1986

The Effects of a Computer-Assisted Instruction Tutorial Program on the Academic Performance and Attitudes of College Athletes.

Jesse Henry Hurst

THE EFFECTS OF A COMPUTER-ASSISTED INSTRUCTION TUTORIAL PROGRAM ON THE ACADEMIC PERFORMANCE AND ATTITUDES OF COLLEGE ATHLETES

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Education in the Graduate School of Texas Southern University

By

Jesse Henry Hurst, B.A., M.A.

Texas Southern University

1986

Approved By

School of Education Advisor

Dean, The Graduate School

THE EFFECTS OF A COMPUTER-ASSISTED INSTRUCTION TUTORIAL PROGRAM ON THE ACADEMIC PERFORMANCE AND ATTITUDES OF COLLEGE ATHLETES

By

Jesse Hurst, II, Ed.D.

Texas Southern University, 1986

Professor Willie McCree, Advisor

The purpose of this study was to investigate the effects of a computer-assisted instruction tutorial program on the academic performance and attitudes of college athletes. A pretest-post-test experimental design was employed in this study. Forty (40) student athletes enrolled at a university located in Southwest Texas were randomly assigned to one of two groups (20 in the experimental group and 20 in the control group). The experimental group (computer-assisted group) was assigned a series of CAI tutorial lessons to be done in three months while the control group (non-computer-assisted group) was tutored by the traditional method during the same period of time.

A modified version of an instrument developed by Brown was used to measure the attitudes of college athletes toward

CAI. The instrument was divided into two sections. The first section consisted of six (6) items, five (5) socio-demographic items, and one (1) dichotomous item. The second section of the instrument contained eight (8) items in the form of a Likert-type scale. The items in this section called for participants in this study to check one of three options: (1) agree, (2) disagree, and (3) no opinion.

The following conclusions were drawn as a result of the findings of the study. First, it was concluded that computer-assisted instruction had a significant effect on the academic performance of college athletes. Secondly, it was concluded that the exposure of college athletes to computer-assisted instruction did not have a significant effect on their attitudes toward computer-assisted instruction. Thirdly, it was concluded that the sex of student athletes did not have a significant effect on their attitudes toward computer-assisted instruction.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

VITA

July 2, 1941 . . .	Born - Houston, Texas
1963	B.A., Oklahoma State University
1963	Manpower Project, University of Houston
1964	Probation Officer, Cook County, Illinois
1964	United States Army
1965	Hutcherson Branch YMCA, Tulsa, Oklahoma
1965	Youth Director, Booker T. Washington High School, Carver-Anderson Quarterback Club, Tulsa, Oklahoma
1966	YMCA Certification, University of Oklahoma, Norman, Oklahoma
1967	Bien Hoa, Vietnam, U.S. Army, 173rd Airborne Brigade
1970	1st 36th Infantry, Frieburg, Germany
1971	South Vietnamese Advisor, 38th Ranger Battalion, An Loc, Vietnam
1973	First of the 8th 1st Calvary Division, Fort Hood, Texas
1974	M.A., Prairie View A&M University
1974-80	Instructor/Assistant Football Coach, Head Women's Basketball, Strength Coach, Form Counselor, Prairie View A&M University, Prairie View, Texas
1980-84	Teaching Assistant, Texas Southern University, and Campus Representative, Coors Beer
Major Field . . .	Higher Education Administration

DEDICATION

This study is dedicated to my wife, Carol, to my four children, Tosh, Nicole, Katrina, and LaMonica and to the rest of the Hurst family. A special dedication goes to my Mother for her unparalleled support. A very special dedication goes to my late Father, who would have been so happy and proud to be a part of this occasion.

ACKNOWLEDGEMENTS

The researcher wishes to express appreciation and gratitude to a few of the many persons who made this research study possible. To my major advisor, Dr. Willie McCree, I express my deep appreciation for guidance and understanding throughout my program.

Special thanks are extended to Dr. Alvin McNeil, Dr. Joseph Jefferson, Dr. Cliff Stallings, and Dr. Bettye Cox for their invaluable assistance in this research project. Sincere appreciation and gratitude are extended to the faculty of the Department of Foundations and Higher Education for their support throughout my program. Special thanks to Dr. Harold Fillyaw, Ms. Vasquez, Dr. Ralph Butler, Ms. Patricia Rivers, and a host of other friends for their suggestions and comments regarding various parts of this study. Finally, to my wife Carol, whose love, wisdom, understanding, patience, and spiritual fortitude have been the driving light in the pursuit of my academic goals, I would like to express my love and gratitude.

Chapter 1

INTRODUCTION

A major contemporary development in America's pedagogical process (one which is well overdue) is the widespread concern for the academic difficulties of college athletes. The "dumb jock syndrome" has generated much criticism and controversy within the athletic fraternities on college campuses across America.[1] Proposal 48 will attest to this fact. However, this proposal only addresses the academic performance of those athletes entering college for the first time beginning in 1986.[2]

The reason(s) for the academic difficulties of college athletes have not been fully investigated. Many of the reasons these students have academic problems seem to be based on observational findings rather than on empirical

---

[1]Harry Edward, "The Black 'Dumb Jock': An American Sports Tragedy," Atlantic Monthly (August 1983): 33.

[2]NCAA Bylaws 5-1 (j), as amended by Proposal No. 48 at the 1983 NCAA Convention, require a minimum 2.00 high school grade point average in a core curriculum of at least eleven defined academic courses and a minimum combined score of seven hundred on the SAT or a 15 composite score on the ACT for a student to be immediately eligible as a college freshman to practice and play intercollegiate athletics and receive athletically related financial aid. Proposal No. 48 was adopted by the NCAA Division I membership, to become effective August 1, 1986.

ones. Further, the lack of research pertaining to the academic problems of college athletes seems to suggest that it is all right to be a marginal student as long as a student is an athlete. To what else could one attribute such an oversight and/or lackadaisical attitude on the part of social scientists and educators toward one of America's most exploited resources? As Harry Edward opines:

> For as long as organized sports participation has been associated with American education, the traditionally somewhat comic, not altogether unappealing "dumb jock" image of the student athlete has endured. Though over the years there have been some notable efforts by journalists, academicians, and sports activists to expose the desperately serious realities masked by this caricature, only recently has American society been jolted into recognizing the extensive and tragic implications of widespread educational mediocrity and failure among student athletes, and -- no less importantly -- that "dumb jocks" are not born; they are being systematically created.[3]

A variety of educational programs has been developed and instituted by higher educational institutions in an effort to alleviate the academic problems of college athletes. Nevertheless, many college athletes have failed to respond adequately to these programs which have been developed to assist them in overcoming their academic difficulties. Many of the athletes need extensive instruction in the basic skills, especially reading and writing, in order to work successfully toward acquiring the academic

---

[3]Edward, op. cit., p. 33.

skills necessary to obtain a college degree. They need programs which are motivating, individualized, and offer extensive practice opportunities. Such programs must be individualized to meet each college athlete's needs as well as enhance his basic skills.

Inasmuch as student athletes are faced with demanding athletic responsibilities, the amount of time they have for studies suffers drastically. Due to the time constraints and their poor academic backgrounds, athletes need assistance with their studies. Preferably, they need a method or technique which offers individualized instruction.

Computer-assisted instruction is one of the leading instructional techniques available for individualized instruction. Past research studies have suggested that computer-assisted instruction is an effective technique for raising the academic achievement of students when compared with traditional techniques.[4]

Not only has academic achievement been shown to improve with the aid of computer-assisted instruction, but so have the attitudes of the users toward computer-assisted instruction as well. Students' attitudes toward specific

---

[4]San-Yun W. Tsai and Norval F. Pohl, "Student Achievement in Computer Programming: Lecture vs - Computer-Aided Instruction," Journal of Experimental Education. Also see John Allen, "Current Trends in Computer-Assisted Instruction," Computers and the Humanities, 1972, 7:47 - 53; D. Alpert and D. L. Bitzer, "Advances in Computer-Based Education," Science, 1970, 167:1582-1590.

methods of instructional devices, including computer-assisted instruction, have been shown to be highly correlated with achievement.[5] Mathis, Smith and Hansen concluded that exposure to computer-assisted instruction produces positive attitudes toward computer-assisted instruction as an instructional device.[6]

The combination of academic gains by students and favorable attitudes toward computers as a teaching device by students makes computer-assisted instruction a highly visible tool for the learning process in the higher educational spectrum. However, literature concerning the impact of CAI on college students' achievements and their attitudes has focused on regular college students rather than on student athletes. The paucity of research concerning the effects of CAI on the academic achievements and attitudes of college athletes seems to warrant an empirical and systematic investigation into this issue.

