3%	5	2.9%	3	1.7%
EDUCATION						
Users	0		2	1.1%	8	4.6%
Non-Users	2	1.1%	11	6.3%	4	2.3%
TOTAL						
Users	4	2.3%	23	13.1%	67	38.3%
Non-Users	15	8.6%	40	22.9%	26	14.9%

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The availability of a centralized pool of programming talent on campus.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	3	1.7%	17	9.8%	6	3.4%
Non-Users	18	10.3%	22	12.6%	4	2.3%
BUSINESS						
Users	4	2.3%	3	1.7%	3	1.7%
Non-Users	1	0.6%	7	4.0%	0	
ENGINEERING						
Users	8	4.6%	27	15.5%	13	7.5%
Non-Users	7	4.0%	4	2.3%	1	0.6%
EDUCATION						
Users	1	0.6%	6	3.4%	3	1.7%
Non-Users	5	2.9%	8	4.6%	3	1.7%
TOTAL						
Users	16	9.2%	53	30.5%	25	14.4%
Non-Users	31	17.8%	41	23.6%	8	4.6%

The extent and degree of technical training required if you are new to computer-assisted instruction.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	8	4.7%	12	7.1%	4	2.4%
Non-Users	13	7.6%	27	15.9%	4	2.4%
BUSINESS						
Users	1	0.6%	5	2.9%	4	2.4%
Non-Users	2	1.2%	3	1.8%	3	1.8%
ENGINEERING						
Users	12	7.1%	21	12.4%	13	7.6%
Non-Users	5	2.9%	6	3.5%	1	0.6%
EDUCATION						
Users	0		5	2.9%	5	2.9%
Non-Users	3	1.8%	13	7.6%	0	
TOTAL						
Users	21	12.4%	43	25.3%	26	15.3%
Non-Users	23	13.5%	49	28.8%	8	4.7%

ITEM # 8   KNOWLEDGE

The services available to you as an instructor through computer program librarians and other user services personnel.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	7	4.1%	14	8.2%	4	2.4%
Non-Users	25	14.7%	17	10.0%	1	0.6%
BUSINESS						
Users	1	0.6%	8	4.7%	1	0.6%
Non-Users	2	1.2%	4	2.4%	2	1.2%
ENGINEERING						
Users	8	4.7%	24	14.1%	14	8.2%
Non-Users	5	2.9%	6	3.5%	1	0.6%
EDUCATION						
Users	2	1.2%	5	2.9%	3	1.8%
Non-Users	8	4.7%	7	4.1%	1	0.6%
TOTAL						
Users	18	10.6%	51	30.0%	22	12.9%
Non-Users	40	23.5%	34	20.0%	5	2.9%

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KNOWLEDGE

The facilities and mechanisms available for introducing new faculty members to the computer resources on campus.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	7	4.1%	13	7.6%	5	2.9%
Non-Users	26	15.2%	16	9.4%	2	1.2%
BUSINESS						
Users	3	1.8%	6	3.5%	1	0.6%
Non-Users	4	2.3%	2	1.2%	2	1.2%
ENGINEERING						
Users	13	7.6%	21	12.3%	11	6.4%
Non-Users	6	3.5%	4	2.3%	2	1.2%
EDUCATION						
Users	4	2.3%	4	2.3%	2	1.2%
Non-Users	12	7.0%	4	2.3%	1	0.6%
TOTAL						
Users	27	15.8%	44	25.7%	19	11.1%
Non-Users	48	28.1%	26	15.2%	7	4.1%

ITEM # 10   KNOWLEDGE

The level of technical support that is available to you
in developing computer-based materials.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	8	4.6%	14	8.0%	4	2.3%
Non-Users	26	14.9%	15	8.6%	3	1.7%
BUSINESS						
Users	3	1.7%	3	1.7%	4	2.3%
Non-Users	4	2.3%	2	1.1%	2	1.1%
ENGINEERING						
Users	12	6.9%	22	12.6%	13	7.5%
Non-Users	5	2.9%	6	3.4%	1	0.6%
EDUCATION						
Users	2	1.1%	6	3.4%	2	1.1%
Non-Users	10	5.7%	6	3.4%	1	0.6%
TOTAL						
Users	25	14.4%	45	25.9%	23	13.2%
Non-Users	45	25.9%	29	16.7%	7	4.0%

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ITEM # 11 KNOWLEDGE

The transportability of programs that you develop between other colleges and universities.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	12	7.0%	9	5.2%	5	2.9%
Non-Users	32	18.6%	11	6.4%	1	0.6%
BUSINESS						
Users	2	1.2%	5	2.9%	3	1.7%
Non-Users	4	2.3%	2	1.2%	2	1.2%
ENGINEERING						
Users	18	10.5%	21	12.2%	8	4.7%
Non-Users	9	5.2%	3	1.7%	0	
EDUCATION						
Users	2	1.2%	7	4.1%	1	0.6%
Non-Users	12	7.0%	3	1.7%	0	
TOTAL						
Users	34	19.8%	42	24.4%	17	9.9%
Non-Users	57	33.1%	19	11.0%	3	1.7%

ITEM # 12   KNOWLEDGE

The outlets available for distributing and publishing
computer materials that you develop.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	16	9.2%	7	4.0%	3	1.7%
Non-Users	38	21.8%	5	2.9%	1	0.6%
BUSINESS						
Users	6	3.4%	4	2.3%	0	
Non-Users	6	3.4%	2	1.1%	0	
ENGINEERING						
Users	23	13.2%	18	10.3%	6	3.4%
Non-Users	9	5.2%	3	1.7%	0	
EDUCATION						
Users	7	4.0%	3	1.7%	0	
Non-Users	14	8.0%	2	1.1%	1	0.6%
TOTAL						
Users	52	29.9%	32	18.4%	9	5.2%
Non-Users	67	38.5%	12	6.9%	2	1.1%

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ITEM # 13 KNOWLEDGE

The existing mechanisms for protecting the patents and
copyrights of material that you develop.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	20	11.6%	3	1.7%	3	1.7%
Non-Users	38	22.0%	55	2.9%	0	
BUSINESS						
Users	9	5.2%	1	0.6%	0	
Non-Users	5	2.9%	3	1.7%	0	
ENGINEERING						
Users	30	17.3%	12	6.9%	5	2.9%
Non-Users	8	4.6%	4	2.3%	0	
EDUCATION						
Users	7	4.0%	2	1.2%	1	0.6%
Non-Users	14	8.1%	2	1.2%	1	0.6%
TOTAL						
Users	66	38.2%	18	10.4%	9	5.2%
Non-Users	65	37.6%	14	8.1%	1	0.6%

