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THE EFFECTS OF COMPUTER REVIEW ASSISTANCE MODULES (CRAM) ON STUDENT ACHIEVEMENT IN UNITED STATES HISTORY

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THE EFFECTS OF COMPUTER REVIEW ASSISTANCE MODULES (CRAM) ON STUDENT ACHIEVEMENT IN UNITED STATES HISTORY

by

Mark W. Feldhausen

A DISSERTATION

Presented to the Faculty of
The Graduate College in the University of Nebraska
In Partial Fulfillment of Requirements
For the Degree Doctor of Philosophy
Major: Interdepartmental Area of Administration, Curriculum, and Instruction

Under the Supervision of
Professors Clarice Ramsey and Lee Witters

Lincoln, Nebraska

December, 1985
TITLE

The Effects of Computer Review Assistance Modules (CRAM) on Student Achievement in United States History

BY

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GRADUATE COLLEGE

UNIVERSITY OF NEBRASKA
THE EFFECTS OF COMPUTER REVIEW ASSISTANCE MODULES (CRAM) ON STUDENT ACHIEVEMENT IN UNITED STATES HISTORY
Mark W. Feldhausen, Ph.D.
University of Nebraska, 1985

Advisers: Clarice Ramsey and Lee Witters

This study investigated the effectiveness of Computer Review Assistance Modules (CRAM) on student achievement in United States history in secondary schools. Computer Review Assistance Modules are examples of adjunct computer assisted instruction (CAI) programs written for use on microcomputers. The researcher designed the modules with a pascal based authoring system—Apple SuperPilot to provide students with an additional, supplemental method of study for unit exams.

The review of the literature included an analysis of the current status of microcomputers in education with special emphasis upon their use in social studies education. The work of behaviorist and cognitive psychologists in reference to CAI was examined. Finally, a review of the effectiveness of CAI through the use of box-score analyses and meta-analyses was conducted.

The purpose of the study was to determine the effectiveness of CRAM. Ten intact classrooms of secondary
United States history students were randomly assigned to control and treatment groups. The treatment group (N=103) used CRAM in preparation for the final unit exam. The control group (N=113) used a traditional study guide to prepare. An evaluation survey was administered to the treatment group after the posttest. Available achievement composite scores were used to establish three achievement levels used as blocking variables in the analysis of variance.

The results of the experiment indicate that there was no statistically significant difference, at any achievement level, in unit test performance between those that used CRAM and those that did not. Attitudinal information indicated that the majority of students enjoyed the use of CRAM and believed it helped them prepare for the unit exam. The low and high achievement levels were more positive toward CRAM than was the medium achievement level. The study concluded with recommendations that further study of CAI such as CRAM and its use in social studies, the motivational impact of CAI, the CRAM paradigm, and the types of questions used in CRAM be pursued.
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CHAPTER I
INTRODUCTION

Initially regarded as a toy or passing fad, the computer, specifically the microcomputer, is rapidly becoming a permanent part of American public education. In 1981 only 18.2% of all public schools possessed microcomputers. Yet, in just three years that percentage had increased to 68.4% (Chion-Kenney, 1984).

With the proliferation of microcomputers in the schools a growing need exists to address the question of their utilization. The microcomputer is regarded as an object of instruction, illustrated by computer literacy and programming; as the manager of instruction, exemplified by record-keeping and test scoring; and as the medium of instruction, demonstrated by simulations, problem solving, and computer-assisted instruction (West, 1983). The third category is of paramount importance to classroom teachers interested in computers. The National Education Association reported in its 1983 study, A Teacher Survey NEA Report: Computers In The Classroom, that the dominant concern of teachers as users of computers was instructional application.

The computer is not a new educational tool. Beginning in the 1960's, first in industry and then rapidly moving into higher education, the possibilities of
computer-assisted instruction (CAI) were quickly realized (Suppes & Macken, 1978). Stanford University and the University of Illinois were among the leading institutions engaged in CAI research. University researchers examined various models of computer-assisted instruction, experimented with hardware, developed programs, and evaluated the effectiveness of CAI as both a substitute for and supplement to traditional instructional methodologies.

Visonhaleur and Bass (1972), in reviewing ten major studies of computer-assisted instruction, reported that when comparing CAI to traditional instruction no significant differences in achievement were obtained. However, when CAI drill and practice, as a supplement to instruction, was examined, there appeared to be strong evidence for the effectiveness of CAI. Three years later a review of the research commissioned by the Association for Supervision and Curriculum Development revealed a myriad of contradicting results from CAI studies (Edwards, Norton, Taylor, Weiss, & Dusseldorp, 1975). These researchers found CAI to be most effective as a supplement to traditional instruction. They found no significant difference when CAI was substituted for traditional instruction. Few studies reveal the effectiveness of CAI as it relates to the ability level of students.

By 1977 CAI, as a viable instructional methodology,
had met with mixed success. Practical limitations existed for computer-assisted instruction. Equipment was cumbersome and expensive. Time-sharing systems connected to large centrally located mainframe computers via telephone lines proved to be troublesome and unreliable (Hofmeister, 1984). However, in 1977, just as educators were about to abandon CAI, a revolution in computer technology occurred. The advent of the microprocessor had resulted in the microcomputer—a small, inexpensive, desktop computer. With the microcomputer the question of CAI's efficacy was resurrected.

The need for further research into the effectiveness of computer-assisted instruction via microcomputer is evident (Gleason, 1981), especially in subject areas other than mathematics and language arts (Billings, 1983). One discipline, social studies, has received virtually no attention at all. Inherent in the absence of CAI studies in social studies may be the reluctance of social studies teachers to use computers. A National Science Foundation report (1977) indicated that only 3% of those social studies teachers surveyed used computers (Klassen & Rawitsch, 1982). This percentage has increased in six years to only 5.3% (NEA, 1983). With so few social studies teachers using computers, the question of their effectiveness as an instructional tool within the discipline remains conjecture.
CONTEXT OF PROBLEM

The purpose of this study was to investigate the effectiveness of teacher-authored Computer Review Assistance Modules (CRAM) on student achievement in United States history. The researcher found, however, that the issues surrounding this study dealt with more than the increased frequency of computers in the public schools with little or no usage by social studies teachers and mixed reviews of CAI effectiveness. Therefore, in order to fully understand the need for such an investigation, several other major areas of concern were examined.

The first area of concern was the structure of computer-assisted instruction and its history. CAI consists of adjunct and primary types of material (Chambers & Sprecher, 1983) divided into drill and practice, tutorials, simulations, and problem solving (Hofmeister, 1984; Manion, 1985). CAI in American public schools began in 1959 (Baker, 1978) and expanded during the next two decades through major research projects such as Plato and TICCIT—Time Shared, Interactive, Computer Controlled, Information Television (Alderman, Appel, & Murphy, 1978; Hofmeister, 1984). Computer usage grew, because of reduced costs and greater availability, with the advent of the microcomputer (Gleason, 1981).
The second area of concern was the computer and the social studies. The negative attitudes toward and lack of use of computers by social studies teachers (Klassen & Rawitsch, 1982; Roberts, 1982) is contrary to the rapid growth of the technology in education (Chion-Kenney, 1984). Computers have played a minor role in the social studies (Martorella & Kohn, 1970) but can and should play a larger role as a tool of social studies educators (Cohen, 1982; Diem, 1980; Rooze, 1983; Saltinski, 1981).

The third concern was that of computer-assisted instruction and the social studies. Recently, the social studies has undergone a review of its purposes and its scope and sequence (NCSS, 1984). Furthermore, in a summary of Project SPAN (Social Studies Priorities, Practices, and Needs), a National Science Foundation research report on the social studies (Morrissett, 1983), the authors have suggested that the social studies has several major problems. These problems included the need for a greater emphasis on knowledge and skills and an increased variety of teaching methods. Solutions to these problems has included the use of computers and CAI (Cohen, 1982; Rooze, 1983; Saltinski, 1981; Senn, 1983).

A fourth concern was the theoretical foundations upon which CAI is based. CAI, in its structure and purpose, is an extension of Programmed Instruction (Hofmeister, 1984; O'Day, 1970). Its psychological foundation lies in the
work of B. F. Skinner (1968) with regard to the reinforcement and repetition of responses to specific stimuli. The information processing models of cognitive psychology (Gagne, 1982; Gagne, Wagner, Rojas, 1981; Moates & Schumacher, 1980) are also a foundation of drill and practice and tutorial CAI. Computer-assisted instruction utilizes the principles of the behaviorist and cognitive schools of psychology (Chambers & Sprecher, 1983).