Statement of the Problem

The purpose of this study was to investigate the effects of a computer-assisted instruction tutorial program on the

---

[5]R. F. Bundy, "Computer-Assisted Instruction -- Where Are We?" Phi Delta Kappan, 1968, 49:424-429.

[6]Arthur Mathis, Timothy Smith, and Duncan Hansen, "College Students' Attitudes Toward Computer-Assisted Instruction," Journal of Educational Psychology, 1970, 61:46-51.

academic performances and attitudes of college athletes. The following questions were examined:

1. Do student athletes in the computer-assisted instruction tutorial program show gains in academic performance when they are compared with similar student athletes not in the computer-assisted program?

2. Do student athletes in the computer-assisted instruction tutorial program show more favorable attitudes toward the use of the computer-assisted instruction program when they are compared with similar student athletes not in the computer-assisted instruction program?

Significance of the Study

Time management has become the enemy of college athletes because more than 70% of athletes' time on campus is spent in non-academic environments. Inasmuch as a large number of college athletes attending higher educational institutions are faced with the problem of meeting a variety of academic requirements (while spending a considerable amount of time in non-academic surroundings), it is important to gather as much information as possible about various instructional techniques that could possibly improve the academic performance of these students. Moreover, this study will also provide the administration and other academic structures of universities with information that

could provide valuable data and possibly enhance their academic programming for college athletes.

The significance of this study was to launch an investigation into how to improve the academic performance of college athletes. Proposal 48 (which means each athlete must maintain a 2.0 grade-point average) has created finger pointing, recruiting violations, NCAA investigations, and angry athletes, athletes who have been major participants in their respective school programs. According to USA Today, eight out of ten athletes have left college without their degrees in the past ten years.[7]

In many instances, the ineligibility is prevalent among the poorly prepared student athletes, those who have met the bare minimum requirement for entrance into college. Because of the solid, hard-core courses that are now on the class schedule, NCAA Division I schools can no longer have "easy" freshman courses; all courses are solid, hard-core ones.

Therefore, this investigation addresses itself to such issues as student athletes' attitudes toward computers and how computer assistance can improve the academic performance of each individual athlete. Could this investigation be a major break-through for athletes in their academic endeavors? In the years to come, there is a possibility

---

[7] USA Today, June 5, 1985, Section C, pp. 1-4.

that a twofold objective can be achieved -- satisfactory athletic and satisfactory academic performance for each student athlete. Such achievement is important because the performance level of each athlete deteriorates in time; however, the academic ability can reflect mental capabilities long after the playing skills have diminished for the athlete.

The problem with improving academic performance for student athletes is that most athletes are not getting the education they deserve in certain institutional curricula because too much of the athlete's time is taken up with activities that have nothing to do with intellectual efforts. The problem is most serious for students at the lowest economic levels.

According to Chandler Davidson, there are no cheap or easy solutions to the problem of improving academic performance.[8] The proliferation of entertainment and time-killing activities in the typical athlete's program is an admission of educational failure. Therefore, all avenues should be reviewed to find a possible, workable solution.

This investigation was seeking a method by which to improve the academic performance with the computer-assistance program, one which will possibly enable student athletes to

---

[8]Chandler Davidson, The Houston Post, June 3, 1985, Section B, p. 3.

obtain degrees and develop life-earning adjustments for later life.

Additionally, the findings of this study will be useful to college administrators in evaluating the effectiveness of the computer as a tool for instruction. Positive results could open the way for institutions to plan and implement programs that would enhance the quality of their entire academic program. Finally, this study will provide administrators on college and university campuses with needed data for the purpose of providing a sound and practical tutorial program for college athletes.

Statement of Hypotheses

According to the problem formed for this study, it was hypothesized that:

Ho 1: There is no statistically significant difference between the academic performance of college athletes who completed the computer-assisted instruction tutorial program and those student athletes who did not complete the computer-assisted instruction tutorial program, as measured by physical science scores.

Ho 2: There is no statistically significant difference between the attitudes toward computer-assisted instruction of student athletes who completed the computer-assisted instruction tutorial

program and those student athletes who did not complete the computer-assisted tutorial program.

Ho 3: There is no statistically sifnigicant difference between the attitudes of male and female student athletes toward computer-assisted instruction.

Assumptions

This study was designed and developed within the framework of the following assumptions:

1. It was assumed that student athletes who are exposed to computer-assisted instruction will show significantly higher gains in academic performance that will those student athletes who were not exposed to computer-assisted instruction.
2. Also, it was assumed that the attitudes of the student athletes exposed to CAI will improve. Having directed and individualized instruction will affect the athletes in a positive manner.

Limitations

In carrying out this study, the following limitations were observed:

1. This study was limited to the attitudes of college athletes attending a predominantly white university in Southwest Texas.
2. Another limitation of this study was that it included only those college athletes enrolled in physical science courses during the spring semester of 1985.

Definition of Terms

Throughout the study, the investigator referred to the following terms or concepts: Computer-Assisted Instruction, Academic Performance, Attitude, Student Athlete, Predominantly White University, and Traditional Instruction. To assure the reader a better understanding of these terms as related to this study, each concept was operationally defined below.

1. Computer-Assisted Instruction - An individual tutoring procedure using a computer.
2. Academic Performance - The actual performance of the student athlete on the physical science pretest and post-test.
3. Attitude - The student athlete's mental disposition or his perception toward computer-assisted instruction.
4. Student Athlete - Any student who participated in intercollegiate athletics at the university.
5. Predominantly White University - An institution of higher learning with over 50% of its student clientele white.

6. Traditional Instruction - A tutorial session provided by the teacher.

Organization of the Remainder of the Study

Chapter 1 included the Introduction, Statement of the Problem, Significance of the Study, Statement of the hypotheses, Assumptions, Limitations, and the Definition of Terms. Chapter 2 represented a review of the literature that had implications for the study under investigation. Chapter 3 presented the types of design, the population, sampling procedure, data-gathering instrument, validity and reliability of the instrument, independent and dependent variables, and statistical analysis. Chapter 4 contained the analysis of the data. Chapter 5 contained the summary, conclusions, implications, and recommendations.

Chapter 2

REVIEW OF LITERATURE

This section examines literature related to the role or influence of computer-assisted instruction on the academic performance levels and attitudes of college athletes. Most of the literature reviewed which held implications for this investigation also encompassed areas that were not of concern. Accordingly, only those portions of the reviewed literature that reflected relevance for this investigation were abstracted and reported in this chapter. Further, this chapter is divided into three major categories. The first part of this chapter addresses computer-assisted instruction as an educational tool. The second portion of this chapter explores computer-assisted instruction vs. traditional instruction. The third and final section of this chapter provides a review of the studies relating to the attitudes of college students toward computer-assisted instruction.

Computer-Assisted Instruction (CAI)

The computer as an instructional tool probably had its origin in B. F. Skinner's fill-in-the-blanks teaching machine. Needless to say, the use of the computer in education has changed since Skinner's invention. The computer as an

educational tool has come to be known as computer-assisted instruction. The computer-assisted instruction process involves students participating in individual sessions at a computer terminal and responding to information or a series of questions presented by the system. Since the inception of computer-assisted instruction, extensive efforts have been devoted to developing computer programs to help students obtain, review and apply knowledge through a variety of modes. Among these modes are drill and practice, problem-solving, simulation, and tutorial.[9]

Nevertheless, total utilization of educational computing is not being realized due to a variety of questions raised by educators concerning the conditions under which, and for whom, computer-assisted instruction is effective. Even though answers to the aforementioned questions are not available, a plethora of research has been conducted to examine the usefulness of CAI as an educational tool.

The quest for computer application in education continues to flourish in the 80's even though some critics doubt its capability to enhance learning. The trouble with computer-assisted instruction is that many individuals unwisely perceive the computer as a panacea to educational woes, because, in many instances, it has been effective as an individualized instructional tool.

---

[9]Marie Dence, "Toward Defining the Role of CAI: A Review," Educational Technology (November 1980): 50-54.