ITEM # 14   <u>KNOWLEDGE</u>

The computing system (Control Data Corporation 6400 Series
Computer) currently in use at Lehigh University.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	1	0.6%	16	9.2%	9	5.2%
Non-Users	30	17.3%	12	6.9%	2	1.2%
BUSINESS						
Users	1	0.6%	8	4.6%	1	0.6%
Non-Users	3	1.7%	3	1.7%	2	1.2%
ENGINEERING						
Users	1	0.6%	27	15.6%	19	11.0%
Non-Users	3	1.7%	6	3.5%	3	1.7%
EDUCATION						
Users	0		7	4.0%	3	1.7%
Non-Users	13	7.5%	3	1.7%	0	
TOTAL						
Users	3	1.7%	58	33.5%	32	18.5%
Non-Users	49	28.3%	24	13.9%	7	4.0%

The centralization of computer resources on campus.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	3	1.7%	15	8.7%	8	4.6%
Non-Users	21	12.1%	20	11.6%	3	1.7%
BUSINESS						
Users	2	1.2%	5	2.9%	2	1.2%
Non-Users	2	1.2%	4	2.3%	2	1.2%
ENGINEERING						
Users	4	2.3%	29	16.8%	14	8.1%
Non-Users	4	2.3%	5	2.9%	3	1.7%
EDUCATION						
Users	0		6	3.5%	4	2.3%
Non-Users	5	2.9%	11	6.4%	1	0.6%
TOTAL						
Users	9	5.2%	55	31.8%	28	16.2%
Non-Users	32	18.5%	40	23.1%	9	5.2%

ITEM # 16   KNOWLEDGE

The programming languages that are currently available for
devoloping computer-assisted instructional programs and packages.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	8	4.6%	15	8.7%	3	1.7%
Non-Users	27	15.6%	16	9.2%	1	0.6%
BUSINESS						
Users	1	0.6%	8	4.6%	1	0.6%
Non-Users	3	1.7%	3	1.7%	2	1.2%
ENGINEERING						
Users	17	9.8%	22	12.7%	8	4.6%
Non-Users	5	2.9%	7	4.0%	0	
EDUCATION						
Users	0		8	4.6%	2	1.2%
Non-Users	10	5.8%	6	3.5%	0	
TOTAL						
Users	26	15.0%	53	30.6%	14	8.1%
Non-Users	45	26.0%	32	18.5%	3	1.7%

ITEM # 17 <u>KNOWLEDGE</u>

The location of the interactive computer terminals (CRT's,
teletypes, etc.) on the campus.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	0		17	9.8%	9	5.2%
Non-Users	16	9.2%	26	15.0%	2	1.2%
BUSINESS						
Users	0		5	2.9%	5	2.9%
Non-Users	1	0.6%	4	2.3%	3	1.7%
ENGINEERING						
Users	9	5.2%	24	13.9%	14	8.1%
Non-Users	4	2.3%	6	3.5%	2	1.2%
EDUCATION						
Users	0		6	3.5%	4	2.3%
Non-Users	7	4.0%	9	5.2%	0	
TOTAL						
Users	9	5.2%	52	30.1%	32	18.5%
Non-Users	28	16.2%	45	26.0%	7	4.0%

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The accessibility of the interactive computer terminals on campus.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	1	0.6%	18	10.4%	7	4.0%
Non-Users	21	12.1%	20	11.6%	3	1.7%
BUSINESS						
Users	0		5	2.9%	5	2.9%
Non-Users	1	0.6%	5	2.9%	2	1.2%
ENGINEERING						
Users	11	6.4%	21	12.1%	15	8.7%
Non-Users	6	3.5%	5	2.9%	1	0.6%
EDUCATION						
Users	0		8	4.6%	2	1.2%
Non-Users	11	6.4%	5	2.9%	0	
TOTAL						
Users	12	6.9%	52	30.1%	29	16.8%
Non-Users	39	22.5%	35	20.2%	6	3.5%

ITEM # 19 <u>KNOWLEDGE</u>

The physical capabilities (input/output) of the interactive computer terminals on campus.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	3	1.8%	17	9.9%	6	3.5%
Non-Users	29	17.0%	13	7.6%	1	0.6%
BUSINESS						
Users	0		7	4.1%	3	1.8%
Non-Users	1	0.6%	5	2.9%	2	1.2%
ENGINEERING						
Users	15	8.8%	21	12.3%	10	5.8%
Non-Users	5	2.9%	6	3.5%	1	0.6%
EDUCATION						
Users	1	0.6%	6	3.5%	3	1.8%
Non-Users	13	7.6%	3	1.8%	0	
TOTAL						
Users	19	11.1%	51	29.8%	22	12.9%
Non-Users	48	28.1%	27	15.8%	4	2.3%

ITEM # 20 <u>KNOWLEDGE</u>

The quality of documentation that is available for
existing computer programs.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	6	3.5%	16	9.4%	4	2.3%
Non-Users	29	17.0%	11	6.4%	3	1.8%
BUSINESS						
Users	2	1.2%	5	2.9%	3	1.8%
Non-Users	2	1.2%	4	2.3%	1	0.6%
ENGINEERING						
Users	8	4.7%	29	17.0%	9	5.3%
Non-Users	5	2.9%	7	4.1%	0	
EDUCATION						
Users	1	0.6%	8	4.7%	1	0.6%
Non-Users	15	8.8%	1	0.6%	1	0.6%
TOTAL						
Users	17	9.9%	58	33.9%	17	9.9%
Non-Users	51	29.8%	23	13.5%	5	2.9%

ITEM # 21 KNOWLEDGE

The traditional nature of instruction at Lehigh University.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	2	1.2%	10	6.1%	12	7.3%
Non-Users	6	3.7%	14	8.5%	21	12.8%
BUSINESS						
Users	2	1.2%	1	0.6%	7	4.3%
Non-Users	1	0.6%	5	3.0%	2	1.2%
ENGINEERING						
Users	5	3.0%	18	11.0%	22	13.4%
Non-Users	2	1.2%	6	3.7%	3	1.8%
EDUCATION						
Users	3	1.8%	2	1.2%	5	3.0%
Non-Users	4	2.4%	6	3.7%	5	3.0%
TOTAL						
Users	12	7.3%	31	18.9%	46	28.0%
Non-Users	13	7.9%	31	18.9%	31	18.9%

ITEM # 22 KNOWLEDGE

A fear of being reduced to a button pushing or clerical role
by the computer.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	4	2.5%	13	8.2%	7	4.4%
Non-Users	11	7.0%	17	10.8%	11	7.0%
BUSINESS						
Users	0		3	1.9%	7	4.4%
Non-Users	1	0.6%	4	2.5%	3	1.9%
ENGINEERING						
Users	11	7.0%	19	12.0%	16	10.1%
Non-Users	2	1.3%	5	3.2%	3	1.9%
EDUCATION						
Users	2	1.3%	3	1.9%	3	1.9%
Non-Users	3	1.9%	7	4.4%	3	1.9%
TOTAL						
Users	17	10.8%	38	24.1%	33	20.9%
Non-Users	17	10.8%	33	20.9%	20	12.7%