Finally, the instructional effectiveness of CAI was a concern. Computer technology, hardware and software, changes with great rapidity. Generalizations and conclusions, resulting from studies which utilized various types of CAI among several academic disciplines at differing educational levels, must be viewed with caution (Glass, McGaw, & Smith, 1981; Pogrow, 1983). For these reasons two major types of reviews were consulted: the box-score method and meta-analysis. Whether box-score analyses (Edward, Norton, Taylor, Weiss, & Dusseldorp, 1975; Jamison, Suppes, & Wells, 1974; Thomas, 1979; Visionhaler & Bass, 1972) or meta-analyses (Burns & Bozeman, 1981; Hartley, 1977; Kulik, Bangert, & Williams, 1983; Kulik, Kulik, & Bangert-Downs, 1984; Kulik, Kulik, & Cohen, 1980) were employed, supplemental computer-assisted instruction was more effective than traditional instruction alone.
Conclusions about the effectiveness of CAI at varying levels of student aptitude were limited in the studies. The authors of one report asserted that CAI was effective especially for disadvantaged elementary students and special education (Jamison, Suppes, & Wells, 1974). Other researchers reported that CAI was most effective for low ability students (Edwards, Norton, Taylor, Weiss, & Dusseldorp, 1975), while others concluded that performance increases were about equal for high, medium, and low aptitude students (Kulik, Kulik, & Cohen, 1980).

Virtually all of these studies were in science, mathematics, and language arts. The need for research into the effectiveness of CAI in areas such as social studies remains (Billings, 1983; Gleason, 1981; Rooze, 1983).

Consequently, certain assumptions and areas of concern are apparent. Microcomputers are becoming an integral part of public education. As such, further research into their effective use, especially in the area of CAI, is necessary. This research should occur in academic disciplines such as social studies. In addition, the effectiveness of CAI, authored by classroom teachers to fulfill specific objectives and educational requirements in social studies, rather than the use of commercially developed software, is of interest (Cohen, 1983; Diem, 1980). And finally, the research into CAI
should also be related to the student's individual achievement level (Cohen, 1983; Atkinson, 1984).

PURPOSE OF THE STUDY

The purpose of this study was to determine the effectiveness, at varying levels of student achievement, of teacher written Computer Review Assistance Modules (CRAM) upon student achievement in United States history. A second purpose was to secure information from those subjects who used CRAM regarding their attitude toward the structure of this computer-assisted instruction material, their help derived from the reinforcers used, and their view of CRAM as a supplemental study method for unit test preparation.

RESEARCH QUESTIONS

Specific questions to be statistically analyzed in this study were:

1. Are there significant differences in achievement on the unit test between subjects who utilized teacher written Computer Review Assistance Modules (CRAM) in test preparation in United States history and those who did not?

2. Are there significant differences in achievement
on the unit test, at varying student achievement levels, between subjects who utilized teacher written Computer Review Assistance Modules (CRAM) in test preparation in United States history and those who did not?

3. What are the subject's affective responses to the use of Computer Review Assistance Modules (CRAM) for unit test preparation?

DEFINITIONS OF TERMS

For the purpose of this study, the following terms are defined:

Achievement. The mastery of certain skills, acquisition of information, or extent to which something is learned, measured in a quantitative manner, which usually results from planned instruction or training.

Computer. A machine that can be programmed to process information. This term includes mainframe, minicomputer, and microcomputer.

Computer-Assisted Instruction (CAI). The application of computers in education includes drill and practice, tutorial, and simulation exercises. Applied here, the term is synonymous with computer based education (CBE), computer managed instruction (CMI), computer-assisted learning (CAL), and instructional application of computers.
Computer Review Assistance Modules (CRAM).
Researcher written CAI, using a pascal based authoring system—Apple SuperPilot, for the microcomputer, in which the student interacts with a simulated multiple choice exam for the purpose of content review and mastery practice.

Hardware. It is the computer equipment, the machine itself.

Microcomputer. The smallest of computers usually having from 48K to 128K of memory, consisting of keyboard, monitor, disk drive, and memory processor. In this study it is synonymous to computer.

Public Schools. Those schools which are open to all students and supported by public monies.

Secondary Students. Those individuals enrolled in grades 10, 11, and 12.

Software. It includes computer programs and data, both application and instructional programs.

ASSUMPTIONS

For the purpose of this study the following assumptions were made:

1. All individuals who use CRAM follow set procedures in a diligent manner.
2. The levels of reliability and validity of the instruments used to measure achievement are adequate.

3. The subjects that receive the CRAM treatment are representative of the population being studied.

4. The subjects who use CRAM answered the follow-up questionnaire honestly.

5. Instruction and content are delivered to all classes, control and treatment, involved in the study in accordance with the prescribed curriculum syllabus and time-line no matter which of the United States history team members (teachers) were involved.

LIMITATIONS OF THE STUDY

1. The population in this study is limited to secondary school students in a suburban Nebraska school district enrolled in United States history during the 1984-1985 academic year. No attempt was made to control for the socio-economic background of the subjects.

2. Subjects are assigned to either control or treatment as a part of an already constituted classroom. Students and the study, therefore, may be subject to class effect (Blair, Higgins, Topping, & Mortimer, 1983).

3. The novelty of using a computer for United States history and test preparation may result in a Hawthorne effect for some subjects (Borg & Gall, 1979).
4. The utilization of classes as the experimental unit contributes to the probability of a Type I error (Blair, Higgins, Topping, & Mortimer, 1983).

IMPORTANCE OF THE STUDY

Computer Review Assistance Modules (CRAM) are an extension of CAI drill and practice software used to supplement traditional instructional methods. They provide the student with an additional interactive mode of study and content review for test preparation. Researchers need to continue studying to 1) examine its effectiveness, and 2) find additional paradigms of delivery. Furthermore, in CAI research several disciplines, including social studies, have been neglected. Finally, it is important to ascertain the effectiveness of CRAM CAI as it pertains to differing levels of student achievement. In this way optimal utilization can be realized.

Pragmatically, CRAM's importance lies in other areas. CRAM is teacher written and continuously modifiable. More importantly, unlike commercial software, it meets the specific needs and objectives of a unique course within a school district. It is reasonably inexpensive to produce and it can be applied to any number of different content areas.
DESIGN OF THE STUDY

Setting

The setting for the study was Ralston High School, a suburban school district of Omaha, Nebraska.

Population

The population for the study was those secondary students enrolled in United States history during the 1984-1985 academic year.

Instrumentation

The composite score of the school district authorized and approved Science Research Associates (SRA) Achievement Series, Form 2, Level H, was used to measure subject achievement level. The reliability of the SRA composite score is .97 (1978). The final unit test or posttest, developed and approved by the school's United States history team, was used as the dependent variable to measure achievement of content. The study guide, used by the control group, was written to parallel CRAM content. CRAM, the treatment, was written by this investigator, a teacher of United States history. It was approved for its validity by the team, based upon established objectives and previous unit exams, before implementation. The survey, approved by the United States history teaching
team, was administered to the treatment group to secure their attitudes toward the structure and use of CRAM.

**Procedures**

The writing of Computer Review Assistance Modules (CRAM) for United States history began in the winter of 1982 under the direction and approval of the office of curriculum of the school district. One year later the first module was used by students. In so doing, programming and content problems were discovered and remedied. Feedback from students and United States history teachers was secured also. Since that time the district administration has made a strong commitment to microcomputers in terms of time, personnel, finances, hardware, and software. Consequently, district officials desire to ascertain the efficacy of CRAM. With the approval and support of the school district's curriculum office and high school administration, a study of CRAM was undertaken.

The study involved eleven United States history classes with approximately 250 secondary students. Five classes were randomly assigned to the control group and five to the treatment group. Treatment consisted of the use of CRAM in preparation for the taking of the final unit test. Simultaneously, the control group was given a study guide which parallels the CRAM material. This
procedure caused no disruption to normal classroom routine. All instructional methods and materials, with the exception of treatment, remained as prescribed by the district's United States history curriculum guidelines.

ORGANIZATION OF THE STUDY

The study is organized into five chapters. Chapter One provides an introduction to the study. It contains a summary of the background and issues surrounding CAI, the purpose of the study, the research questions, definitions, limitations, assumptions, importance of the study, design, and the procedures for carrying the study out.

In Chapter Two the literature regarding computer-assisted instruction—its modes of delivery and history, computers and the social studies, CAI and the social studies, CAI and learning theory, and the instructional effectiveness of CAI is reviewed for findings which are relevant to the study of Computer Review Assistance Modules (CRAM) and student achievement at various ability levels. Findings are summarized and issues to be addressed by the study are stated.

A description of the procedures used in the study are contained in Chapter Three. Demographic information about the subjects, a description of the CRAM utilized, and information about the instruments used in the study are
included.

In Chapter Four, the method of analysis of the data is presented. The data are examined with respect to the two research questions posed and the survey information from the experimental group summarized.

A summary of the study and the findings of the study are presented in Chapter Five. Instructional implications of CAI and CRAM are suggested. Issues and questions raised by the study are posed and recommendations for further research made.
CHAPTER II

REVIEW OF LITERATURE

The review of literature was conducted to ascertain the status of computer-assisted instruction (CAI) as an effective pedagogical technique within the social studies content area. Chapter II is divided into five parts: computer-assisted instruction--modes of delivery and history, computers and the social studies, CAI and the social studies, CAI and learning theory, and the instructional effectiveness of CAI.