For instance, Magidson found that the computer as an instructional tool was more effective than the traditional method in 45 percent of the studies he analyzed.[10] Vinsonhaler and Bass reported that students who used computer-assisted instruction improved their academic performance.[11] Too, Allen reported that the computer has been effective in the studying of foreign language, especially German.[12]

Not only has computer-assisted instruction proved to be effective in improving academic achievement among some students, it has also been shown to improve the attitudes of students toward the computer. For example, Cartwright and Derevensky found that the students exposed to CAI had more favorable attitudes toward computer-assisted instruction than did those students not exposed to CAI.[13] Cavin, Cavin and Lagowski also reported that the students who used CAI

---

[10]Errol M. Magidson, "Trends in Computer-Assisted Instruction," Educational Technology, 1978, 18:50-63.

[11]John F. Vinsonhaler and Ronald K. Bass, "A Summary of Ten Major Studies on CAI Drill and Practice," Educational Technology, 1972, 12:24-32.

[12]John R. Allen, "Current Trends in Computer-Assisted Instruction," Computers and the Humanities, 1972, 7:47-53.

[13]Glenn F. Cartwright and Jeffery L. Derevensky, "An Attitudinal Study of Computer-Assisted Testing as a Learning Method," Psychology in the Schools, 1976, 13:317-321.

developed positive attitudes toward the computer.[14] Seemingly, the future of the computer as an educational tool seems to be a positive one. Because of the effectiveness of this tool, future educators can utilize the full potential of this technology to enhance the learning environment.

Computer-Assisted Instruction vs. Traditional Instruction

Educators' concerns about the relationship betweem computer-assisted instruction and traditional instruction have motivated them to examine both variables in regard to academic achievement. Regarding such concerns, Tsai and Pohl studied the effect on the academic achievement of college students of computer-assisted instruction and traditional instruction utilized separately and also used together,[15] employing students in three sections of a university course in introductory computer programming. For each section of the computer course, the minimum enrollment in the class was 45 students and the maximum was 54. From the three computer classes, three matched groups of 15 students each were identified and used. Data for this study were collected from homework assignments, hour quizzes, a term project, and a final examination. In

---

[14]Claudia S. Cavin, E. D. Cavin and J. J. Lagowski, "The Effects of Computer-Assisted Instruction on the Attitudes of College Students Toward Computers and Chemistry," Journal of Research in Science Teaching, 1981, 18:329-333.

[15]Tsai and Pohl, p. 50.

addition, a questionnaire was designed to secure information concerning the students' (1) age, (2) sex, (3) classification, and (4) previous computer programming experience. Tsai and Pohl found no observable difference in the students' performance on homework assignments or term projects. However, significant differences were found on final examinations. Those students who had both types of instruction achieved higher scores on the final examination than did those who had received either the computer-assisted instruction or the traditional instruction only.[16]

Earlier, Allen had studied the current trends in computer-assisted instruction. In his study, Allen examined the effectiveness of the computer-assisted instruction vis a vis traditional instruction in teaching German. Allen concluded that students studying German using computer-assisted instruction learned more than did students under traditional instruction.[17]

A study was conducted by Vinsonhaler and Bass who summarized the results of ten independent studies of CAI drill and practice. Their investigation involved over 30 separate experiments with about 10,000 participants working within the content areas of language arts and mathematics.

---

[16]Tsai and Pohl, pp. 50-53.

[17]Allen, John R., "Current Trends in Computer-Assisted Instruction," Computers and the Humanities, 1972, 7:47-53.

Vinsonhaler and Bass found that CAI groups showed better performance gains than did traditional instruction groups.[18]

In addition, Alpert and Bitzer initiated a study to ascertain the effectiveness of computer-assisted instruction when compared to traditional instruction. The participants were twenty students in a medical science course at the University of Illinois. Computer-assisted instruction was used during the entire semester. Alpert and Bitzer found that the CAI group scored as well in grade performance as did the control group (the traditional class), even though the former group required only one-third to one-half as many student contact hours of instruction as did those students taught in the traditional classroom. Additionally, subsequent measurements extending over a 26-week period indicated that the computer-assisted instruction group showed greater retention over that interval.[19]

In another study, Magidson compared the effectiveness of computer-assisted instruction to traditional instruction. Magidson surveyed a series of computer-assisted instruction studies and found that CAI was at least as effective as traditional instruction in 55 percent of the studies and was

---

[18]John F. Vinsonhaler and Ronald K. Bass, "A Summary of Ten Major Studies on CAI Drill and Practice," Educational Technology, 1972, 12:29-32.

[19]D. Alpert and D. L. Bitzer, "Advances in Computer-Based Education," Science, 1970, 167:1582-1590.

more effective in 45 percent. Moreover, Magidson found that CAI learning required less time.[20]

A similar study by Lewellen, who investigated the relationship between computer-assisted instruction and traditional instruction, revealed findings compatible to those of Magidson. Lewellen found that computer-assisted instruction student groups performed better on standardized tests than did student groups using traditional instruction.[21]

Attitudes of College Students Toward Computer-Assisted Instruction

One of the most significant investigations done in the area of attitudinal study regarding computer-assisted instruction of college students was conducted by Cartwright and Derevensky at McGill University.[22] In this study, Cartwright and Derevensky investigated the effects of exposure to Computer-Assisted Testing (CAT) as an effective instructional method on the attitudes of college students toward computer-assisted instruction (CAI). One hundred twenty-four students (29 males and 95 females) participated in the study. Teaching

---

[20]Errol D. Magidson, "Trends in Computer-Assisted Instruction," Educational Technology, 1978, 18:5063.

[21]L. Lewellen, "Computers in the Classroom," Journal of Educational Data Processing, 1971, 8:33-38.

[22]Glen F. Cartwright and Jeffery L. Derevensky, "An Attitudinal Study of Computer-Assisted Testing as a Learning Method," Psychology in the Schools, 1976, 13:317-321.

Methods Questionnaire 11 was administered to all students to assess their attitudes toward computer-assisted instruction. Five computer quizzes, consisting of 20 randomly drawn multiple-choice questions, were individually administered on 10 teletype terminals. The findings indicated that participants exposed to computer-assisted testing had significantly more favorable attitudes toward computer-assisted instruction than did those participants who were not exposed to computer-assisted testing. Moreover, the students perceived computer-assisted testing as an effective instructional method in enhancing mastery of conceptual and factual material.[23]

Claudia Cavin, E. D. Cavin and Lagowski conducted a study to ascertain whether college students' attitudes toward computers and chemistry would be affected by their using computer-assisted instruction materials in a chemistry course and whether there would be any difference among students according to sex. The participants in this study were 44 students (21 males and 23 females). The students were divided into an experimental group (18 students) and a control group (26 students). The experimental group (CAI group) was assigned a series of CAI lessons to be done outside the class, while the control group (non-CAI group) was given a series of written homework assignments. The data were obtained from a

---

[23]Ibid.

locally-devised questionnaire. The data were analyzed using a 2-way analysis of covariance. Cavin, Cavin and Lagowski found that the attitudes of the female students toward computers improved by using computer-assisted instruction. However, no change in the attitude of the students toward chemistry was found.[24]

Another interesting study surveying the attitudes of students toward computer-assisted instruction was done by Mathis, Smith, and Hansen, who examined the attitudes of college students before and after they had experienced computer-assisted instruction.[25] Data for this study were obtained from 64 randomly selected students from a General Psychology 205 class at Florida State University. The data were collected by means of Form A and Form B of the Brown Scale. A modified Solomon Four-Group design was used to assess changes in the attitudes of students toward computer-assisted instruction as measured by the Brown Scale. Mathis, Smith and Hansen found that the students were generally positive toward computer-assisted instruction but those who had experienced using it were more positive than were those

---

[24]Claudia S. Cavin, E. D. Cavin and J. J. Lagowski, "The Effect of Computer-Assisted Instruction on the Attitudes of College Students Toward Computers and Chemistry," Journal of Research in Science Teaching, 1981, 18:329-333.

[25]Arthur Mathis, Timothy Smith, and Duncan Hansen, "College Students' Attitudes Toward Computer-Assisted Instruction," Journal of Educational Psychology, 1970, 61:46-51.

who had participated in the reading control group. Additionally, those students who made many errors while being instructed by the computer were less positive toward using the method (r = -.49) than were those who had not used CAI. Moreover, students who had received a CAI program or reading covering unfamiliar concepts rather than material on which they were to be tested that week were less positive than were those who had not. Also, the researchers found that pre-testing had no effect on the attitudes of the students toward CAI.[26]

Further inquiry into the attitudes of college students toward computer-assisted instruction was made by Gadzella on undergraduate students taking psychology courses.[27] Gadzella investigated the effectiveness of a computer-assisted instruction (CAI) study skills program on students' behaviors and attitudes. A total of 196 students volunteered to participate in the study; forty-one students later dropped out. Of the 155 who remained, there were 88 students in the experimental group (who completed the CAI program) and 67 students in the control group (who did not have access to the program). The survey of Study Habits and Attitudes Inventory

---

[26] Ibid.