ITEM # 23 <u>KNOWLEDGE</u>

A lack of understanding of the computer's potential role
in the instructional process.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	6	3.7%	14	8.6%	6	3.7%
Non-Users	11	6.7%	21	12.9%	9	5.5%
BUSINESS						
Users	0		7	4.3%	3	1.8%
Non-Users	1	0.6%	5	3.1%	2	1.2%
ENGINEERING						
Users	6	3.7%	25	15.3%	13	8.0%
Non-Users	3	1.8%	6	3.7%	2	1.2%
EDUCATION						
Users	1	0.6%	4	2.5%	4	2.5%
Non-Users	2	1.2%	12	7.4%	0	
TOTAL						
Users	13	8.0%	50	30.7%	26	16.0%
Non-Users	17	10.4%	44	27.0%	13	8.0%

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Cautiousness and uncertainty as to the potential effectiveness of CAi when compared with traditional teaching methods.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	7	4.3%	16	9.8%	3	1.8%
Non-Users	11	6.7%	27	16.5%	3	1.8%
BUSINESS						
Users	0		5	3.0%	5	3.0%
Non-Users	2	1.2%	4	2.4%	2	1.2%
ENGINEERING						
Users	9	5.5%	22	13.4%	12	7.3%
Non-Users	4	2.4%	7	4.3%	0	
EDUCATION						
Users	0		7	4.3%	3	1.8%
Non-Users	4	2.4%	11	6.7%	0	
TOTAL						
Users	16	9.8%	50	30.5%	23	14.0%
Non-Users	21	12.8%	49	29.9%	5	3.0%

The attitude of administrators towards the use of computers in instruction.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	15	8.8%	7	4.1%	4	2.4%
Non-Users	25	14.7%	14	8.2%	4	2.4%
BUSINESS						
Users	3	1.8%	4	2.4%	2	1.2%
Non-Users	3	1.8%	5	2.9%	0	
ENGINEERING						
Users	19	11.2%	20	11.8%	7	4.1%
Non-Users	7	4.1%	4	2.4%	1	0.6%
EDUCATION						
Users	4	2.4%	5	2.9%	1	0.6%
Non-Users	12	7.1%	4	2.4%	0	
TOTAL						
Users	41	24.1%	36	21.2%	14	8.2%
Non-Users	47	27.6%	27	15.9%	5	2.9%

The competition between instructional users and other users for computer resources.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	9	5.3%	9	5.3%	8	4.7%
Non-Users	30	17.8%	9	5.3%	3	1.8%
BUSINESS						
Users	1	0.6%	5	3.0%	4	2.4%
Non-Users	3	1.8%	5	3.0%	0	
ENGINEERING						
Users	15	8.9%	19	11.2%	12	7.1%
Non-Users	4	2.4%	5	3.0%	2	1.2%
EDUCATION						
Users	2	1.2%	7	4.1%	1	0.6%
Non-Users	12	7.1%	4	2.4%	0	
TOTAL						
Users	27	16.0%	40	23.7%	25	14.8%
Non-Users	49	29.0%	23	13.6%	5	3.0%

ITEM # 27   KNOWLEDGE

The means and procedures available to you to facilitate the
interchange of CAI program materials on the campus.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	17	10.0%	7	4.1%	2	1.2%
Non-Users	34	20.0%	9	5.3%	0	
BUSINESS						
Users	5	2.9%	3	1.8%	1	0.6%
Non-Users	4	2.4%	4	2.4%	0	
ENGINEERING						
Users	27	15.9%	16	9.4%	3	1.8%
Non-Users	7	4.1%	4	2.4%	0	
EDUCATION						
Users	6	3.5%	3	1.8%	1	0.6%
Non-Users	13	7.6%	2	1.2%	2	1.2%
TOTAL						
Users	55	32.4%	29	17.1%	7	4.1%
Non-Users	58	34.1%	19	11.2%	2	1.2%

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ITEM # 28 KNOWLEDGE

The quality of computer-based learning materials, in your discipline, currently available at Lehigh University.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	8	4.7%	15	8.7%	3	1.7%
Non-Users	25	14.5%	14	8.1%	4	2.3%
BUSINESS						
Users	0		8	4.7%	2	1.2%
Non-Users	1	0.6%	5	2.9%	2	1.2%
ENGINEERING						
Users	6	3.5%	34	19.8%	6	3.5%
Non-Users	7	4.1%	4	2.3%	1	0.6%
EDUCATION						
Users	4	2.3%	4	2.3%	2	1.2%
Non-Users	12	7.0%	4	2.3%	1	0.6%
TOTAL						
Users	18	10.5%	61	35.5%	13	7.6%
Non-Users	45	26.2%	27	15.7%	8	4.7%

ITEM # 29 <u>KNOWLEDGE</u>

An uncertainty as to who, on campus, should acquire and
distribute software, and provide the required training and
related services.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	11	6.5%	11	6.5%	4	2.4%
Non-Users	33	19.6%	8	4.8%	2	1.2%
BUSINESS						
Users	4	2.4%	3	1.8%	3	1.8%
Non-Users	4	2.4%	4	2.4%	0	
ENGINEERING						
Users	21	12.5%	17	10.1%	7	4.2%
Non-Users	4	2.4%	5	3.0%	2	1.2%
EDUCATION						
Users	4	2.4%	6	3.6%	0	
Non-Users	14	8.3%	1	0.6%	0	
TOTAL						
Users	40	23.8%	37	22.0%	14	8.3%
Non-Users	55	32.7%	18	10.7%	4	2.4%

ITEM # 30   KNOWLEDGE

The existing channels of communications between present computer users and non-users.