CAI--MODES OF DELIVERY AND HISTORY

The utilization of the computer, especially the microcomputer, is a relatively recent development in American education. Described by some educators as innovative and revolutionary, and by others as faddish and foolish, it would appear that this technology will not soon disappear (Gleason, 1981). The computer has been presented to educators as a tutor, a tool, and a tutee (Taylor, 1980). It has been perceived as the object of instruction, manager of instruction, and medium of instruction (West, 1983). Nevertheless, despite the descriptions, the acclaim, and the detractors, the focal point of computers in education is computer-assisted
instruction.

Computer-assisted instruction is defined as "the use of the computer to provide course content instruction" (Chambers and Sprecher, 1983, p. 3). The term is also viewed as synonymous with Computer Based Instruction (CBI) and Computer-assisted Learning (CAL). CAI incorporates a number of different delivery modes. Among the earliest modes of CAI were the drill and practice program and the tutorial program.

Drill and practice programs are usually supplementary programs designed to assist the student with review, reinforcement, and with the mastery of basic skills and knowledge (Hofmeister, 1984; Manion, 1985). Tutorial programs, although usually viewed as a substitute for teacher-directed instruction, may in fact be used in a supplementary fashion. In this way independent instruction, which emphasizes knowledge acquisition, student evaluation, and feedback, is provided (Hofmeister, 1984; Manion, 1985). Tutorials also engage the student in a dialogue-type learning activity in which the computer provides help and direction to the student (Chambers and Sprecher, 1983). A third mode of CAI delivery is the simulation. In a simulation the student plays a role and interacts with the computer to emulate real life conditions (Hofmeister, 1984). Recently CAI has been defined to include problem-solving programs and word-
processing (Manion, 1985).

CAI is divided into two major types—adjunct and primary. Adjunct CAI refers to those programs which are used to supplement or enrich the learning situation. Primary CAI materials stand alone, require little or no teacher assistance, and usually require a longer time period for implementation (Chambers and Sprecher, 1983). Drill and practice, tutorial, and simulation programs are essentially adjunct CAI.

Computer-assisted instruction was first introduced in a public school setting by the IBM Watson Research Center in New York state in 1959 (Baker, 1978). Within the next five years CAI research projects were established at the University of Illinois—the Plato Project, and at Stanford University's Institute for Mathematical Studies in the Social Sciences (IMSSS). The Plato System and IMSSS provided supplementary and basic instruction in mathematical logic, reading, chemistry and precalculus (Suppes and Macken, 1978). These projects were characterized by large CRT's (cathode ray tubes), teletypes, headsets, and rear projection type 16mm film projectors, connected by telephone lines to large mainframe computers. These projects resulted in the production of CAI hardware and software that was to become suitable for the classroom environment (Hofmeister, 1984).

During the 1970's CAI development continued as the
Plato project was expanded and the Mitre Corporation began work with TICCIT--Time Shared, Interactive, Computer Controlled, Information Television (Alderman, Appel, & Murphy, 1978). This was a multi-media approach to CAI. Modifications and advancements in hardware and software made CAI more affordable and available and minicomputers replaced the large mainframe computers of the previous decade.

In 1977 the microcomputer was introduced. Since that time CAI has been adapted for use by this new technology. The microcomputer of the 1980's is smaller, less expensive, and less threatening to educators that the larger time-sharing systems (Gleason, 1981). The Plato system has been adapted for microcomputer use and authoring systems, such as those based on the Pilot language developed at the University of California Medical Center, allows educators to create their own CAI programs (Hazen, 1982; Hofmeister, 1984).

COMPUTERS AND THE SOCIAL STUDIES

Among American educators, the social studies teacher appears to be among the last to use the educational technology of the 1980's (Roberts, 1982). As early as 1977, a National Science Foundation study indicated that 74% of surveyed social studies teachers, grades nine
through twelve, believed that computers were not needed as a means of instruction. The negative attitude towards computers was even more severe among social studies teachers at the primary, intermediate, and junior high grade levels, where 84%, 74%, and 78% respectively believed that computers were not necessary in social studies education. Furthermore, only 3% of those secondary social studies teachers reporting had ever used a computer as an instructional tool (Klassen & Rawitsch, 1982). Six years later the National Education Association (1983) reported that 5.3% of those teachers reporting used computers for social studies. This was a negligible increase.

Such a response toward computer usage may have been understandable as late as 1981 when only 18.2% of all public schools possessed microcomputers. However, by the fall of 1984 68.4% of all public schools had acquired at least one microcomputer. This accelerated acquisition of computers within the public schools was reflected across grade levels as 62.4% of all elementary, 80.5% of all junior high and 86.1% of all senior high schools possessed microcomputers (Chion-Kenney, 1984). The practical implications of computer acquisition became visible when the number of computers per building was revealed. There was an average of 5.8 computers in every public school. Senior high schools had the highest average with 10.6
machines per building (Chion-Kenney, 1984). The influx of computers into the mainstream of American public education was evident.

Despite the disparity between the rapid growth in the acquisition of computers by public schools and the seemingly slow-paced acceptance of this educational tool in the social studies, computers were being used by social studies educators. Reporting in 1970, Martorella and Kohn noted that appropriate software for social studies was scant when compared to other content areas. Their survey of available computer programs for social studies instruction was divided into three sections. They found only four programs available at the elementary level, twelve at the secondary, and eight at the college/university level. The twenty-four programs were either simulations or data base retrieval systems for topical research within a particular sub-discipline of the social studies/social sciences. Martorella and Kohn (1970) warned social studies educators about the practical limitations of the existing hardware and software requirements. The early limitations have been echoed by others (Hofmeister, 1984).

From this point on, the use of computers in social studies education took a back seat to what was happening in other disciplines, especially mathematics and language arts (Roberts, 1982). During the decade and a half since
the Martorella and Kohn study, little had changed. Those few social studies teachers who used computers did so for the purpose of simulations and an occasional drill and practice program (Roberts, 1982; Rooze, 1983). The use of computers in social studies was still considered to be a relatively new innovation. Suggestions were constantly being made which echoed the prior uses of computer simulations and drill and practice, while others advocate the use of computers to teach statistics and data analysis in the social studies (Saltinski, 1981). Even the National Council for the Social Studies (NCSS), representing approximately 10% of all secondary social studies teachers (Levin, 1984), had just begun to take a position regarding computers (Cohen, 1983). In 1981, Diem, writing for the NCSS, stated the problem succinctly when he suggested that social studies teachers acquire basic computer skills and the ability to author lessons for the computer. In concluding his analysis of computers and the social studies Diem (1981) stated, "We have a tool that can be an aid to our teaching--if we learn to use it" (p. 6).

CAI AND THE SOCIAL STUDIES

In summarizing the 1982 National Council for the Social Studies (NCSS) convention, Cohen (1983) reported a
growing interest and concern for the use of computers and appropriate software among social studies educators. Major questions and assertions, reported at the convention, were the concerns about quality software and the belief that with authoring languages, good social studies teachers would soon be able to develop software themselves. Of further concern was the question of how software would be integrated into the social studies curriculum. Since that time the questions of computer usage, software types and selection, and integration into the social studies curriculum have been addressed by the NCSS and social studies educators in the field.

It has been noted that social studies educators are among the last to make use of this new technology (Roberts, 1982; NEA, 1983). This tendency among social studies teachers was reiterated in the Association for Supervision and Curriculum Development (ASCD) publication Social Studies in the 1980's: A Report of Project SPAN (Fancett & Hawke, 1983). It was reported that computers ranked next to last among instructional techniques used by social studies teachers; only contract learning was used less frequently.

In Project SPAN (Social Studies Priorities, Practices, and Needs), the editors concluded that the social studies would encounter six major problems in the 1980's that would necessitate solutions if the discipline
was to survive. Among them was the need to promote greater student learning; learning which focuses on the knowledge, skills, and attitudes believed to be important for the social studies. A second problem was a lack of variety in teaching methods, evaluation practices, and limited kinds of learning experiences (SPAN Consultants & Staff, 1983).

The role of computers and computer-assisted instruction material has been offered as a solution to the problems cited in the SPAN report. Senn (1983) asserted that the educational practices and goals of the social studies would be improved by using computers and its accompanying software. Computers could promote more effective learning via individualized instruction and immediate and objective feedback, thus providing greater motivation to the students. Senn also believed that the computer would be more fun and provide a variety of learning methods for the student through drill and practice, tutorials, simulations, and other programs.

When the NCSS revised its scope and sequence for the social studies in a report released in November, 1983 (NCSS, 1984), it focused upon the need for knowledge and the development of specific skills. Knowledge was defined as the base "... which provides facts, concepts, and generalizations that help students understand human affairs and the base condition. Knowledge provides a
basis for values and beliefs, and it is the vehicle for the development of skills" (p. 251).

Among those necessary skills outlined by the NCSS was the ability to operate a computer using prepared instructional or reference programs. The acquisition of requisite knowledge and the students self-directed interaction with the computer were at the heart of computer-assisted instruction (Manion, 1985).

The NCSS report on a scope and sequence for the social studies reflected a long standing debate among social studies educators as to whether the knowledge approach or the skills approach should be emphasized. These two views of social studies instruction require that the role of the computer and computer-assisted instruction be examined within these differing perspectives.