[27] Bernadette M. Gadzella, "Computer-Assisted Instruction on Study Skills," Journal of Experimental Education (1982): 122-126.

was administered to all students three times during the semester. The data were analyzed using trend analysis.

Gadzella found that those students who completed the computer-assisted instruction study skills program gained significantly greater insights into effective study skills and attitudes than did those students who did not have access to the program. Also, the results revealed that during the semester the scores for the experimental group increased significantly while the scores for the control group decreased significantly.

Empirical Studies and Computer-Assisted Instruction

A study was done by Burns and Bozeman who examined the research findings pertaining to the effectiveness of computer-assisted instruction in mathematics at elementary and secondary schools.[28] Burns and Bozeman utilized the research integration methodology known as Meta-analysis to analyze the data. The sample consisted of 40 students who met pre-established criteria. Among Burns and Bozeman's findings were:

1. A mathematics instructional program supplemented with either drill/practice or tutorial computer-assisted instruction was significantly more effective in fostering student achievement

---

[28]Patricia Knight, Burns and William C. Bozeman, "Computer-Assisted Instruction and Mathematics Achievement: Is There a Relationship?" Educational Technology (October 1981): 32-39.

than was a program utilizing only traditional instructional methods.

2. CAI drill/practice programs were significantly more effective in promoting increased student achievement at both the elementary and secondary instructional levels and among high achieving and disadvantaged students as well as among students whose distinct ability levels had been differentiated by the original researchers. The achievement of average level students was not significantly enhanced by supplementary drill/practice CAI.

3. Instructional plans accommodating supplementary drill/practice CAI were significantly more effective in stimulating greater achievement gains among boys at the intermediate grade level than were instructional plans employing traditional pedagogical models. It was not demonstrated that a basis existed to support an analogous conclusion relative to achievement among intermediate girls.

4. Tutorial CAI-supplemented instruction was significantly more effective in promoting increased mathematics achievement among students at both the elementary and secondary instructional levels, among disadvantaged students, and with respect to instances in which study summaries did not report findings pertaining to particular student ability levels.

5. There was virtually no evidence to suggest the existence of a relationship between experimental design features and study outcomes.[29]

A similar study was conducted by Kulik, Banger, and Williams. They utilized Meta-analysis to integrate the findings from 51 independent studies of computer-based teaching in grades 6 through 12 and found that the computer-based teaching raised the final examination scores of

---

[29] Ibid.

students approximately .32 standard deviations, or from the 50th percentile to the 63rd percentile. Also, the computer-based instruction group showed positive results on follow-up examinations given to students several months after the completion of instruction. Additionally, the students who were taught using computers revealed positive attitudes toward the courses they were taking.[30]

An investigation conducted by Menis, Snyder and Ben-Kohav focused on improving mathematics grades among high school students with the aid of the computer; the investigators studied 402 tenth-grade students who had made low mathematics grades in the ninth grade. Menis, Snyder and Ben-Kohav found that the better mathematics students did not improve their grades on the average, that the weaker students improved their grades, and that using the computer as a home drill aid raised the self-confidence of the weaker students toward mathematics.[31]

Koch, under the endorsement of the National Association of Secondary School Principals and its Committee on Educational Technology, conducted a study to determine the use

---

[30]James A. Kulik, Robert L. Bangert, and George W. Williams, "Effects of Computer-Based Teaching on Secondary School Students," Journal of Educational Psychology 75, no. 1 (1983): 19-26.

[31]Yosef Menis, Mitchel Snyder and Ezra Ben-Kohav, "Improving Achievement in Algebra by Means of the Computer," Educational Technology (August 1980): 19-22.

of computers for instructional purposes in schools.[32] This investigation included data from a survey of schools throughout the country who were utilizing computers for instruction. In addition, data were collected from personal visits to those schools using computers in instruction and which had unique or unusual programs. Koch found that computer-assisted instruction drill and practice programs provided a significant advantage over traditional instruction in foreign languages and the sciences.

In another study, Griswold studied the attitudes of students in a computer-assisted instruction program over a period of time. The study consisted of 126 computer-assisted instruction and non-computer-assisted instruction users in both reading and mathematics.[33] Griswold found that the computer-assisted instruction users showed internal responsibility and a great sense of control over their learning. Additionally, the researcher found that the female computer-assisted instruction users were more positive than were male computer-assisted instruction users and non-computer-assisted instruction users. Moreover, Griswold

---

[32]Warren J. Koch, "Basic Facts About Using the Computer In Instruction," Education Digest 28-31.

[33]P. A. Griswold, Longitudinal Patterns of Student Attitudes In a Computer-Assisted Instruction Curriculum. (Rocky Mountain Educational Research Association) Unpublished Manuscript, 1981, Eastern Montana College.

noted increased achievement utilizing computer-assisted instruction among students at both the elementary and secondary levels among boys and among high achieving as well as disadvantaged students.

An investigation undertaken by Steele, Battista and Krockover examined the effects of microcomputer-assisted instruction on the acquisition of computer literacy of fifth-grade students. The population of this study consisted of eighty-six fifth-grade students.[34] The data were gathered from the Minnesota Computer Literacy and Awareness Assessment (MCLAA). Steele, Battista and Krockover found that the micro-computer drill and practice group scored higher than did the conventional drill and practice group in each case.

In an attempt to study the effects of computer-assisted instruction versus printed instruction on student learning in the cognitive categories of knowledge and application, Boettcher, Alderson and Saccucci examined the test scores of nursing students.[35] The population of this study consisted of eighty-three nursing students. Four tests were

---

[34]Kathleen J. Steele, Michael T. Battista and Gerald H. Krockover, "The Effect of Microcomputer Assisted Instruction on the Computer Literacy of Fifth Grade Students," Journal of Educational Research, 76:298-301.

[35]Elaine G. Boettcher, Sylvia F. Alderson, and Michael S. Saccucci, "A Comparison of the Effects of Computer-Assisted Instruction Versus Printed Instruction on Student Learning in the Cognitive Categories of Knowledge and Application," Journal of Computer-Based Instruction 8 (August 1981): 13-17.

administered to each of the participants: a pretest for knowledge equals a pretest for application, a post-test for knowledge, and a post-test for application. Boettcher, Alderson and Saccucci found no significant difference between the computer-assisted group and the printed instruction groups on the post-test scores related to either cognitive category. Additionally, they found that both groups of participants made equally significant gains in the amount of knowledge gained in the application of learning demonstrated.

Also, Smith examined the effects of a computer-assisted instruction program in mathematics on student attitudes of self-concept, locus of control and level os aspiration.[36] The data for this study were gathered from 240 junior high school students (115 CAI and 125 non-CAI students). The Sears Self-Concept Inventory, the Cooper-Smith Self-Esteem Inventory and Crandall Locus of Control Instrument were employed in this study. Smith found that the levels of aspiration, measured after two weeks of computer-assisted instruction and again six weeks later, were realistic. In mathematics Smith found that students' self-concepts and feelings of locus of control did not increase, on the average, from pretest to post-test. Additionally, in terms

---

[36]Ian D. Smith, "Impact of Computer-Assisted Instruction on Student Attitudes," Journal of Educational Psychology 64, no. 3 (1973): 366-372.

of attitudes, the non-computer-assisted instruction group was more stable from pretest to post-test; by contrast, the computer-assisted instruction students were considerably less stable.

Chapter 3

RESEARCH DESIGN

The primary objective of this study was to investigate the effects of a computer-assisted instruction program on the academic performances and the attitudes of college athletes. This chapter consists of six major sections: (1) the design of the study, (2) selection of the population and sampling procedure, (3) the construction and validation of the investigative instrument, (4) the data collection technique, (5) the description of the independent and dependent variables, and (6) the statistical procedure employed in the study.

Type of Design

The pretest-post-test design (see Figure I) was employed in the study. This experimental design involved two groups: one experimental group and one control group. Pre- and post-tests were given to both groups. The experimental group (computer-assisted group) was assigned a series of CAI tutorial lessons to be done in three months while the control group (non-computer-assisted group) was tutored by the traditional method during the same period of time.