	None		Some		Considerable	
ARTS & SCIENCES						
Users	10	5.9%	14	8.3%	2	1.2%
Non-Users	24	14.2%	16	9.5%	3	1.8%
BUSINESS						
Users	1	0.6%	5	3.0%	3	1.8%
Non-Users	4	2.4%	3	1.8%	1	0.6%
ENGINEERING						
Users	19	11.2%	20	11.8%	6	3.6%
Non-Users	7	4.1%	5	3.0%	0	
EDUCATION						
Users	3	1.8%	5	3.0%	2	1.2%
Non-Users	9	5.3%	7	4.1%	0	
TOTAL						
Users	33	19.5%	44	26.0%	13	7.7%
Non-Users	44	26.0%	31	18.3%	4	2.4%

ITEM # 1   <u>EFFECT</u>

The amount of university funding available to you for the development and use of computer-based learning materials.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	2	1.3%	2	1.3%	7	4.6%	8	5.3%	4	2.6%
Non-Users	5	3.3%	3	2.0%	21	13.8%	7	4.6%	1	0.7%
BUSINESS										
Users	1	0.7%	3	2.0%	2	1.3%	3	2.0%	1	0.7%
Non-Users	0		3	2.0%	2	1.3%	1	0.7%	1	0.7%
ENGINEERING										
Users	2	1.3%	6	3.9%	14	9.2%	9	5.9%	10	6.6%
Non-Users	0		0		7	4.6%	2	1.3%	0	
EDUCATION										
Users	2	1.3%	2	1.3%	2	1.3%	3	2.0%	1	0.7%
Non-Users	2	1.3%	1	0.7%	9	5.9%	3	2.0%	0	
TOTAL										
Users	7	4.6%	13	8.6%	25	16.4%	23	15.1%	16	10.5%
Non-Users	7	4.6%	7	4.6%	39	25.7%	13	8.6%	2	1.3%

ITEM # 2   EFFECT

The amount of external funding available to you for research and development in the area of computer-assisted instruction.

	Very Neg.	Negative	None	Positive	Very Pos.
ARTS & SCIENCES					
Users	0	2 1.4%	15 10.1%	3 2.0%	1 0.7%
Non-Users	5 3.4%	3 2.0%	21 14.2%	4 2.7%	2 1.4%
BUSINESS					
Users	1 0.7%	1 0.7%	5 3.4%	2 1.4%	1 0.7%
Non-Users	0	2 1.4%	3 2.0%	1 0.7%	1 0.7%
ENGINEERING					
Users	4 2.7%	2 1.4%	24 16.2%	7 4.7%	4 2.7%
Non-Users	0	0	5 3.4%	3 2.0%	1 0.7%
EDUCATION					
Users	2 1.4%	3 2.0%	3 2.0%	1 0.7%	1 0.7%
Non-Users	3 2.0%	0	9 6.1%	3 2.0%	0
TOTAL					
Users	7 4.7%	8 5.4%	47 31.8%	13 8.8%	7 4.7%
Non-Users	8 5.4%	5 3.4%	38 25.7%	11 7.4%	4 2.7%

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ITEM # 3   EFFECT

The economic and professional rewards that you may
derive from developmental work in this area.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	1	0.6%	2	1.3%	9	5.8%	10	6.5%	1	0.6%
Non-Users	5	3.2%	1	0.6%	17	11.0%	12	7.8%	4	2.6%
BUSINESS										
Users	3	1.9%	3	1.9%	1	0.6%	2	1.3%	1	0.6%
Non-Users	1	0.6%	1	0.6%	3	1.9%	1	0.6%	1	0.6%
ENGINEERING										
Users	1	0.6%	4	2.6%	15	9.7%	16	10.4%	6	3.9%
Non-Users	1	0.6%	0		1	0.6%	6	3.9%	1	0.6%
EDUCATION										
Users	0		1	0.6%	2	1.3%	5	3.2%	1	0.6%
Non-Users	0		2	1.3%	8	5.2%	4	2.6%	1	0.6%
TOTAL										
Users	5	3.2%	10	6.5%	27	17.5%	33	21.4%	9	5.8%
Non-Users	7	4.5%	4	2.6%	29	18.8%	23m	14.9%	7	4.5%

ITEM # 4   EFFECT

The degree to which computer-based materials that you
develop count towards your research publishing.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	1	0.6%	4	2.5%	15	9.4%	2	1.3%	4	2.5%
Non-Users	5	3.1%	3	1.9%	21	13.2%	6	3.8%	3	1.9%
BUSINESS										
Users	5	3.1%	0		2	1.3%	2	1.3%	0	
Non-Users	1	0.6%	0		3	1.9%	3	1.9%	0	
ENGINEERING										
Users	3	1.9%	3	1.9%	13	8.2%	10	6.3%	17	10.7%
Non-Users	1	0.6%	0		0		4	2.5%	4	2.5%
EDUCATION										
Users	0		1	0.6%	4	2.5%	2	1.3%	2	1.3%
Non-Users	1	0.6%	1	0.6%	9	5.7%	3	1.9%	1	0.6%
TOTAL										
Users	9	5.7%	8	5.0%	34	21.4%	16	10.1%	23	14.5%
Non-Users	8	5.0%	4	2.5%	33	20.8%	16	10.1%	8	5.0%

ITEM # 5   EFFECT

The availability to you of programming talent within your department.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	1	0.6%	4	2.5%	8	4.9%	8	4.9%	5	3.1%
Non-Users	7	4.3%	3	1.9%	11	6.8%	12	7.4%	6	3.7%
BUSINESS										
Users	2	1.2%	0		3	1.9%	2	1.2%	2	1.2%
Non-Users	0		1	0.6%	3	1.9%	2	1.2%	1	0.6%
ENGINEERING										
Users	4	2.5%	4	2.5%	15	9.3%	11	6.8%	13	8.0%
Non-Users	0		0		3	1.9%	2	1.2%	4	2.5%
EDUCATION										
Users	0		1	0.6%	1	0.6%	5	3.1%	2	1.2%
Non-Users	1	0.6%	1	0.6%	6	3.7%	6	3.7%	2	1.2%
TOTAL										
Users	7	4.3%	9	5.6%	27	16.7%	26	16.0%	22	13.6%
Non-Users	8	4.9%	5	3.1%	23	14.2%	22	13.6%	13	8.0%

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The availability of a centralized pool of programming talent on the campus.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	0		4	2.6%	9	5.8%	7	4.5%	5	3.2%
Non-Users	3	1.9%	6	3.8%	12	7.7%	11	7.1%	6	3.8%
BUSINESS										
Users	2	1.3%	1	0.6%	2	1.3%	4	2.6%	1	0.6%
Non-Users	0		3	1.9%	1	0.6%	2	1.3%	1	0.6%
ENGINEERING										
Users	4	2.6%	5	3.2%	15	9.6%	8	5.1%	11	7.1%
Non-Users	0		1	0.6%	1	0.6%	5	3.2%	2	1.3%
EDUCATION										
Users	1	0.6%	2	1.3%	0		5	3.2%	1	0.6%
Non-Users	1	0.6%	0		6	3.8%	7	4.5%	1	0.6%
TOTAL										
Users	7	4.5%	12	7.7%	26	16.7%	24	15.4%	18	11.5%
Non-Users	4	3.6%	10	6.4%	20	12.8%	25	16.0%	10	6.4%