At the 1983 NCSS convention in San Francisco, Rooze addressed this problem in a paper on integrating computer software into social studies instruction. He believed that using computers as an instructional technique, within the knowledge approach to social studies, would result in several advantages. Drill and practice programs would allow the student to learn social studies content and skills, receive immediate knowledge of results, and supplement regular instruction. Tutorials could be used for initial instruction on concepts and skills. The interactive nature of computers might also make social
studies more appealing to students and productive.

From the skills perspective of social studies education, Rooze echoed Saltinski's (1981) belief that the computer could be used in data retrieval and analysis. In this way social science skills, especially statistics, often ignored by social studies teachers, would be confronted.

CAI AND LEARNING THEORY

The theoretical premises and practical concerns regarding the utilization of this new technology are inherent in the concerns about computers in social studies education. Adjunct computer-assisted instruction is the most prevalent form of computer usage in the social studies today (Roberts, 1982; Rooze, 1983). Drill and practice programs and tutorials, as examples of CAI, can be traced to the work in programmed instruction (PI) which occurred in the 1960's (Hofmeister, 1984). PI material, written for texts and teaching machines, specified objectives and required empirical testing. It allowed the learner to be self-paced, respond overtly, and receive immediate feedback. O'Day (1971), in analyzing PI principles and effectiveness, concluded that computer-assisted instruction was the logical extension of programmed instruction. CAI would, O'Day believed,
enhance student motivation and allow students to select the pace and sequencing of their own learning.

The work of psychologist B. F. Skinner influenced PI and CAI. Skinner first studied the behavior of animals and then studied human behavior. He found that by providing suitable stimuli, the subject would respond and, because of reinforcement, that response would be repeated regularly when the appropriate stimuli was present (Skinner, 1968). Skinner's work emphasized the need to reinforce responses in a positive fashion in order to facilitate learning. He also noted the need for practice or repetition. The repetition and positive feedback are necessary for learning to take place.

Skinner's views are applicable to drill and practice CAI (Chambers & Sprecher, 1983). Basic to drill and practice CAI is the repetition of material for the purpose of mastery. Second, the use of reinforcement, both positive and negative, is beneficial to learning, such as the increase or decrease in scored points. In this way the learner becomes more proficient.

Skinner's concepts are applicable to tutorial programs also. The tutorial requires the student to interact with the computer by providing a response to each question or set of information. It permits the student to proceed at his or her own pace. It also provides adequate reinforcement of efficient work (Chambers & Sprecher,
1983).

However, the theoretical basis of CAI is not found in the work of Skinner alone. Cognitive psychology has been utilized in the creation of CAI drill and practice and tutorial modules. Based upon the information processing models (Moates & Schumacher, 1980), CAI would be concerned with 1) the effect of stimuli upon the receptors of the learner; 2) information storage in short-term (working) memory; 3) storage of information in long term memory; 4) the encoding and decoding of information; and 5) the retrieval of stored information. Viewed as a part of cognitive learning theory, CAI drill and practice speeds the learning process, making the learning of low level skills more efficient and automatic. Drill and practice reinforce the indexing characteristics of basic knowledge and skills, making them more easily retrieved and placed in short-term (working) memory (Gagne, 1982).

CAI tutorials are influenced by cognitive learning theory as well. Expressed in terms of cognitive theory, the internal learning processes can be compared with the external instructional events of computer-assisted instruction (Gagne, Wagner, & Rojas, 1981). The internal learning processes include alertness, expectancy, retrieval to short-term memory, selective perception, semantic encoding, retrieval and responding, reinforcement, cueing retrieval, and generalizing. These
internal learning processes are equivalent to the following external instructional events: gaining attention, informing the learner of lesson objectives, stimulating recall of prior learning, presenting stimuli, guided learning, eliciting performance, providing information feedback, assessing performance, and enhancing retention and learning transfer. The external instructional events, contained within the CAI, would be that with which the learner would interact. Accordingly, the internal processes would occur (Chambers & Sprecher, 1983).

The efforts to systematize and formalize learning, that began with programmed instruction, is continued by CAI. Furthermore, the influence of behaviorist and cognitive learning theories is apparent in computer-assisted instruction.

THE INSTRUCTIONAL EFFECTIVENESS OF CAI

The review of the literature revealed a substantial number of studies in which computer-assisted instruction was compared to more traditional methods of instruction. The majority of these studies pertained to the fields of science, mathematics, and language arts. Attempts at generalizing the effectiveness of CAI, based upon such studies, however, was difficult for several reasons. The
studies varied in the degree to which CAI was used as a supplement to or substitute for traditional instruction. Studies differed with regard to design--some utilized control groups; others did not. The type of adjunct CAI investigated included drill and practice, tutorials, and simulations. A wide range of settings was covered by the studies, including elementary, secondary, and college. The hardware and software packages utilized within studies also varied. For these reasons, replication of studies and the duplication of results was virtually non-existent.

Recently, several researchers have noted that these problems and the ever-changing technology have made it difficult to generalize about the effectiveness of computer-assisted instruction (Glass, McGaw, & Smith, 1981; Pogrow, 1983). In order to make sense of these diverse studies, two methods of analysis have been employed by reviewers of CAI research. The first is the box-score method; the second is meta-analysis. The box-score method generalized its findings by reporting the proportion of studies found to be favorable to CAI versus those that were unfavorable. The box-score method usually included a narrative of comments about the studies. In contrast, meta-analysis takes a more quantitative approach with the statistical analysis of the summary findings of many empirical studies. By employing appropriate statistical methods, a synthesis of the findings can be
achieved for the purpose of generalization about a specific research question (Glass, McGaw, & Smith, 1981).

The earliest attempt at a box-score review of CAI was performed by Visonhaler and Bass (1972). They reported the results from ten independent studies of elementary students using drill and practice CAI in the content areas of mathematics and language arts. Visonhaler and Bass concluded that there was strong evidence for the effectiveness of CAI over traditional instruction. The elementary students who used CAI drill and practice showed performance gains of one to eight months on standardized achievement tests.

Jamison, Suppes, and Wells (1974) also concluded that CAI, as a supplement to regular instruction at the elementary level, was effective in improving achievement scores. At the secondary and college levels, these box-score reviewers concluded that CAI was as effective as traditional instruction and it provided substantial savings of student time spent at the learning task.

Similar conclusions were reported by Edwards, Norton, Taylor, Weiss, and Dusseldorp (1975) in their review of CAI for the Association for Supervision and Curriculum Development (ASCD). They reported that CAI, as a supplement to regular instruction, proved to be more effective than traditional instruction alone. As a substitute CAI was viewed to be equal to traditional
instruction. In either case, all studies reported that it took students less time to learn.

A final box-score review was published by Thomas (1979) regarding studies omitted by Edwards, Norton, Taylor, Weiss, and Dusseldorp (1975) or conducted after the ASCD summary report. This review dealt specifically with computer-assisted instructional material at the secondary level. Thomas (1979) concluded that although a few studies were found in which CAI was not effective, the overwhelming number of studies supported CAI as a viable instructional alternative. The review showed that CAI also resulted in reduced time spent to attain mastery learning and CAI improved attitudes toward learning.

One of the problems with the box-score method of review was that no answer was provided concerning the degree to which CAI improves learning. The meta-analysis attempted to solve this problem. The first meta-analysis of computer-assisted instruction was conducted by Hartley (1977), who focused on mathematics in elementary and secondary schools. She reported that the average effect of CAI was to raise student achievement scores by .41 standard deviations. This is the same as raising one's performance level from the 50th percentile to the 66th percentile. Hartley also noted that elementary students fared better than secondary students, and that CAI was more effective than programmed instruction but not as
effective as peer tutoring.

Burns and Bozeman (1981) also used meta-analysis to integrate findings in CAI mathematics instruction in elementary and secondary schools. These reviewers reported an effect size of .45 for tutorial CAI and .34 for drill and practice.

At the collegiate level, Kulik, Kulik, and Cohen (1980) used meta-analysis to examine the effectiveness of computer based teaching. They found computer-assisted instruction raised examination scores about three points or about one-quarter standard deviation. Thus, the student in a CAI class scored at the 60th percentile on an examination over course content while a student in a class utilizing traditional instruction scored at the 50th percentile. Finally, Kulik, Kulik, and Cohen concluded that CAI took only about two-thirds the amount of time that traditional instruction took.

Kulik, Bangert, and Williams (1983) integrated 51 studies of CAI at grades six through twelve to determine the effectiveness of computer based teaching on secondary students. Their analysis showed that CAI raised student scores on examinations approximately .32 standard deviations. This is a performance increase from the 50th to the 63rd percentile. In addition, CAI methods resulted in positive attitudes toward the content being taught and a substantially reduced amount of time needed for student
Finally, Kulik, Kulik, and Bangert-Downs (1984) reported the use of meta-analysis on 29 studies of CAI in the elementary schools. They reported achievement score increases of .48 standard deviations, or increases from the 50th percentile to the 68th percentile.