Figure 1 - Pretest - Post-test Design

$\underline{R}_1\ \underline{O}\ \underline{X}\ \underline{O}_2$	Experimental Group (CAI Group)
$\underline{R}\ \underline{O}_3\ \ \underline{O}_4$	Control Group (Non-CAI Group)

R = Random assignment of participants (student athletes)

X = Experimental variable manipulated (the group assisted by the computer)

C = RO-O-Control Group

O_1 = Pretest for Experimental Group

O_2 = Post-test for Experimental Group

O_3 = Pretest Control Group

O_4 = Post-test Control Group

Random assignment controls the regression and the selection factors. The pretest controls the mortality, randomization and the control group control the maturation, and the control group controls the history, testing, and instrumentation.

The pretest-post-test design, like other kinds of research designs, has its methodological weaknesses. However, the only major weakness with this design is a "possible" interaction between the pretest and the treatment which may make the results generalizable only to other pretested groups.[37]

Although the pretest-post-test design has its methodological weaknesses, the combination of random assignment and the presence of a pretest and a control group which serve to control for all sources of internal validity tend to outweigh its disadvantages.[38] The seriousness of this potential weakness depends upon certain factors such as the nature of the pretest, the nature of the treatment, and the length of the study. The combination of random assignment and the presence of the pretest and a control group should serve to control for all sources of internal validity.[39]

---

[37] L. R. Gay, Educational Research, 2nd Ed. (London: Charles E. Merrill, 1981), pp. 227-229.

[38] Ibid.

[39] Ibid.

Inasmuch as the pretest-post-test design controls for all sources of internal validity, the use of this design for this research investigation provides the most practicable and systematical means for studying the effects of a computer-assisted instruction program on the academic performances and attitudes of college athletes.

Population

The population consisted of 47 student athletes enrolled in a physics course at a predominantly white university located in Southwest Texas. The population also included both male and female student athletes. The university from which the population was drawn has a reputation for having a solid athletic program. It is a member of Division I of the NCAA. The university has a student enrollment of 40,000.

Sampling Procedure

Random sampling was employed in this study. Each student athlete enrolled in the physics course had an equal chance of participating in the study. The procedures for selecting the student athletes for the experimental and control groups were done as indicated below. The names of all of the 47 (total) student athletes in the physics class were placed in a container. A coin was used for the purpose of flipping for heads and tails. Of the participants selected, two students decided emphatically to drop out of

the control group and two students dropped the course. In the experimental group, three students dropped out of the research. However, most of the students tended to be very eager to participate and to improve the plight or academic success for future athletes. Finally, the students were randomly assigned to one of two groups: the experimental group (those students who are tutored by CAI) and the control group (those students who are tutored by the traditional method). The final population consisted of thirty-two (32) male students and eight (8) female students.

Instrumentation

A modified version of an instrument developed by Brown (1966) was used to measure the attitudes of college athletes toward CAI. The modified version of the Brown instrument contained 14 questions. (Six [6] of these items were developed by the investigator.)

In addition, the instrument was divided into two sections. The first section consisted of six (6) items: five (5) sociodemographic items and one (1) dichotomous item. The second section of the instrument contained eight (8) items in the form of a Likert-type scale. The respondents were asked to rate each item on a three-point scale, ranging from "agree" to "disagree." Items in this section of the questionnaire were scored 3, 2, 1, to correspond with a response of "agree," "no opinion," and "disagree,"

respectively. The lowest scores represented a less than favorable attitude toward CAI and the highest scores represented a most favorable attitude toward CAI (see Appendix I).

Validity and Reliability

The Brown Questionnaire (1966) yielded an internal consistency reliability coefficient of .89 for the original form.[40] It should be noted that Mathis, Smith and Hansen reported a Kuder-Richardson Formula 20 reliability of .82 for versions of the Brown Scale (Form B).[41]

The final tabulation of data from the modified version of Brown's instrument yielded internal consistency reliability coefficient of .80 for the test as a whole. Brunie and Kintz opined that whenever an instrument's reliability value is .70 or above, the instrument is considered reliable.[42]

Data Collection Procedure

In January of 1985, the student athletes enrolled in an introductory physics course at a predominantly white

---

[40]Mathis, Smith and Hansen, p. 47.

[41]Ibid.

[42]L. Brunie and B. L. Kintz, Computational Handbook of of Statistics (Glenview, Ill.: Scott, Foresman and Company, 1969), pp. 187-88.

university were randomly assigned to one of two groups: the Experimental Group and Control Group. Those in the experimental group were given an average of 45 minutes, 2 days a week, of CAI tutorial sessions by individual typewriter-like terminals (VAX 3) in small booths. The control group was given tutorial sessions via the traditional method and covering the same time period. Both groups covered the sample material. Additionally, both groups were administered a physics pre-test covering various topics in the introductory course before they were assigned to the subgroups to begin the operation.

Students were instructed that the material that they would be studying was relevant to some future examination in the class but were not told that they would be given the same material in the two subgroups. All the students (experimental group and control group) were post-tested immediately after the final tutorial sessions, using the same physics test used for the pretest.

Once the students completed the post-test, they were administered a copy of the modified questionnaire developed by Brown in 1966 to assess their attitudes toward CAI. The post-test scores were computed for both groups. In addition, the scores on the modified version of the Brown Questionnaire of both groups were computed by the researcher.

The data from the post-tests and questionnaires were coded by the researcher. The codes were punched into the

computer terminal. For analysis purposes, the Statistical Package for the Social Sciences (SPSS) was used. For this part of the operation, the professional services of the computing center at Texas Southern University were utilized.

Independent and Dependent Variables

For the present study, the independent variable was computer-assisted instruction. This variable was assumed to have some effect on the dependent variables, which were the academic performance of the student athletes and their attitudes toward CAI.

Statistical Analysis

The data for the present study were treated through the utilization of the one-way analysis of variance and the one-way analysis of covariance. According to Kerlinger, the analysis of variance is a "statistical technique which analyzes the independent and interactive effects of two or more independent variables on a dependent variable.[43]

Additionally, the use of the analysis of covariance was employed to control statistically any initial difference

---

[43]Fred N. Kerlinger, Foundations of Behavioral Research, 2nd ed. (New York: Holt, Rinehart and Winston, Inc., 1974), p. 249.

in the students which might have been present and which might confound differences between the two groups of students.[44]

Summary

This study examined the effects of a computer-assisted instruction program on the academic performances and attitudes of college athletes. The population for this study included student athletes from a predominantly white university located in Southwest Texas. Further, a modified version of the Brown Questionnaire was developed to measure the attitudes of college athletes toward CAI. The instrument has an internal consistency reliability coefficient of .89 for the original form. A pretest, post-test design was employed in the study.

For the treatment of data, the Statistical Package for the Social Sciences (SPSS) was employed. The .05 percent level or better was used as the criteria for the significance in testing the hypothesis for acceptance or rejection.

---

[44]Allen L. Edwards, Multiple Regression and the Analysis of Variance and Covariance, 2ed. (New York: W. W. Freeman and Company, 1985), pp. 168-171.

Chapter 4

ANALYSIS OF DATA

The purpose of this study was to examine the effects of a computer-assisted instruction tutorial program on the academic performance and attitude of college athletes. The following questions were examined:

1. Do student athletes in the computer-assisted instruction tutorial program show gains in academic performance when compared with similar student athletes not in the computer-assisted program?
2. Do student athletes in the computer-assisted instruction tutorial program show more favorable attitudes toward the use of the computer-assisted instruction program when compared with similar student athletes not in the computer-assisted instruction program?

The population of this study consisted of forty (40) student athletes (32 male students and 8 female students) attending a predominantly white university in Southwest Texas. From this population, twenty (20) student athletes were randomly assigned to the experimental group and

twenty (20) student athletes were randomly assigned to the control group. The data analysis for this study was accomplished through the application of the analysis of covariance (one-way) and the analysis of variance (one-way). Summarized in Tables 1-3 are the effects of computer-assisted instruction on the academic performance and attitudes of student athletes.