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The extent and degree of technical training that is required if you are new to computer-assisted instruction.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	1	0.7%	9	6.2%	7	4.8%	1	0.7%	1	0.7%
Non-Users	6	4.1%	12	8.2%	13	8.9%	5	3.4%	3	2.1%
BUSINESS										
Users	1	0.7%	5	3.4%	3	2.1%	1	0.7%	0	
Non-Users	0		4	2.7%	2	1.4%	0		1	0.7%
ENGINEERING										
Users	7	4.8%	6	4.1%	17	11.6%	5	3.4%	2	1.4%
Non-Users	0		2	1.4%	4	2.7%	2	1.4%	1	0.7%
EDUCATION										
Users	2	1.4%	2	1.4%	2	1.4%	3	2.1%	0	
Non-Users	1	0.7%	7	4.8%	7	4.8%	1	0.7%	0	
TOTAL										
Users	11	7.5%	22	15.1%	29	19.9%	10	6.8%	3	2.1%
Non-Users	7	4.8%	25	17.1%	26	17.8%	8	5.5%	5	3.4%

ITEM # 8 <u>EFFECT</u>

The services available to you as an instructor through
computer program librarians and other user services personnel.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	0		4	2.6%	7	4.6%	10	6.6%	2	1.3%
Non-Users	3	2.0%	5	3.3%	15	9.9%	11	7.3%	3	2.0%
BUSINESS										
Users	1	0.7%	1	0.7%	2	1.3%	5	3.3%	1	0.7%
Non-Users	0		1	0.7%	1	0.7%	4	2.6%	1	0.7%
ENGINEERING										
Users	2	1.3%	4	2.6%	10	6.6%	17	11.3%	10	6.6%
Non-Users	0		0		4	2.6%	1	0.7%	3	2.0%
EDUCATION										
Users	1	0.7%	1	0.7%	2	1.3%	2	1.3%	3	2.0%
Non-Users	0		4	2.6%	3	2.0%	6	4.0%	1	0.7%
TOTAL										
Users	4	2.6%	10	6.6%	21	13.9%	34	22.5%	16	10.6%
Non-Users	3	2.0%	10	6.6%	23	15.2%	22	14.6%	8	5.3%

ITEM # 9   <u>EFFECT</u>

·The facilities and mechanisms available for introducing
new faculty members to the computing resources on campus.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	0		5	3.4%	8	5.4%	10	6.7%	1	0.7%
Non-Users	7	4.7%	5	3.4%	17	11.4%	6	4.0%	3	2.0%
BUSINESS										
Users	3	2.0%	1	0.7%	5	3.4%	1	0.7%	0	
Non-Users	2	1.3%	2	1.3%	1	0.7%	1	0.7%	1	0.7%
ENGINEERING										
Users	3	2.0%	7	4.7%	17	11.4%	5	3.4%	6	4.0%
Non-Users	0		0		4	2.7%	1	0.7%	3	2.0%
EDUCATION										
Users	1	0.7%	3	2.0%	3	2.0%	2	1.3%	0	
Non-Users	3	2.0%	4	2.7%	5	3.4%	3	2.0%	0	
TOTAL										
Users	7	4.7%	16	10.7%	33	22.1%	18	12.1%	7	4.7%
Non-Users	12	8.1%	11	7.4%	27	18.1%	11	7.4%	7	4.7%

ITEM # 10   **EFFECT**

The level of technical support that is available to you in developing computer-based materials.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	0		6	3.9%	11	7.1%	5	3.2%	2	1.3%
Non-Users	6	3.9%	7	4.5%	16	10.3%	5	3.2%	3	1.9%
BUSINESS										
Users	2	1.3%	4	2.6%	1	0.6%	2	1.3%	1	0.6%
Non-Users	0		2	1.3%	2	1.3%	2	1.3%	1	0.6%
ENGINEERING										
Users	3	1.9%	7	4.5%	12	7.7%	10	6.5%	11	7.1%
Non-Users	1	0.6%	0		2	1.3%	4	2.6%	2	1.3%
EDUCATION										
Users	0		1	0.6%	2	1.3%	6	3.9%	0	
Non-Users	4	2.6%	3	1.9%	4	2.6%	5	3.2%	0	
TOTAL										
Users	5	3.2%	18	11.6%	26	16.8%	23	14.8%	14	9.0%
Non-Users	11	7.1%	12	7.7%	24	15.5%	16	10.3%	6	3.9%

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ITEM # 11   EFFECT

The transportability of programs that you develop between other colleges and universities.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	0		3	2.0%	13	8.8%	3	2.0%	2	1.4%
Non-Users	1	0.7%	1	0.7%	27	18.4%	7	4.8%	1	0.7%
BUSINESS										
Users	3	2.0%	1	0.7%	5	3.4%	1	0.7%	0	
Non-Users	0		1	0.7%	4	2.7%	1	0.7%	1	0.7%
ENGINEERING										
Users	3	2.0%	7	4.8%	22	15.0%	2	1.4%	6	4.1%
Non-Users	0		0		6	4.1%	2	1.4%	1	0.7%
EDUCATION										
Users	0		2	1.4%	5	3.4%	1	0.7%	1	0.7%
Non-Users	1	0.7%	1	0.7%	10	6.8%	2	1.4%	0	
TOTAL										
Users	6	4.1%	13	8.8%	45	30.6%	7	4.8%	9	6.1%
Non-Users	2	1.4%	3	2.0%	47	32.0%	12	8.2%	3	2.0%

ITEM # 12   EFFECT

The outlets available for distributing and publishing
computer materials that you develop.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	0		2	1.4%	16	11.0%	2	1.4%	2	1.4%
Non-Users	2	1.4%	2	1.4%	28	19.2%	4	2.7%	1	0.7%
BUSINESS										
Users	2	1.4%	0		8	5.5%	0		0	
Non-Users	0		1	0.7%	4	2.7%	1	0.7%	1	0.7%
ENGINEERING										
Users	1	0.7%	7	4.8%	23	15.8%	4	2.7%	2	1.4%
Non-Users	0		0		6	4.1%	2	1.4%	1	0.7%
EDUCATION										
Users	0		0		7	4.8%	2	1.4%	0	
Non-Users	1	0.7%	2	1.4%	10	6.8%	1	0.7%	1	0.7%
TOTAL										
Users	3	2.1%	9	6.2%	54	37.0%	8	5.5%	4	2.7%
Non-Users	3	2.1%	5	3.4%	48	32.9%	8	5.5%	4	2.7%

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ITEM # 13   EFFECT

The existing mechanisms for protecting patents and
copyrights of material that you develop.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	0		1	0.7%	18	13.0%	0		0	
Non-Users	0		2	1.4%	32	23.2%	1	0.7%	1	0.7%
BUSINESS										
Users	1	0.7%	0		8	5.8%	0		0	
Non-Users	0		1	0.7%	5	3.6%	1	0.7%	0	
ENGINEERING										
Users	3	2.2%	4	2.9%	25	18.1%	1	0.7%	1	0.7%
Non-Users	1	0.7%	0		7	5.1%	1	0.7%	0	
EDUCATION										
Users	1	0.7%	0		8	5.8%	0		0	
Non-Users	2	1.4%	1	0.7%	11	8.0%	1	0.7%	0	
TOTAL										
Users	5	3.6%	5	3.6%	59	42.8%	1	0.7%	1	0.7%
Non-Users	3	2.2%	4	2.9%	55	39.9%	4	2.9%	1	0.7%

The computing system (Control Data Corporation 6400 Series Computer) currently in use at Lehigh University.