Computer-assisted instruction, as presented by both box-score and meta-analysis reviewers, was a consistently more effective instructional methodology, as evaluated by examination scores, and took less time for the student to learn in contrast to traditional pedagogical methods. Furthermore, several reviews asserted a positive attitude toward the subjects learned as a result of CAI.

Only three reviews dealt with the issue of student aptitude and CAI effectiveness. Jamison, Suppes, and Wells (1974) reported that the performance of special education and disadvantaged students improved from the use of CAI material. Edwards, Norton, Taylor, Weiss, and Dusseldorp (1975) proposed that CAI was more effective for low ability students. Kulik, Kulik, and Cohen (1980) asserted that the benefits from CAI were about equal across aptitude levels.

An additional concern was the content areas within which CAI research was conducted. Whether the studies were independently conducted or a part of larger research projects, such as those put forth by the Plato project and
TICCIT, drill and practice and tutorial CAI was dominated by mathematics, science, and language arts. Only two studies dealing with the social studies content area were found. One examined student attitude toward computer literacy using a high school American history class as the medium for delivery (Berg, 1979). The other analyzed the motivating factors for student usage of collegiate macroeconomic CAI lessons (Schenk & Odorzynski, 1979). Neither study addressed the question of the effectiveness of CAI material or the possible variance of achievement based upon differing student ability levels.

CONCLUSIONS DRAWN FROM THE REVIEW OF LITERATURE

The utilization of computers and computer-assisted instruction in social studies education is just beginning. Social studies teachers have thus far registered negative attitudes toward this technology. Surveys have shown that despite the rapid growth of computers, especially microcomputers in American public education, few social studies teachers are taking advantage of this tool to advance the teaching of basic knowledge essential for higher level thought processes and the development of social studies skills and concepts. This can be done through the use of adjunct CAI material exemplified by drill and practice, tutorials, simulations, problem
solving, and data analysis (statistics) programs.

CAI is an extension of programmed instruction and incorporates behavioral and cognitive learning theory. Among the principles that CAI utilizes are repetition, reinforcement, guided practice, and semantic encoding and decoding reinforcing indexing characteristics of information. Furthermore, the interactive nature of CAI allows the student to be an active participant in the learning activity.

The study of the instructional effectiveness of computer-assisted instruction has occurred almost exclusively in science, mathematics, and language arts. The differing types of CAI used combined with the various types of hardware and software packages and paradigms of CAI have necessitated that conclusions regarding CAI's effectiveness utilize box-score and, more recently, meta-analysis. Researchers have concluded from these methods of review that CAI, as a supplement for regular instruction, is effective. CAI as a substitute to traditional instruction has proved to be effective also. CAI is believed to reduce the amount of time needed to learn a particular task and to cause improved student attitudes toward school and individual subjects. Few studies have examined the effectiveness of CAI when compared to student achievement levels.

This study was designed to study the effectiveness of
computer-assisted instruction (Computer Review Assistance Modules--CRAM) in United States history at various levels of student achievement. Information was gathered from those students who used CRAM regarding the structure of this CAI, their attitudes toward using CAI, and their feelings toward using CAI in social studies.
CHAPTER III
METHODOLOGY

The purpose of this study was to determine the effectiveness of teacher written Computer Review Assistance Modules (CRAM) upon student achievement in United States history. This effectiveness was to be examined at three levels of student achievement. A secondary purpose was to secure information from those subjects who utilized CRAM regarding their attitudes toward computer-assisted instruction (CAI) material, the help/encouragement provided by reinforcers, and their view of CRAM as a supplemental study method for unit test preparation in United States history.

Specific questions to be statistically analyzed were:

1. Are there significant differences in achievement on the unit test between subjects who utilized teacher written Computer Review Assistance Modules (CRAM) in test preparation in United States history and those who did not?

2. Are there significant differences in achievement on the unit test, at varying student achievement levels, between subjects who utilized teacher written Computer Review Assistance Modules
(CRAM) in test preparation in United States history and those who did not?

3. What are the subject's affective responses to the use of Computer Review Assistance Modules (CRAM) for unit test preparation?

**SOURCES OF DATA**

The study was conducted with all secondary students enrolled in United States history at a suburban high school during the 1984-1985 academic year. The investigator was a member of the United States history team which consisted of four teachers. The high school had an enrollment of approximately 1100 students, grades 9-12. It is the only high school in a suburban school district of metropolitan Omaha, Nebraska. The district is dominated by middle class families with a growing number of middle management and professional families. It is predominantly white with less than 2% of the students coming from non-white ethnic backgrounds. A major emphasis at the high school is student preparation for college and continued vocational training. An estimated 65% of the students continue their education after graduation.

All students are required to take United States
history in order to graduate from high school. During the 1984-1985 school year, there were 13 sections of United States history including two sections designed for low-reading students. Except for the sections for low-reading students, no particular plan was used in assigning students to sections of United States history. Eleven sections of United States history were chosen for use in this study, excluding the low-reading sections. The eleven sections were taught by the four members of the United States history team utilizing an established curriculum, standard materials, jointly held activities, and a uniform time-table of instruction. The study was conducted during the second and third weeks of October, 1984.

INSTRUMENTS/DATA SOURCES USED IN THE STUDY

Five instruments and sources of data were used in the study. They included CRAM, the study guide, SRA composite scores, the unit exam, and the CRAM Evaluation survey.

CRAM

Computer Review Assistance Modules (CRAM) are adjunct computer-assisted instruction which are
teacher-authored to meet specific content objectives, CRAM incorporates features of both drill and practice and tutorial CAI. The purpose of CRAM is to provide the learner with an alternative method of study in preparation for the final unit exam. CRAM tests the student's knowledge, provides immediate feedback, instructs the student via feedback on where to find additional information if mastery has not been achieved. CRAM utilizes multiple-choice questions which are at the knowledge, comprehension, and application levels of Bloom's taxonomy. CRAM was written using the Apple SuperPilot authoring system. The CRAM used in the study, as the treatment, was examined by the United States history team to insure that it covered the stated unit objectives, terms, and concepts that were to be mastered by the student (Appendix A).

STUDY GUIDE

The study guide (Appendix B) was prepared for use by the control group. Representative of a traditional means of review for unit test preparation, the content of the study guide matched, item for item, the questions contained in the Computer Review Assistance Module (CRAM). The structure of the study guide was simply a listing of
terms and concepts.

**SRA**

The Science Research Associates Achievement Series was used by the school district to evaluate student achievement and district educational growth. Form 2, Level H was used in the spring of 1984. The investigation was conducted in the fall of 1984. The composite score was used as a blocking variable in the analysis of variance. The reliability of the SRA composite score is .97 (1978).

**UNIT EXAM**

The final unit exam, used as the dependent variable, was developed for the Constitution Unit by the United States history team over several years (Appendix C). The test consisted of fifty multiple choice questions worth two points each. The structure of the questions used in the final unit exam and the structure of CRAM questions is similar. The investigator utilized this test to replicate normal classroom conditions and teacher made tests. The United States history team reviewed the test with the investigator to establish content validity. According to Kerlinger (1973), content validity is essentially "judgment" (p. 458) and a panel of
experts such as teachers may establish such validity.

SURVEY

Entitled the Computer Review Assistance Modules (CRAM) Evaluation (Appendix D), this survey was administered to the treatment group the day after the posttest was taken. The purpose of the survey was to secure attitudinal information from the subjects who had utilized CRAM regarding its structure and their perception of CAI, and to determine whether future use of CRAM was desirable or warranted. The questions were arrived at through discussions held between the investigator and the United States history teaching team and a professor of educational psychology. The survey was divided into three parts. Part I consisted of three questions, the purpose of which was to act as a cross check for sign-up sheets in the computer lab to assist in the verification of CRAM usage as required by the investigator. Part II consisted of eleven statements. Ten of the statements required the subjects to respond to a five point scale. The last question of Part II asked for a yes/no response. Part III of the survey consisted of three open-ended questions and appeared on the back of the survey form.
PROCEDURES FOR COLLECTING DATA

Students in ten intact United States history classes were the subjects of this study. Scores from the Science Research Associates Achievement Test Series, given the preceding April, were available for each student from school records.

During the course of the study five classes were required to use the Computer Review Assistance Modules (CRAM) at least twice in the week and a half before the final unit exam. The other five classes were given a study guide which paralleled the CRAM content. The schedule and content and structure of CRAM were approved by the United States history team which closely coordinated regular instruction prior to the use of CRAM.

STRUCTURE OF CRAM

The structure of Computer Review Assistance Modules (CRAM) is similar to those paradigms used by adjunct computer-assisted instruction such as drill and practice and tutorials. CRAM was created by the investigator using a microcomputer authoring system for the Apple II+/IIe called Apple SuperPilot. Based upon the Pascal computer language, the authoring system allows a teacher to create lessons while
learning a minimum number, approximately twelve, of commands. The system requires an Apple II+/IIe microcomputer, 64K of memory, and two disk drives to create lessons. One disk drive and 64K of memory is required to run student diskettes. The authoring system was chosen because its structure was easy to learn and students were unable to break into programs such as those written in BASIC.