Academic Performance

As shown in Table 1, when the one-way analysis of covariance was computed for the students' post-test scores, there was a statistically significant difference found between the experimental group and control group ($F = 43.438$, $df = 1/37$, $P = .05$). Since the F-value was computed to be 43.438 and is greater than the critical value of 4.10 at the .05 level of probability, the null hypothesis (Ho 1) was rejected. Most importantly, the mean score for the experimental group was 25.35 and the mean score for the control group was 16.95 (see Table IV in Appendix D). The results of the one-way analysis of covariance seem to suggest that the student athletes in the computer-assisted instruction tutorial program (experimental group) show significant gains in academic performance more than did those student athletes not in the computer-assisted instruction tutorial program (control group).

Attitudes Toward Computer-Assisted Instruction

Revealed in Table 2 are the analysis of variance results for the attitudes of student athletes toward computer-assisted instruction. As indicated in this table, significant differences between the attitudes of student athletes in the experimental group and control group ($F = 2.790$, $df = 1/38$, $P > .05$) were not found with regards to computer-assisted instruction. Because the calculated value of F was 2.790 and was less than the critical value of 4.10 at the .05 level of probability, the null hypothesis (Ho 2) was accepted.

Sex and Attitude Toward Computer-Assisted Instruction

Shown in Table 3 are the analysis of variance results (by the sex of student athletes regarding their attitudes) toward computer-assisted instruction. The differences found in the attitudes of male and female student athletes ($F = 1.646$, $df = 1/38$, $P > .05$) were not significant at the .05 level. Because the calculated value of F was 1.646 and was less than the critical value of 4.10 at the .05 level of probability, the null hypothesis (Ho 3) was accepted.

Table 1

Summary of Analysis of Covariance
for Academic Performance

Source	Degrees of Freedom	Sum of Squares	Mean Squares	F	P
Between groups	1	786.478	786.478	43.438	S**
Covariates	1	201.589	201.589	11.134	S
Within groups	37	669.908	18.106		
Total	39	1657.975			

F = 43.438; df = 1/37; p = .05; C.V. = 4.10
* The pre-test scores are covariate factors
** Significant at the .05 level of probability

Table 2

Analysis of Variance Summary Table Toward Computer-Assisted Instruction

Source	Degrees of Freedom	Sum of Squares	Mean Squares	F	P
Between groups	1	46.225	46.225	2.790	NS
Within groups	38	629.550	16.567		
Total	39	675.775			

F = 2.790; df = 1/38; p = .05; C.V. = 4.10

Table 3

Analysis of Variance Summary Table
for Sex and Attitudes
Toward Computer-Assisted Instruction

Source	Degrees of Freedom	Sum of Squares	Mean Squares	F	P
Between groups	1	28.056	28.056	1.646	NS
Within groups	38	647.719	17.045		
Total	39	17.328			

F = 1.646; df = 1/38; p = .05; C.V. = 4.10

Discussion of the Hypotheses

In the present study, the following hypotheses were tested:

Ho 1: There is no statistically significant difference between the academic performance of college athletes who completed the computer-assisted instruction tutorial program and those student athletes who did not complete the computer-assisted instruction tutorial program as measured by Physical Science scores. When the one-way analysis of covariance was computed for the two groups (see Table 1), the F value was 43.438 with 1 degree of freedom, which was significant at the .05 level. Consequently, the hypothesis was rejected and it could be concluded that there was a significant difference between the academic performance of the experimental group (those student athletes tutored by computer-assisted instruction) and the control group (those student athletes not tutored by computer-assisted instruction).

Ho 2: There is no statistically significant difference between the attitudes of student athletes who completed the computer-assisted instruction tutorial program and those student athletes who did not complete the computer-assisted instruction tutorial program toward computer-assisted

instruction. Analysis of data, as summarized in Table 2, revealed no significant difference between the attitudes of the experimental group and the control group toward computer-assisted instruction.

Ho 3: There is no statistically significant difference between attitudes of male and female student athletes with respect to computer-assisted instruction. As shown in Table 3, there was no statistically significant difference between male and female student athletes' attitudes toward computer-assisted instruction. As a result, this hypothesis was substantiated.

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to investigate the effects of a computer-assisted instruction tutorial program on the academic performance and attitudes of college athletes. A pretest-post-test design was employed in this study. Forty (40) student athletes enrolled in a physics class at a university located in Southeast Texas were randomly assigned to one of two groups (20 in the experimental group and 20 in the control group). The experimental group (computer-assisted group) was assigned a series of CAI tutorial lessons to be done in three months while the control group (non-computer-assisted group) was tutored by the traditional method during the same period of time.

A modified version of an instrument developed by Brown was used to measure the attitudes of college athletes toward CAI. The instrument was divided into two sections. The first section consisted of six (6) items: five (5) socio-demographic items, and one (1) dichotomous item. The second section of the instrument contained eight (8) items in the form of a Likert-type scale. The items in this section called for the participants in this study to check one of

three options: agree (1), disagree (2), and no opinion (3). The data analysis for this study was accomplished through the application of the one-way analysis of variance and one-way analysis of covariance.

Summary of the Findings

Based on the results of this study, the following findings can be observed:

1. Those student athletes who were tutored by computer-assisted instruction achieved higher scores on the physics post-test than did those who were tutored by the traditional method.
2. Those student athletes exposed to computer-assisted instruction did not have more favorable attitudes toward CAI than did those student athletes not exposed to computer-assisted instruction.
3. The attitudes of student athletes toward computer-assisted instruction were not significantly affected by sex.

Conclusions

The following conclusions were made as a result of the related literature and findings of this study. First, it was concluded that computer-assisted instruction had a significant effect on the academic performance of college athletes. Secondly, it was concluded that the exposure of

college athletes to computer-assisted instruction did not have a significant effect on their attitude toward computer-assisted instruction. Thirdly, it was concluded that the sex of student athletes did not have a significant effect on their attitudes toward computer-assisted instruction.

Discussion

The findings of the present study concerning the effect of computer-assisted instruction on the academic performance of students were favorable to those of Allen (1972), Tsai and Pohl (Fall, 1983), Alpert and Bitzer (1970) and Lewellen (1971). These researchers found that the academic performance of students was significantly affected by computer-assisted instruction.[45] Moreover, the findings of the present study pertaining to the effects of exposure to CAI on the attitudes of students toward computer-assisted instruction did not support those reported by Mathis, Smith and Hansen. In short, Mathis, Smith and Hansen found that those students who had experienced computer-assisted instruction had more positive attitudes toward computer-assisted instruction than those who did not experience such instruction.[46]

---

[45]Allen, 1972, pp. 47-53; Tsai and Pohl, 1983, pp. 50-53; Alpert and Bitzer, 1970, pp. 1582-1590; and Lewellen, 1971, pp. 33-38.

[46]Mathis, Smith and Hansen, pp. 46-51.

Finally, the findings of the present study concerning the effect of sex on the attitudes of students toward computer-assisted instruction did not support those by Cavin, Cavin and Lagowski. Cavin, Cavin and Lagowski found that the attitudes of the female students toward computers improved by using computer-assisted instruction.[47]

Implications

On the basis of the findings, the following implications for practice are offered:

1. One implication of this study and one that is directed primarily to athletics administrators, suggests the need for more focus on CAI as a tutorial tool for college athletes. More specifically, computer-assisted instruction can be used in those situations where the possibility if good that such instruction will enhance and foster the learning process for individual students as well as for groups of students.
2. A second implication of this study, and one directed at the core of an institution of higher learning (students, instructors and administrators), suggests a need for all concerned with the institution to develop a positive attitude toward

---

[47]Cavin, Cavin and Lagowski, pp. 329-333.

computer-assisted instruction for the purpose of implementing this individualized tool on a scale large enough to make the process worthwhile.

3. Another implication of this study, and one directed to the future of CAI, suggests a need to clarify the effectiveness of CAI in the academic environment.

Recommendations

The following recommendations are presented for computer-assisted instruction with athletics:

1. Athletic departments should take a more active part in the total welfare of their students who are receiving grants-in-aid.
2. Computers are needed for the athletic department -- e.g., Apple IIe or Commodore.
3. A person knowledgeable in computers should be trained or hired to write programs for the athletic department.
4. Terminal programs should be expanded to accommodate students in graphics and mathematics classes.
5. Computer literacy should become part of each student's curriculum in order to learn various methods and techniques in the computer world.
6. A general concern should arise when a student spends four years with an athletic department

engaged in sports and after four years he has accumulated only sophomore hours toward graduation. Athletic manipulation and monopoly of the athlete's time need to be cut back in order to allow students more time in academics. Instructors, faculty and school staff should work closer with the athletic departments for the total welfare of the students.