	Very Neg.	Negative	None	Positive	Very Pos.
ARTS & SCIENCES					
Users	0	0	11 7.0%	10 6.4%	4 2.5%
Non-Users	1 0.6%	4 2.5%	28 17.8%	3 1.9%	1 0.6%
BUSINESS					
Users	1 0.6%	1 0.6%	6 3.8%	1 0.6%	1 0.6%
Non-Users	0	2 1.3%	3 1.9%	2 1.3%	0
ENGINEERING					
Users	1 0.6%	2 1.3%	10 6.4%	16 10.2%	16 10.2%
Non-Users	0	0	5 3.2%	2 1.3%	2 1.3%
EDUCATION					
Users	1 0.6%	2 1.3%	3 1.9%	3 1.9%	0
Non-Users	2 1.3%	0	12 7.6%	0	1 0.6%
TOTAL					
Users	3 1.9%	5 3.2%	30 19.1%	30 19.1%	21 .13.4%
Non-Users	3 1.9%	6 3.8%	48 30.6%	7 4.5%	4 2.5%

The centralization of computer resources on the campus.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	1	0.6%	3	1.9%	13	8.4%	7	4.5%	1	0.6%
Non-Users	1	0.6%	3	1.9%	26	16.9%	4	2.6%	3	1.9%
BUSINESS										
Users	0		1	0.6%	7	4.5%	0		1	0.6%
Non-Users	0		2	1.3%	5	3.2%	0		0	
ENGINEERING										
Users	0		10	6.5%	17	11.0%	8	5.2%	7	4.5%
Non-Users	0		0		5	3.2%	2	1.3%	2	1.3%
EDUCATION										
Users	0		3	<1.9%	5	3.2%	1	0.6%	0	
Non-Users	1	0.6%	0		12	7.8%	2	1.3%	1	0.6%
TOTAL										
Users	1	0.6%	17	11.0%	42	27.3%	16	10.4%	9	5.8%
Non-Users	2	1.3%	5	3.2%	48	31.2%	8	5.2%	6	3.9%

ITEM # 16   EFFECT

The programming languages that are currently available for developing computer-assisted instructional programs and packages.

	Very Neg.	Negative	None	Positive	Very Pos.
ARTS & SCIENCES					
Users	0	1 0.7%	17 11.1%	6 3.9%	1 0.7%
Non-Users	2 1.3%	4 2.6%	25 16.3%	5 3.3%	0
BUSINESS					
Users	1 0.7%	2 1.3%	5 3.3%	1 0.7%	1 0.7%
Non-Users	1 0.7%	0	2 1.3%	3 2.0%	1 0.7%
ENGINEERING					
Users	2 1.3%	1 0.7%	22 14.4%	7 4.6%	9 5.9%
Non-Users	1 0.7%	0	5 3.3%	2 1.3%	1 0.7%
EDUCATION					
Users	2 1.3%	1 0.7%	5 3.3%	1 0.7%	0
Non-Users	1 0.7%	1 0.7%	13 8.5%	1 0.7%	0
TOTAL					
Users	5 3.3%	5 3.3%	49 32.0%	15 9.8%	11 7.2%
Non-Users	5 3.3%	5 3.3%	45 29.4%	11 7.2%	2 1.3%

ITEM # 17   EFFECT

The location of the interactive computer terminals
(teletypes, CRT's, etc.) on the campus.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	1	0.6%	5	3.2%	6	3.8%	10	6.4%	4	2.5%
Non-Users	2	1.3%	6	3.8%	22	14.0%	7	4.5%	0	
BUSINESS										
Users	1	0.6%	0		3	1.9%	3	1.9%	3	1.9%
Non-Users	1	0.6%	0		1	0.6%	3	1.9%	2	1.3%
ENGINEERING										
Users	4	2.5%	7	4.5%	14	8.9%	6	3.8%	12	7.6%
Non-Users	1	0.6%	1	0.6%	2	1.3%	3	1.9%	2	1.3%
EDUCATION										
Users	1	0.6%	3	1.9%	1	0.6%	4	2.5%	0	
Non-Users	0		1	0.6%	12	7.6%	3	1.9%	0	
TOTAL										
Users	7	4.5%	15	9.6%	24	15.3%	23	14.6%	19	12.1%
Non-Users	4	2.5%	8	5.1%	37	23.6%	16	10.2%	4	2.5%

ITEM # 18   EFFECT

The accessibility of the interactive computer terminals on the campus.

	Very Neg.	Negative	None	Positive	Very Pos.
ARTS & SCIENCES					
Users	1 0.6%	8 5.1%	5 3.2%	9 5.7%	3 1.9%
Non-Users	2 1.3%	8 5.1%	20 12.7%	6 3.8%	2 1.3%
BUSINESS					
Users	0	1 0.6%	2 1.3%	6 3.8%	1 0.6%
Non-Users	0	2 1.3%	1 0.6%	2 1.3%	2 1.3%
ENGINEERING					
Users	1 0.6%	7 4.5%	14 8.9%	11 7.0%	10 6.4%
Non-Users	0	0	5 3.2%	3 1.9%	0
EDUCATION					
Users	2 1.3%	3 1.9%	1 0.6%	2 1.3%	1 0.6%
Non-Users	1 0.6%	0	14 8.9%	1 0.6%	0
TOTAL					
Users	4 2.5%	19 12.1%	22 14.0%	28 17.8%	15 9.6%
Non-Users	3 1.9%	10 6.4%	40 25.5%	12 7.6%	4 2.5%

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ITEM # 19   <u>EFFECT</u>

The physical capabilities (input/output) of the
interactive computer terminals on the campus.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	2	1.3%	5	3.3%	8	5.3%	9	5.9%	2	1.3%
Non-Users	0		4	2.6%	25	16.4%	6	3.9%	2	1.3%
BUSINESS										
Users	1	0.7%	2	1.3%	4	2.6%	2	1.3%	1	0.7%
Non-Users	1	0.7%	0		0		6	3.9%	0	
ENGINEERING										
Users	1	0.7%	7	4.6%	14	9.2%	8	5.3%	10	6.6%
Non-Users	0		0		5	3.3%	2	1.3%	1	0.7%
EDUCATION										
Users	1	0.7%	3	2.0%	2	1.3%	2	1.3%	1	0.7%
Non-Users	1	0.7%	0		13	8.6%	1	0.7%	0	
TOTAL										
Users	5	3.3%	17	11.2%	28	18.4%	21	13.8%	14	9.2%
Non-Users	2	1.3%	.4	2.6%	43	28.3%	15	9.9%	3	2.0%