CRAM is a series of randomly selected multiple choice questions. The student chooses the number of questions to be reviewed from a file of forty questions. The questions are constructed to parallel the objectives of the unit and the term sheet given at the beginning of each unit. The unit under study, during the investigation, dealt with the Constitutional Period, 1781-1789.

The student is given two chances to answer the question correctly. If the question is answered incorrectly on the first attempt, the student is given a clue, or the location of the information in the text, notes, or terms. If the question is missed on the second attempt, the student is given the correct answer and encouraged to study the appropriate material. If the question is answered correctly on either the first or second attempt, the student receives a positive reinforcer and allowed to
continue. At the end of the review the student is given a total score on those questions answered on the first and second attempts. A final message reminds the student to study for the final unit exam and encourages them to try CRAM again.

PROCEDURES

The writing of Computer Review Assistance Modules (CRAM) for United States history began in the winter of 1982. One year later the first module was used by students. At that time programming and content problems were discovered and remedied. Feedback from students was secured through the use of a survey and discussions were held with the United States history team to acquire additional information regarding CRAM. The administration, which had supported the project from its inception, then authorized that a study be undertaken to determine the efficacy of CRAM.

Random selection procedures were used to assign ten of the eleven United States history classes to either treatment or control group. Random assignment of individual students to control or treatment groups was not possible without disrupting intact classes assigned via computer during the previous summer.
Student assignment to classes, however, was done randomly with only two conditions to be satisfied: 1) the need to balance the number of students within classes, and 2) the need to avoid scheduling conflicts.

Ten days prior to the final unit exam each class within the experimental group used CRAM for a forty minute period. The students were instructed to choose twenty questions the first time through the program and an odd number the second time. This guaranteed exposure to a maximum number of review questions. Students were then required to use CRAM at least once more before the unit exam. In each use of CRAM, students used the microcomputer by themselves. This was monitored by the investigator, team members and two computer lab supervisors. Simultaneously, members of the control group were given a specially devised review sheet which paralleled the content of CRAM (see Appendix B). The purpose of the review sheet for the control group was to utilize class time in as similar as possible a manner to those using CRAM and to establish a basis of comparison between CRAM and traditional methods of review and test preparation. Following the posttest, the final unit exam, a survey was conducted of those students who had used CRAM to obtain affective
information regarding CRAM structure, usage, and perceived effectiveness as an alternative and supplemental study method.

DATA ANALYSIS

The data in this study were analyzed using an analysis of variance to determine if statistically significant differences between the control group and treatment group existed at the alpha level of .05. A frequency distribution of the students composite SRA achievement test scores was conducted to establish three, approximately equal in number, achievement levels in both the treatment and control groups. These achievement groups—low, medium and high—were used as blocking variables to determine possible statistically significant differences between the two groups at various achievement levels. The three achievement levels incorporated the following ranges of SRA composite achievement scores (national norms percentiles): Low equaled 1 through 75, Medium equaled 76 through 90, and High equaled 91 through 99.

The total enrollment of the ten classes was 251. Of this number 128 were in the control group and 123 in the treatment group. During the data analysis
participants were eliminated from the study who 1) were not present on the day of the final unit exam but would have taken it later, 2) missed the initial utilization of CRAM and/or the required second use of CRAM, 3) did not receive a control group study guide, and 4) had no SRA achievement test composite score available. This left 113 students in the control group and 103 in the treatment group. The total "N" of the study was 216. The resultant disproportionality between the total number of subjects in the control group (n = 113) and the number of subjects in the treatment group (n = 103) posed no threat to the robustness of the analysis of variance test being used. In order to compensate for the disproportionality and provide the necessary descriptive statistics, the SPSS-X MANOVA procedure was employed (SPSS Inc., 1983).

An SPSS-X crosstabulation analysis was then run for the survey data reported by the experimental group. The crosstabulation reported the survey data of the experimental group by collapsing the information according to the SRA composite scores--blocking variables which had been previously established for use in the analysis of variance.
SUMMARY

The procedures described in Chapter III were used to investigate whether or not there was a significant difference in final unit exam scores between those students who used CRAM and those students who used a traditional method of review. The investigation also examined possible differences at varying student achievement levels. Surveys, completed by those who used CRAM, provided information about CRAM's structure and student perception of CAI. The population included all secondary students enrolled in United States history.
CHAPTER IV
PRESENTATION AND ANALYSIS OF DATA

The purpose of this study was to determine the effectiveness, at varying levels of student achievement, of teacher written Computer Review Assistance Modules (CRAM) upon student achievement in United States history. A second purpose was to secure information from those subjects who used CRAM regarding their attitude toward the structure of this computer assisted instruction material, the help provided by the reinforcers used, and their view of CRAM as a supplemental study method for unit test preparation. Therefore, the study was divided into three specific research questions:

1. Are there significant differences in achievement on the unit test between subjects who utilized teacher written Computer Review Assistance Modules (CRAM) in test preparation in United States history and those who did not?

2. Are there significant differences in achievement on the unit test, at varying levels of student achievement, between subjects who utilized Computer Review Assistance Modules (CRAM) in test preparation in United States history and those who did not?

3. What are the subject's affective responses to the use of Computer Review Assistance Modules (CRAM) for unit
test preparation. 

In this chapter the methods by which the data were analyzed is described. The results of the statistical tests of the research questions are then reported and analyzed.

METHOD OF ANALYSIS

The data was analyzed through the use of analysis of variance (ANOVA). The purpose of ANOVA is to determine, through the establishment of an F-ratio, whether there exists a treatment effect. The treatment effect is caused by any observed or measureable differences between the independent variable or experimental treatment and the dependent variable or response variable of the control group (Keppel, 1982).

The F-ratio contrasts the differences among treatment means and the differences among subjects treated alike. The differences among treatment means are referred to as between group differences and the treatment within a treatment group is called within-group differences. The between group differences are the result of the combined effects of experimental treatment and experimental error while the within-group differences represent experimental error alone.

Thus the F-ratio is also a contrast among between
group differences and within-groups differences. These differences or deviations may be transformed into more useful quantities called variances. The statistical analysis of between groups and within-groups variances is called analysis of variance. Mathematically, this relationship is represented by:

$$SS(T) = SS(A) + SS(S/A)$$

where, $SS(T)$ is the sum of the squared deviations from the mean,

- $SS(A)$ is the between-groups deviation, and
- $SS(S/A)$ is the within-groups deviation.

The SPSS-X MANOVA procedure, treatment x blocking variables, was utilized for the purpose of data analysis regarding research question #1 and #2. This was done to secure sequential ANOVA data accessible only through the MANOVA procedure as well as weighted cell means which account for the disproportionality of achievement level groupings--blocking variables, as discussed in Chapter III.

The third research question required the use of the SPSS-X crosstabulation procedure. This procedure tabulated the survey information provided by the treatment group. It gave not only the distributions of survey responses for the entire treatment group but also distributions based upon the SRA, blocking variable, groupings. Thus the data may be analyzed collectively and
by achievement level.

ANALYSIS OF DATA RELATED TO RESEARCH QUESTIONS

In the following sections, the statistics relating to each of the research questions are presented.

Research Question #1

The first step in the analysis of data was the determination of whether or not there was a statistically significant difference between those subjects who used the Computer Review Assistance Modules (CRAM) and those who did not (p<.05).

Table 1
MANOVA Summary Table

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (SRA)</td>
<td>13507.65930</td>
<td>2</td>
<td>6753.82965</td>
<td>49.26253</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td>B (Grp.)</td>
<td>143.96944</td>
<td>1</td>
<td>143.96944</td>
<td>1.05012</td>
<td>p&gt;.05</td>
</tr>
<tr>
<td>A x B</td>
<td>271.20122</td>
<td>2</td>
<td>135.60061</td>
<td>.98907</td>
<td>p&gt;.05</td>
</tr>
<tr>
<td>S / AB</td>
<td>28790.73317</td>
<td>210</td>
<td>137.09873</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

With degrees of freedom of 1, 210, the F-ratio would have to be 3.84 to be statistically significant. As presented
in Table 1 the F-ratio was 1.05012. This indicated that there was not a statistically significant difference between the treatment and control groups. It suggests that the use of CRAM did not result in a treatment effect.

Research Question #2

Although Table 1 indicated that there existed no statistically significant differences between those subjects who used CRAM and those who did not, research

<table>
<thead>
<tr>
<th>Groups</th>
<th>SRA 1 (Control)</th>
<th>2 (CRAM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SD</td>
<td>N</td>
</tr>
<tr>
<td>1 (Low)</td>
<td>56.82333</td>
<td>12.33981</td>
</tr>
<tr>
<td>2 (Medium)</td>
<td>68.68293</td>
<td>11.29256</td>
</tr>
<tr>
<td>3 (High)</td>
<td>73.78947</td>
<td>11.35938</td>
</tr>
</tbody>
</table>

Group 66.83186 113 68.28155 103

Total N = 216

Grand Mean = 67.52315
question #2 asks for more specific information. This research question requires that the data be analyzed not only by group but also according to three achievement levels—low, medium, and high. This breakdown of posttest results is contained in Table 2.