7. Keep attendance and daily progress records of each student athlete attending computer-assisted instruction programs and traditional tutorial programs.
8. Academic counselors should be held accountable for all student athletes' degree progress. If no progress is being made, the student athlete should become ineligible.
9. In order to be effective, class attendance and assignment records must be maintained daily by the Research Manager.

Recommendations for Further Study

The following recommendations are offered for further research:

1. A follow-up study should be conducted to compare the success of white student athletes to that of Black athletes.

2. It is also suggested that a research study be conducted to ascertain the influence of the computer-assisted program in terms of the number of years involved with the program.

APPENDICES

APPENDIX A

(A SURVEY OF ATHLETES' PERCEPTION OF CAI)

A SURVEY OF ATHLETES' PERCEPTIONS OF COMPUTER-ASSISTED INSTRUCTION AS A VEHICLE FOR THE ENHANCEMENT OF ACADEMIC PERFORMANCE

Directions: Please (✓) one of the following responses that best applies to you.

Sex: 1. Male ___ 2. Female ___

Race: 1. Black___ 2. White___ 3. Mex-Amer___ 4. Oriental___
5. Native Amer___ 6. Other _____ (Specify)

Classification: F ___ S ___ J ___ S ___

Grade Point Average

4.0 - 3.6

3.5 - 3.0

2.9 - 2.5

2.4 - 2.0

Below - 2.0

What is your SAT or ACT score? (1) 300-600 (2) 601-700
(3) 701-900 (4) 901-1020
(5) 1021-1500

Age ____

Have you ever participated in a Computer-Assisted Instruction Program? Yes ____ No ____

Directions: Circle the response that most nearly approximates your knowledge of each response.

e.g., (1) Agree (2) Disagree (3) No Opinion

1. Computer-Assisted Instruction provides a student with a private tutor.

   (1) Agree (2) Disagree (3) No Opinion

2. Computer-Assisted Instruction is superior to Traditional Instruction.

   (1) Agree (2) Disagree (3) No Opinion

3. Computer-Assisted Instruction would challenge a student to do his best work.

   (1) Agree (2) Disagree (3) No Opinion

4. Computer-Assisted Instruction would allow a student to work at his or her own pace.

   (1) Agree (2) Disagree (3) No Opinion

5. Computer-Assisted Instruction makes it possible for a student to learn quickly.

   (1) Agree (2) Disagree (3) No Opinion

6. Computer-Assisted Instruction would be helpful in learning subject matter.

   (1) Agree (2) Disagree (3) No Opinion

7. Computer-Assisted Instruction allows a student to work at a flexible schedule.

   (1) Agree (2) Disagree (3) No Opinion

8. Computer-Assisted Instruction is an inefficient use of students' time.

   (1) Agree (2) Disagree (3) No Opinion

9. In view of the Computer-Assisted Instruction, I was satisfied with what I learned.

   (1) Agree (2) Disagree (3) No Opinion

10. Computer-Assisted Instruction develops the recall memory phase.

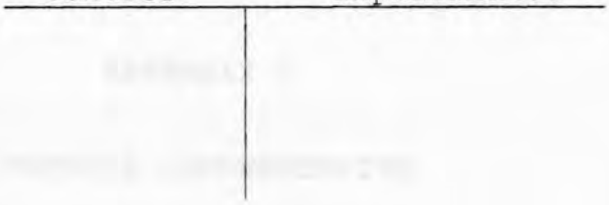
    (1) Agree (2) Disagree (3) No Opinion

APPENDIX B

(PROCEDURES FOR SELECTING STUDENT ATHLETES)

PROCEDURES FOR SELECTING STUDENT ATHLETES

The procedures for selecting the student athletes for the experimental and control groups were as follows: Names of all of the 47 student athletes in the physics class were placed in a container. A coin was used for the purpose of flipping heads and tails. Lines were drawn on a sheet to indicate two columns as shown below:



The first name drawn was opened, then a coin was tossed to see which group the name would be assigned. For the first name drawn, the coin flip indicated heads as Control, tails as Experimental. After the initial toss, in order to save time, names were drawn and randomly assigned control group or experimental group. At the conclusion, twenty-four students were in the control group and twenty-three were assigned to the experimental group.

Later, two students decided emphatically to drop out of the control group and two students dropped the course. In the experimental group there were three to drop our of the research. Most of the students were very eager to participate and to contribute to the academic success of future athletes.

APPENDIX C

PHYSICS COMPREHENSIVE

Name _____ Course _____

Date _____ Instructor _____

Physics

Comprehensive

Directions: The following questions are true or false. Please circle the response "T" for true or "F" for false.

True and False

1. Two stars with the same proper motion necessarily have the same space motion. T/F
2. Galileo invented the telescope. T/F
3. Some Red Giants are burning helium in their cores. T/F
4. Energy is always conserved. T/F
5. The apex is the point in the sky directly over the earth's North Pole. T/F
6. Electric field can be created by moving changes. T/F
7. Evolution implies that every living thing can trace its ancestry back through a continuous string of living cells, to the very origin of cellular life. T/F
8. Mass is a Scalar quantity. T/F
9. Long wavelength light has less energy per proton than short wavelength light. T/F
10. The hotter a black body, the bluer it appears. T/F

11. Molecule lines are pressure only in the coolest stars. T/F

12. Globular clusters generally tend to be found in the halo. T/F

13. The halo of the Milky Way contains mostly population I star. T/F

14. The CNO process is believed to be responsible for the major part of the nucleon-synthesis going on in the sun. T/F

15. The average star in our galaxy has a much greater absolute magnitude than the sun. T/F

Directions: There may be more than one correct answer or there may be no correct answer. Mark all correct answers.

16. Hipparchus

    a. thought the sun was the center of the universe.
    b. was first to suggest the Milky Way was made of stars.
    c. invented the Stellar Magnitude System.
    d. compiled a star catalogue.
    e. measured the speed of light.

17. Which of the following are composed of photons?

    a. radio waves
    b. microwave
    c. oceanwaves
    d. soundwaves
    e. gamma-rays

18. Which of the following can be determined about a star by examining only the shape of a single spectral line?

    a. the chemical composition
    b. if the star is rapidly rotating
    c. if the star has a surface pressure
    d. the star's diameter
    e. the star's radical velocity. (i.e., its motion toward or away from the earth.)

19. Concerning Other Galaxies:

    a. Einstein is the person credited with the first proof that they were not part of our galaxy.
    b. the best distance measures come from stellar parallax
    c. one can use copheid variables to measure the distance to the nearest galaxies
    d. they all look pretty much like our galaxy
    e. Huffle first proposed the classification be home for the galaxies.

20. The fundamental postulates of relativity include:

    a. light moves at the same speed with respect to every observer
    b. length appears to shorten when moving along the direction being measured
    c. the laws of physics are the same everywhere
    d. mass appears to increase when moving
    e. clocks appear to run slower when moving

21. Main Sequence Stars:

    a. all have about the same surface temperature
    b. do not move at all on the H-R diagram while they are still the main sequence stars
    c. are all burning hydrogen in their cores
    d. are all in hydrostatic equilibrium
    e. have a luminosity that is proportional to their mass

22. OSO's:

a. include Quassars as well as Seyfart galaxies
b. all have large redshirts
c. if the cosmological interpretation is correct are the farthest and brightest objects we've seen yet
d. are population II objects
e. have never been associated with clusters of galaxies.