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ITEM # 20   EFFECT

The quality of the documentation that is available for existing computer programs.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	2	1.3%	8	5.3%	8	5.3%	4	2.6%	2	1.3%
Non-Users	3	2.0%	5	3.3%	23	15.2%	3	2.0%	3	2.0%
BUSINESS										
Users	3	2.0%	1	0.7%	2	1.3%	4	2.6%	0	
Non-Users	0		1	0.7%	2	1.3%	3	2.0%	0	
ENGINEERING										
Users	4	2.6%	7	4.6%	15	9.9%	10	6.6%	7	4.6%
Non-Users	0		1	0.7%	3	2.0%	1	0.7%	2	1.3%
EDUCATION										
Users	0		2	1.3%	4	2.6%	3	2.0%	0	
Non-Users	1	0.7%	0		14	9.3%	0		0	
TOTAL										
Users	9	6.0%	18	11.9%	29	19.2%	21	13.9%	9	6.0%
Non-Users	4	2.6%	7	4.6%	42	27.8%	7	4.6%	5	3.3%

The traditional nature of instruction at Lehigh University.

	Very Neg.	Negative	None	Positive	Very Pos.
ARTS & SCIENCES					
Users	3 2.1%	5 3.4%	9 6.2%	2 1.4%	4 2.8%
Non-Users	4 2.8%	9 6.2%	19 13.1%	2 1.4%	2 1.4%
BUSINESS					
Users	1 0.7%	3 2.1%	5 3.4%	0	1 0.7%
Non-Users	0	2 1.4%	3 2.1%	1 0.7%	0
ENGINEERING					
Users	3 2.1%	8 5.5%	16 11.0%	9 6.2%	2 1.4%
Non-Users	1 0.7%	2 1.4%	4 2.8%	1 0.7%	0
EDUCATION					
Users	0	2 1.4%	6 4.1%	1 0.7%	0
Non-Users	0	2 1.4%	10 6.9%	2 1.4%	1 0.7%
TOTAL					
Users	7 4.8%	18 12.4%	36 24.8%	12 8.3%	7 4.8%
Non-Users	5 3.4%	15 10.3%	36 24.8%	6 4.1%	3 2.1%

A fear of being reduced to a button pushing or clerical role by the computer.

	Very Neg.	Negative	None	Positive	Very Pos.
ARTS & SCIENCES					
Users	1 0.6%	4 2.6%	19 12.2%	0	0
Non-Users	2 1.3%	1 0.6%	34 21.8%	0	1 0.6%
BUSINESS					
Users	0	0	10 6.4%	0	0
Non-Users	0	2 1.3%	5 3.2%	0	0
ENGINEERING					
Users	3 1.9%	4 2.6%	31 19.9%	2 1.3%	2 1.3%
Non-Users	2 1.3%	1 0.6%	7 4.5%	0	0
EDUCATION					
Users	0	0	10 6.4%	0	0
Non-Users	1 0.6%	3 1.9%	11 7.1%	0	0
TOTAL					
Users	4 2.6%	8 5.1%	70 44.9%	2 1.3%	2 1.3%
Non-Users	5 3.2%	7 4.5%	57 36.5%	0	1 0.6%

ITEM # 23   EFFECT

A lack of understanding of the computers' potential role in the instructional process.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	2	1.3%	8	5.3%	11	7.2%	0		1	0.7%
Non-Users	5	3.3%	7	4.6%	22	14.5%	3	2.0%	2	1.3%
BUSINESS										
Users	0		3	2.0%	4	2.6%	3	2.0%	0	
Non-Users	0		0		6	3.9%	1	0.7%	0	
ENGINEERING										
Users	7	4.6%	6	3.9%	21	13.8%	2	1.3%	3	2.0%
Non-Users	1	0.7%	2	1.3%	7	4.6%	0		0	
EDUCATION										
Users	0		2	1.3%	3	2.0%	4	2.6%	1	0.7%
Non-Users	3	2.0%	3	2.0%	9	5.9%	0		0	
TOTAL										
Users	9	5.9%	19	12.5%	39	25.7%	9	5.9%	5	3.3%
Non-Users	9	5.9%	12	7.9%	44	28.9%	4	2.6%	2	1.3%

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ITEM # 24 <u>EFFECT</u>

Cautiousness and uncertainty as to the potential effectiveness
of CAI when compared with traditional teaching methods.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	4	2.7%	8	5.4%	8	5.4%	1	0.7%	1	0.7%
Non-Users	4	2.7%	9	6.1%	20	13.6%	2	1.4%	3	2.0%
BUSINESS										
Users	0		3	2.0%	5	3.4%	2	1.4%	0	
Non-Users	0		2	1.4%	5	3.4%	0		0	
ENGINEERING										
Users	6	4.1%	7	4.8%	20	13.6%	2	1.4%	1	0.7%
Non-Users	2	1.4%	1	0.7%	6	4.1%	0		0	
EDUCATION										
Users	2	1.4%	2	1.4%	3	2.0%	2	1.4%	1	0.7%
Non-Users	2	1.4%	4	2.7%	9	6.1%	0		0	
TOTAL										
Users	12	8.2%	20	13.6%	36	24.5%	7	4.8%	3	2.0%
Non-Users	8	5.4%	16	10.9%	40	27.2%	2	1.4%	3	2.0%

The attitude of administrators towards the use of the computer in instruction.

	Very Neg.	Negative	None	Positive	Very Pos.
ARTS & SCIENCES					
Users	0	2 1.4%	14 9.9%	1 0.7%	1 0.7%
Non-Users	4 2.8%	2 1.4%	27 19.0%	3 2.1%	2 1.4%
BUSINESS					
Users	0	4 2.8%	3 2.1%	2 1.4%	0
Non-Users	0	2 1.4%	4 2.8%	1 0.7%	0
ENGINEERING					
Users	2 1.4%	6 4.2%	19 13.4%	7 4.9%	3 2.1%
Non-Users	1 0.7%	0	7 4.9%	0	0
EDUCATION					
Users	0	1 0.7%	5 3.5%	3 2.1%	1 0.7%
Non-Users	0	1 0.7%	13 9.2%	1 0.7%	0
TOTAL					
Users	2 1.4%	13 9.2%	41 28.9%	13 9.2%	5 3.5%
Non-Users	5 3.5%	5 3.5%	51 35.9%	5 3.5%	2 1.4%