Table 2, Cell Means, indicates that at the low and high achievement levels the treatment group scored higher than the control group. More specifically, the mean score of those using CRAM versus those who did not was 57.57895 and 56.82353 at the low achievement level, and 78.52500 versus 73.78947 at the high achievement level. In the medium achievement level found the treatment group scored 68.16000 while the control group scored 68.68293. Collectively, the treatment group's mean score was 68.28155 and the control group's mean score was 66.83186. These results suggest that those subjects who utilized CRAM scored quantitatively higher on the unit exam (posttest) than those who did not.

Having found, via the cell means scores, that there is a quantitative difference at the three achievement levels between the control and treatment groups, the question of whether this was a statistically significant difference arises.

Table 1 reveals that a significant F-ratio was not found regarding the interaction of the treatment (CRAM) and the SRA achievement levels. Furthermore, a
significant F-ratio was not found between the treatment and control groups at the various levels of achievement. Finally, a significant F-ratio was found for the SRA achievement levels. This, however, was to be expected and was not part of research question #2.

Research Question #3

For research question #3 subjects responded to a series of questions and statements regarding their use of the Computer Review Assistance Modules (CRAM) for unit test preparation in United States history. As described in Chapter III, the CRAM Evaluation survey was divided into three parts. The data summaries and analyses which follow are based upon Part II, statements 4 through 14, and Part III, question 15 through 17, of the survey. The data are broken down according to the three SRA achievement levels, blocking variables, as well as cumulative responses. Because of the quantity of data each question will be presented independently. There were 103 respondents in the treatment group.

The first statement to which treatment subjects responded was: I had trouble finding a free computer. As indicated in Table 3-A a total of 68.0% of the subjects strongly disagreed and 14.6% disagreed with this statement—a total of 82.6%. The highest disagreement rate occurred within the high achievement group where
Table 3-A
CRAM Evaluation Survey
Statement #4

Statement: I had trouble finding a free computer.

<table>
<thead>
<tr>
<th>SRA levels:</th>
<th>1 (Low)</th>
<th>2 (Medium)</th>
<th>3 (High)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>1 (Strg Agr)</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>2.6</td>
<td>2</td>
<td>8.0</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>13.2</td>
<td>4</td>
<td>16.0</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>26.3</td>
<td>1</td>
<td>4.0</td>
</tr>
<tr>
<td>5 (Strg Dis)</td>
<td>21</td>
<td>55.3</td>
<td>18</td>
<td>72.0</td>
</tr>
</tbody>
</table>

87.5% disagreed/ strongly disagreed with the statement.
In the low achievement group 81.6% disagreed/strongly disagreed while in the medium achievement group 76.0% indicated that they disagreed or strongly disagreed with the statement.

The second survey statement was: The immediate feedback was helpful in locating my weaknesses. Table 3-B presents the responses to this statement. The statement centers on the positive reinforcers, encouragement, and directions used in the CRAM. Subjects in the high
achievement level reported 70.0% of their number agreed/strongly agreed with this statement. In the low achievement group 39.5% strongly agreed and 23.7% agreed, a total of 63.2%. The medium achievement group reported 53.0% agreed/strongly agreed with the statement. Only 9.7% of the 103 total subjects either disagreed or strongly disagreed with the statement. However, 25.2% of the respondents assumed a neutral position on the statement.

Table 3-B

CRAM Evaluation Survey

Statement #5

Statement: The immediate feedback was helpful in locating my weaknesses.

<table>
<thead>
<tr>
<th>SRA levels:</th>
<th>1 (Low)</th>
<th>2 (Medium)</th>
<th>3 (High)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>1 (Strg Agr)</td>
<td>15</td>
<td>39.5</td>
<td>10</td>
<td>40.0</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>23.7</td>
<td>5</td>
<td>13.0</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>18.4</td>
<td>8</td>
<td>32.0</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>7.9</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>5 (Strg Dis)</td>
<td>4</td>
<td>10.5</td>
<td>2</td>
<td>8.0</td>
</tr>
</tbody>
</table>
Table 3-C deals with the statement: I enjoyed working with the computer program. None of the 103 respondents strongly disagreed with the statement while 87.4% of all subjects either agreed or strongly agreed with the statement. 55.3% of the low achievement group strongly agreed and 36.8% agreed with the statement for a 92.1% total. The medium achievement level posited 28.0% who agreed with the statement and 56.0% who strongly agreed, an 84.0% total.

Table 3-C
CRAM Evaluation Survey
Statement #6

<table>
<thead>
<tr>
<th>SRA levels:</th>
<th>1 (Low)</th>
<th>2 (Medium)</th>
<th>3 (High)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>1 (Strg Agr)</td>
<td>21</td>
<td>55.3</td>
<td>14</td>
<td>56.0</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>36.8</td>
<td>7</td>
<td>28.0</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>7.9</td>
<td>1</td>
<td>4.0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0.0</td>
<td>3</td>
<td>12.0</td>
</tr>
<tr>
<td>5 (Strg Dis)</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Statement #7 of the CRAM Evaluation survey, reported
in Table 3-D, was: Working with the computer seemed cold and impersonal. Cumulatively, 29.1% of the subjects disagreed with this statement and 50.5% strongly disagreed, a total of 79.6%. Of the three achievement groups, the low achievement group reported 26.3% disagreeing with the statement and 55.3% strongly disagreeing. While 81.6% of the low achievement group disagreed to some degree with the statement no respondent in that group either agreed or strongly agreed. At the

Table 3-D
CRAM Evaluation Survey
Statement #7

Statement: Working with the computer seemed cold and impersonal.

<table>
<thead>
<tr>
<th>SRA levels:</th>
<th>1 (Low)</th>
<th>2 (Medium)</th>
<th>3 (High)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>1 (Strg Agr)</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>4.0</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>18.5</td>
<td>4</td>
<td>16.0</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>26.3</td>
<td>7</td>
<td>28.0</td>
</tr>
<tr>
<td>5 (Strg Dis)</td>
<td>21</td>
<td>55.3</td>
<td>13</td>
<td>52.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
medium achievement level, 80.0% of the group disagreed/strongly disagreed with the statement. In the high achievement group 77.5% disagreed or strongly disagreed with the statement. Only 4.9% of the 103 subjects agreed with the statement and no respondent strongly agreed.

Table 3-E reports on statement #8: I feel the computer program helped me review for the final unit exam.

Table 3-E
CRAM Evaluation Survey
Statement #8

<table>
<thead>
<tr>
<th>SRA levels:</th>
<th>1 (Low)</th>
<th>2 (Medium)</th>
<th>3 (High)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>1 (Strg Agr)</td>
<td>13</td>
<td>34.2</td>
<td>13</td>
<td>52.0</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>31.6</td>
<td>7</td>
<td>28.0</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>31.6</td>
<td>4</td>
<td>16.0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>4.0</td>
</tr>
<tr>
<td>5 (Strg Dis)</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Of the 103 respondents 2.9% either disagreed or strongly
disagreed with the statement, 19.4% assumed a neutral position, and 77.7% agreed/strongly agreed with it. The high achievement group reported 40.0% agreed and 47.5% strongly agreed, 87.5% of the total subgroup. The medium level reported 80.0% of the group in agreement with the statement, 28.0% agreed and 52.0% strongly agreed. Of the low achievement, 65.8% group either agreed or strongly agreed with the statement. However, 31.6% of the low level group assumed a neutral position regarding the survey statement.

Table 3-F
CRAM Evaluation Survey
Statement #9

<table>
<thead>
<tr>
<th>SRA levels:</th>
<th>1 (Low)</th>
<th>2 (Medium)</th>
<th>3 (High)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>1 (Strg Agr)</td>
<td>14</td>
<td>36.8</td>
<td>16</td>
<td>64.0</td>
</tr>
<tr>
<td>2</td>
<td>16</td>
<td>42.1</td>
<td>8</td>
<td>32.0</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>13.2</td>
<td>1</td>
<td>4.0</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>5 (Strg Dis)</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Statement #9. I enjoyed reviewing for the exam in this manner, is summarized in Table 3-F. 83.5% of the subjects who used CRAM either agreed or strongly agreed with this statement. Of the three achievement groups, 78.9% of the low level, 80.0% of the high level, and 96.0% of the medium level, agreed or strongly agreed with the statement.

Table 3-G. statement #10, I would use the computer

Table 3-G
CRAM Evaluation Survey
Statement #10

Statement: I would use the computer review if given the chance in the future to prepare for a U.S. History unit exam.

<table>
<thead>
<tr>
<th>SRA levels:</th>
<th>1 (Low)</th>
<th>2 (Medium)</th>
<th>3 (High)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>1 (Strg Agr)</td>
<td>22</td>
<td>57.9</td>
<td>15</td>
<td>60.0</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>23.7</td>
<td>8</td>
<td>32.0</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>13.2</td>
<td>2</td>
<td>8.0</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>5 (Strg Dis)</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
review if given the chance in the future to prepare for a U. S. History unit exam, found 86.4% of the experimental group agreeing or strongly agreeing with the statement. Of the total, 2.9% indicated that they disagreed/strongly disagreed with the statement and 10.7% assumed a neutral position toward the statement. Within the three groups, 92.0% of the medium level, 91.6% of the low level, and 87.5% of the high level agreed/strongly agreed with the statement.