23. Which of the following are considered to be part of the Sun's atmosphere?

a. Phtosphere
b. Convective zone
c. Corona
d. Radiative zone
e. Core

24. Hipparchus

a. was the greatest astronomer of antiquity
b. was first to suggest the Milky Way was made of stars
c. invented the Stellar Magnitude System
d. first used the telescope in astronomy
e. measured the speed of light

25. Mark the true statements concerning Black Holes:

a. black holes can be detected by x-ray emission from accretion disks
b. light can orbit a black hole
c. the boundary between the inside and outside is called the event horizon
d. they could conceivably be a source of energy
e. they have "no hair"

26. Life on Earth:

a. is oxygen based
b. is predominantly left hand (in the molecular symmetry sense)
c. contains no right handed molecules
d. is a product of the evolution of the entire universe
e. is based on DNA

Directions: Use the following answer set for the questions

a. BO
b. G9
c. Ma
d. A0
e. F9

27. Which is the closest to the sun in spectral type? _____

28. Which stars could have molecular lines? _____

29. Which stars are the hottest of their class? _____

30. Which stars are cooler than the sun? _____

APPENDIX D

MEANS AND STANDARD DEVIATIONS INVOLVED IN THE ANALYSIS OF COVARIANCE FOR TABLE 1

Table 4

Means and Standard Deviations Involved in the Analysis of Covariance in Table 1

	Experimental Group	Control Group
Pretest	$\bar{X}$ = 17.15 S.D. = 3.18	$\bar{X}$ = 15.90 S.D. = 2.32
Post-test	$\bar{X}$ = 25.35 S.D. = 5.13	$\bar{X}$ = 15.70 S.D. = 3.45

APPENDIX E

MEANS AND STANDARD DEVIATIONS INVOLVED IN THE ANALYSIS OF VARIANCE FOR TABLES 2 AND 3

Table 5

Means and Standard Deviations
Involved in the Analysis of
Variance in Table 2

Experimental Group	Control Group
$\bar{X}$ = 25.90	$\bar{X}$ = 23.75
S.D. = 4.01	S.D. = 4.13

Table 6

Means and Standard Deviations
Involved in the Analysis of
Variance in Table 3

Group I (Male Students)	Group II (Female Students)
$\overline{X}$ = 24.41	$\overline{X}$ = 26.50
S.D. = 4.20	S.D. = 3.78

APPENDIX F

A LIST OF THE NUMBER OF MALE AND FEMALE STUDENTS THAT PARTICIPATED IN THE STUDY

Table 7

A List of the Number of Male and Female Students that Participated in the Study

	Male	Female
Students	32	8

B I B L I O G R A P H Y

BIBLIOGRAPHY

Allen, John R. "Current Trends in Computer-Assisted Instruction." Computers and the Humanities 7 (1972): 47-53.

Alpert, D., and D. L. Bitzer. "Advances in Computer-Based Education." Science 167 (1970): 1582-1590.

Bailey, Roger C. "Self Concept Differences in Low and High Achieving Students." Journal of Clinical Psychology 27 (April 1971): 33-35.

Best, John W. Research in Education, 2nd Ed. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1956.

Boettcher, Elaine G., Sylvia F. Alderson, and Michael S. Saccucci. "A Comparison of the Effects of Computer-Assisted Instruction Versus Printed Instruction on Student Learning in the Cognitive Categories of Knowledge and Application." Journal of Computer-Based Instruction (August 1981): 13-17.

Burns, Patricia K., and William C. Bozeman. "Computer-Assisted Instruction and Mathematics Achievement: Is There a Relationship." Educational Technology (October 1981): 32-39.

Buros, O. K. The Seventh Mental Measurement Yearbook. Highland Park, N.J.: Gryphone Press, 1972.

Campbell, D. T., and J. C. Stanley. Experimental and Quasi-Experimental Designs for Research. Chicago: Vintage Press, 1966.

Cavin, Claudia S., E. D. Cavin, and J. J. Lagowski. "The Effect of Computer-Assisted Instruction on the Attitudes of College Students Toward Computers and Chemistry." Journal of Research in Science Teaching 18 (1981): 328-333.

Coakley, J. J. Sports in Society: Issues and Controversies, 2nd Ed. St. Louis: C. V. Mosby, 1982.

Cochran, L. W. Okoboji: A Twenty-Year Review of Leadership, 1955-1974. Dubuque: Kendall/Hunt, 1977.

Davidson, Chandler. The Houston Post, 3 June 1985, Section B, p. 3.

Dick, W., and R. Latta. Comparative Effects of Ability and Presentations Made in CAI and Programmed Instruction. Ad-694-021. Clearinghouse for Federal Scientific and Technical Information. Springfield, VA, 1969.

Edward, Harry. "The Black 'Dumb Jock': An American Sports Tragedy." Atlantic Monthly (August 1983): 31-34.

Edwards, H. Sociology of Sports. Homewood: Dorsey Press, 1973.

Eggers, John R., and John F. Wedman. "The Growing Obsolescence of Computers in Education." Education Technology (July 1984): 24-27.

Eitzen, D. S. Sports in Contemporary Society: An Anthology. New York: St. Martin Press, 1979.

Federico, Pat-Anthony. "Individual Differences in Cognitive Characteristics and Computer-Managed Mastery of Learning." Journal of Computer-Based Instruction (Summer 1982): 9-15.

Fedism, Janet F. Fowler. "Use of Computer-Assisted Instruction in Introductory Management Science." Journal of Experimental Education 52 (Fall 1983): 22.

Ferguson, George A. Statistical Analysis in Psychology and Education, 4th Ed. New York: McGraw-Hill Book Company, 1976.

Ferguson, G. A. Statistical Analysis in Psychology and Education. New York: McGraw-Hill, 1966.

Fugler, S. K. Sport and Play in American Life. Philadelphia: Saunders College Publishing, 1981.

Gadzella, Bernadette M. "Computer-Assisted Instruction on Study Skills." Journal of Experimental Education (1982): 122-126.

Gay, L. R. Educational Research, 2nd Ed. London: Charles E. Merrill, 1981.

Griswold, P. A. "Longitudinal Patterns of Student Attitudes in a Computer-Assisted Instruction Curriculum," (Rocky Mountain Educational Research Association), unpublished manuscript, 1981, Eastern Montana College.

Heinich, Robert. "Toward Defining the Role of CAI." Educational Technology (November 1980): 50-51.

Hoffstetter, Fred T. "Computer-Based Recognition of Perceptual Patterns in CHORD Quality Dictation Exercises." Journal of Research in Music Education 27-28 (1979/1980): 83-91.

Holland, James. "Early Predictions Concerning CAI." Educational Technology (November 1980): 50.

Kerlinger, F. N. Foundations of Behavioral Research. New York: Holt, Rinehart & Winston, 1966.

Kuck, Warren J. "Basic Facts About Using the Computer in Instruction." Education Digest 38 (March 1973): 28-31.

Kulik, James A., R. L. Bangert, and George W. Williams. "Effects of Computer-Based Teaching on Secondary School Students." Journal of Educational Psychology 75, no. 1 (1983): 19-26.

Lewellen, L. "Computers in the Classroom." Journal of Educational Data Processing 8 (1971): 33-38.

Lipsyte, R. Sportsworld: An American Dreamland. New York: Quadrangle, 1975.

Loy, J., B. McPherson, and G. Kenyon. Sports and Social Systems. Reading: Addison-Wesley, 1978.

Magidson, Errol M. "Trends in Computer-Assisted Instruction." Educational Technology 18 (1978): 5-63.

Mathis, Arthur, Timothy Smith, and Duncan Hansen. "College Students' Attitudes Toward Computer-Assisted Instruction." Journal of Educational Psychology 61 (1970): 46-51.

McBeath, R. J. (Ed.). Extending Education Through Technology: Selected Writings by James D. Finn on Instructional Technology. Washington, D.C.: Association for Educational Communications and Technology (1972): 50-51.

McCallon, E. Programmed Instruction. New York: Vintage Books, 1960.

Menis, Yosef, M. Snyder, and Ezra Ben-Kohav. "Improving Achievement in Algebra by Means of the Computer." Educational Technology (August 1980): 19-22.

Michener, James A. Sports in America. New York: Fawcett Crest Books, Random House, Inc., 1983.

Orlansky, J., and J. Strong. Cost-Effectiveness of Computer-Based Instruction in Military Training, IDA Paper P-1375. Arlington, VA: Institute for Defense Analysis, 1979.

Rader, B. G. American Sports: From the Age of Folk Games to the Age of Spectators. Englewood Cliffs, N.J.: Prentice-Hall, 1983.

Smith, Ian D. "Impact of Computer-Assisted Instruction on Student Attitudes." Journal of Educational Psychology 64, no. 3 (1973): 366-372.

Steele, Kathleen J., M. T. Battista, and Gerald H. Krockover. "The Effects of Microcomputer-Assisted Instruction on the Computer Literacy of Fifth Grade Students." Journal of Educational Research 76 (1983): 298-301.

Tsai, San-Yun W., and Norval F. Pohl. "Student Achievement in Computer Programming: Lecture vs. Computer-Aided Instruction." Journal of Experimental Education (Fall 1983): 50.

Vinsonhaler, John F., and Ronald K. Bass. "A Summary of Ten Major Studies on CAI Drill and Practice." Educational Technology 12 (1972): 29-32.

Watson, P. G. Using the Computer in Education. Englewood Cliffs, N.J.: Prentice-Hall, 1972.