ITEM # 26   <u>EFFECT</u>

The competition between instructional users and other
users for computer resources.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	4	2.7%	6	4.1%	11	7.5%	1	0.7%	0	
Non-Users	0		7	4.8%	27	18.5%	0		1	0.7%
BUSINESS										
Users	1	0.7%	0		7	4.8%	1	0.7%	1	0.7%
Non-Users	0		4	2.7%	3	2.1%	0		0	
ENGINEERING										
Users	4	2.7%	12	8.2%	21	14.4%	3	2.1%	0	
Non-Users	1	0.7%	2	1.4%	3	2.1%	1	0.7%	0	
EDUCATION										
Users	0		2	1.4%	7	4.8%	1	0.7%	0	
Non-Users	0		2	1.4%	13	8.9%	0		0	
TOTAL										
Users	9	6.2%	20	13.7%	46	31.5%	6	4.1%	1	0.7%
Non-Users	1	0.7%	15	10.3%	46	31.5%	1	0.7%	1	0.7%

ITEM # 27   <u>EFFECT</u>

The means and procedures available to you to facilitate the interchange of CAI program materials on the campus.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	1	0.7%	3	2.1%	12	8.6%	1	0.7%	2	1.4%
Non-Users	1	0.7%	3	2.1%	30	21.4%	2	1.4%	1	0.7%
BUSINESS										
Users	1	0.7%	1	0.7%	6	4.3%	0		1	0.7%
Non-Users	0		2	1.4%	3	2.1%	2	1.4%	0	
ENGINEERING										
Users	3	2.1%	3	2.1%	24	17.1%	4	2.9%	2	1.4%
Non-Users	0		0		7	5.0%	0		0	
EDUCATION										
Users	1	0.7%	5	3.6%	3	2.1%	1	0.7%	0	
Non-Users	0		2	1.4%	12	8.6%	1	0.7%	0	
TOTAL										
Users	6	4.3%	12	8.6%	45	32.1%	6	4.3%	5	3.6%
Non-Users	1	0.7%	7	5.0%	52	37.1%	5	3.6%	1	0.7%

ITEM # 28   EFFECT

The quality of computer-based learning materials, in your discipline, currently available at Lehigh University.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	4	2.6%	6	3.9%	7	4.6%	4	2.6%	2	1.3%
Non-Users	7	4.6%	8	5.2%	15	9.8%	5	3.3%	2	1.3%
BUSINESS										
Users	4	2.6%	2	1.3%	1	0.7%	3	2.0%	0	
Non-Users	2	1.3%	3	2.0%	0		2	1.3%	0	
ENGINEERING										
Users	6	3.9%	9	5.9%	11	7.2%	10	6.5%	7	4.6%
Non-Users	1	0.7%	1	0.7%	3	2.0%	3	2.0%	0	
EDUCATION										
Users	3	2.0%	3	2.0%	1	0.7%	3	2.0%	0	
Non-Users	4	2.6%	3	2.0%	6	3.9%	1	0.7%	1	0.7%
TOTAL										
Users	17	11.1%	20	13.1%	20	13.1%	20	13.1%	9	5.9%
Non-Users	14	9.2%	15	9.8%	24	15.7%	11	7.2%	3	2.0%

ITEM # 29   EFFECT

An uncertainty as to who, on the campus, should acquire
and distribute software, and provide the required
training and related services.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	2	1.4%	7	4.9%	13	9.0%	0		0	
Non-Users	7	4.9%	2	1.4%	26	18.1%	1	0.7%	1	0.7%
BUSINESS										
Users	2	1.4%	2	1.4%	4	2.8%	2	1.4%	0	
Non-Users	1	0.7%	4	2.8%	2	1.4%	0		0	
ENGINEERING										
Users	6	4.2%	10	6.9%	16	11.1%	3	2.1%	1	0.7%
Non-Users	1	0.7%	0		6	4.2%	2	1.4%	0	
EDUCATION										
Users	0		4	2.8%	5	3.5%	0		0	
Non-Users	0		7	4.9%	7	4.9%	0		0	
TOTAL										
Users	10	6.9%	23	16.0%	38	26.4%	5	3.5%	1	0.7%
Non-Users	9	6.3%	13	9.0%	41	28.5%	3	2.1%	1	0.7%

The existing channels of communications between present computer users and the non-users.

	Very Neg.		Negative		None		Positive		Very Pos.	
ARTS & SCIENCES										
Users	2	1.4%	7	4.8%	12	8.3%	0		1	0.7%
Non-Users	11	7.6%	2	1.4%	21	14.5%	1	0.7%	2	1.4%
BUSINESS										
Users	3	2.1%	0		4	2.8%	3	2.1%	0	
Non-Users	1	0.7%	3	2.1%	3	2.1%	0		0	
ENGINEERING										
Users	5	3.4%	9	6.2%	21	14.5%	1	0.7%	1	0.7%
Non-Users	0		0		8	5.5%	0		0	
EDUCATION										
Users	1	0.7%	3	2.1%	5	3.4%	0		0	
Non-Users	3	2.1%	4	2.8%	8	5.5%	0		0	
TOTAL										
Users	11	7.6%	19	13.1%	42	29.0%	4	2.8%	2	1.4%
Non-Users	15	10.3%	9	6.2%	40	27.6%	1	0.7%	2	1.4%

VITA

Date of Birth: August 7, 1947

Place of Birth: Bryn Mawr, Pennsylvania

Names of Parents: Hugh J. McFadden, Sr.

Catherine M. McFadden (nee McDevitt)

Spouse: Diana T. McFadden (nee Lagerman)

Children: None

Education:

Elementary

Saint Monica's School
Berwyn Pennsylvania

Saint Norbert's School
Paoli, Pennsylvania

Annunciation B.V.M. School
Havertown, Pennsylvania

Secondary

Msgr. Bonner High School
Drexel Hill, Pennsylvania

Undergraduate

West Chester State College
West Chester, Pennsylvania
B.S. in Secondary Education, Geography
1971

Education cont.

Graduate

West Chester State College
West Chester, Pennsylvania
M.S. in Educational Research
    1972

Lehigh University
Bethlehem, Pennsylvania
doctoral study, 1972 to 1978

Professional Experience:

Current Position:

Director of Institutional Research
Office of the President
Bloomsburg State College
Bloomsburg, Pennsylvania

Previous Positions:

Manager of Educational Systems
Computer Services Center
Bloomsburg State College
Bloomsburg, Pennsylvania

Educational Coordinator
Computing Center
Lehigh University
Bethlehem, Pennsylvania

Graduate Assistant
Computing Center
Lehigh University
Bethlehem, Pennsylvania

Research Associate
Educational Research and Development
    Associates
West Chester, Pennsylvania

Professional Experience cont.

Graduate Assistant
Bureau of Research and Related Services
Learning Research Center
West Chester State College
West Chester, Pennsylvania