Table 3-H
CRAM Evaluation Survey
Statement #11

Statement: I learned something new by using the computer review.

<table>
<thead>
<tr>
<th>SRA levels:</th>
<th>1 (Low)</th>
<th>2 (Medium)</th>
<th>3 (High)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>1 (Strg Agr)</td>
<td>10</td>
<td>26.3</td>
<td>11</td>
<td>44.0</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td>47.4</td>
<td>7</td>
<td>28.0</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>21.1</td>
<td>5</td>
<td>20.0</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>2.6</td>
<td>1</td>
<td>4.0</td>
</tr>
<tr>
<td>5 (Strg Dis)</td>
<td>1</td>
<td>2.6</td>
<td>1</td>
<td>4.0</td>
</tr>
</tbody>
</table>
Statement #11, reported in Table 3-H, was: I learned something new by using the computer. Cumulatively, 72.8% of the respondents either agreed or strongly agreed, 39.8% and 33.0% respectively, with the statement. In the medium achievement group, 28.0% agreed and 44.0% strongly agreed, 72.0% of the subgroup. In the high achievement group, 40.0% agreed and 32.5% strongly agreed, 72.5% of the group. And in the low achievement group, 73.7% of the total group, respectively 47.4% and 26.3% agreed and strongly agreed, with the statement. Of the entire experimental group, 19.4% reported a neutral response and 7.8% either disagreed or strongly disagreed with the statement.

Using the computer review program encouraged me to study for the final unit exam, was statement #12 summarized by Table 3-I. Of the medium achievement group, 68.0% agreed/strongly agreed with the statement, while 24.0% took a neutral position, and no one disagreed/strongly disagreed. In the low achievement group, 52.6% either agreed or strongly agreed, 23.7% and 28.9% respectively, with the statement, 26.3% responded neutrally, and 21.0% either disagreed or strongly disagreed with the statement. In the high achievement group, 40.0% agreed/strongly agreed, 35.0% were neutral, and 22.5% disagreed/strongly disagreed. Finally, when all
Table 3-I
CRAM Evaluation Survey
Statement #12

Statement: Using the computer review program encouraged me to study for the final unit exam.

<table>
<thead>
<tr>
<th>SRA levels:</th>
<th>1 (Low)</th>
<th>2 (Medium)</th>
<th>3 (High)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>1 (Strg Agr)</td>
<td>11</td>
<td>28.9</td>
<td>8</td>
<td>32.0</td>
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<td></td>
<td></td>
<td></td>
<td>7</td>
<td>17.5</td>
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<td>11.1</td>
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<td>2</td>
<td>5.0</td>
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<tr>
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<td>7</td>
<td>18.4</td>
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<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>17.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>13.6</td>
</tr>
<tr>
<td>5 (Strg Dis)</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>2.9</td>
</tr>
</tbody>
</table>

Three groups are examined together 51.4% agreed or strongly agreed, 16.5% disagreed or strongly disagreed, and 29.1% were neutral.

Statement #13, Table 3-J, How would you rate your overall experience with the computer review program, calls for the subject to judge the experience on a scale ranging from very positive to very negative. Of the 103 respondents, 2.9% rated it as negative or very negative, 17.5% were neutral, and 77.6% rated the experience as
Table 3-J
CRAM Evaluation Survey
Statement #13

Statement: How would you rate your overall experience with the computer review program.

<table>
<thead>
<tr>
<th>SRA levels:</th>
<th>1 (Low)</th>
<th>2 (Medium)</th>
<th>3 (High)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
<td>#</td>
</tr>
<tr>
<td>1 (Very Pos)</td>
<td>9</td>
<td>23.7</td>
<td>11</td>
<td>44.0</td>
</tr>
<tr>
<td>2</td>
<td>17</td>
<td>44.7</td>
<td>11</td>
<td>44.0</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>26.3</td>
<td>2</td>
<td>8.0</td>
</tr>
<tr>
<td>4</td>
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<td>0.0</td>
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<td>0.0</td>
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<tr>
<td>5 (Very Neg)</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

positive or very positive. The medium achievement group rated the experience as 44.0% positive and 44.0% very positive. The high achievement group posited 47.5% positive and 32.5% very positive. The low group reported 44.7% positive and 23.7% very positive. It also reported a 26.3% neutral rating.

Table 3-K, statement #14 asks subjects, Would you recommend this program to a friend reviewing for U.S. History exams in the future? They were asked to respond
Yes, Probably Yes, or No. While 54.4% of the experimental

Table 3-K
CRAM Evaluation Survey
Statement #14

Question: Would you recommend this program to a friend reviewing for U.S. History exams in the future.

<table>
<thead>
<tr>
<th>SRA levels:</th>
<th>1 (Low)</th>
<th>2 (Medium)</th>
<th>3 (High)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>1 (Yes)</td>
<td>18</td>
<td>47.4</td>
<td>16</td>
<td>64.0</td>
</tr>
<tr>
<td>2 (Prob Yes)</td>
<td>19</td>
<td>50.0</td>
<td>9</td>
<td>36.0</td>
</tr>
<tr>
<td>3 (No)</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

group responded Yes, 44.7% answered Probably Yes, and 1.0% responded with a No. Of those responding Yes, the high achievement level reported 55.0%, the medium level 64.0%, and the low level 47.4%.

The third part of the CRAM Evaluation survey asked the subjects to respond to three open-ended questions. These questions were:

15. What did you like best about the computer program?

16. What did you like least about the computer
program?

17. What other suggestions, comments, questions, or information could you, would you make about the computer program? (These can be positive or negative!!)

The following is a summary of the comments made by the 103 survey respondents who made up the treatment group.

The responses to question #15 were varied, ranging from one word responses to elaborate sentences. Among the responses (number in parentheses) to this question of what they like best were:

a. It was fun (8)
   b. Made it easy to study (5)
   c. Tested your knowledge (3)
   d. Gave you immediate results (3)
   e. Questions imitated a test (6)
   f. Helped me study (10)
   g. Like to work with computers (3)
   h. Corrective feedback indicated strengths and weaknesses (11)
   i. Helped me remember questions and answers (2)
   j. Encouraged me to study (5)
   k. Learned from it (3)
   l. know what to study (4)
   m. Gave a second chance to answer (5)
   n. Asked questions student could not have
thought of while studying (6)

(Note: 9.7% of the subjects gave no response.)

Question #16 asked the subjects what they liked least about the CRAM program. Seventy-four of the subjects, 71.8%, stated that the computer program took too much time between questions as they appeared on the monitor. Other items included:

a. Questions hard to understand (2)
b. Not enough questions (2)
c. Repetition of questions when used several times (3)
d. Need class time for it (3)
e. Not enough time between questions after wrong answer given on second try (3)

Question #17 asked for additional comments or suggestions about CRAM. Forty-four of the subjects, 42.7%, made no additional comments. Those that were made included:

a. Have a greater variety of questions (11)
b. Took too much time between questions (10)
c. It was fun (2)
d. Made study easier (3)
e. Should be used in future (8)

A summary of the subject's affective responses to the use of CRAM may be achieved by examining the aggregate attitudes of each of the three achievement levels. A
higher percentage of the low achievement level enjoyed working with the computer and claimed to have learned more new material from CRAM than either the medium or high achievement levels. A smaller proportion of the low achievement level felt that CRAM helped them review for the unit exam, would use CRAM again, or would recommend its use to their friends than either the medium or high achievement levels.

The medium achievement level responded more positively than the low and high achievement level in the areas of enjoying a review using CRAM, claiming they would use it again, and recommending its use to their friends for future study. They were least enthusiastic of the three achievement levels in regarding the feedback as helpful, learning something new from CRAM, or enjoying the use of the computer.

A greater percentage of the high achievement level found CRAM's feedback helpful, and believed CRAM helped them review for the unit exam better than either of the other two achievement levels. A lower percentage of the high achievement level felt more encouraged to study for the unit exam after using CRAM than either of the other two achievement levels.
CHAPTER V
CONCLUSIONS

This chapter is composed of four sections. In the first part, the context, problem, research questions, and procedures of the study are summarized. The findings of the study are summarized in the second section. The instructional implications of the findings are suggested in the third. In the fourth section, issues and questions raised by the study are examined.

SUMMARY OF THE STUDY

Computer Review Assistance Modules (CRAM) are examples of adjunct computer-assisted instruction (CAI) material. The purpose of CRAM is to provide the student with an additional, supplemental means by which content mastery may be attained and successful completion of the unit exam may be achieved. CRAM provides the student with a non-traditional method of reviewing, immediate feedback, positive reinforcement, and a system to further enhance the cognitive encoding of information for later retrieval.

Research into the effectiveness of adjunct computer-assisted instruction material has concentrated in the fields of science, mathematics, and language arts; little has been done in the social studies. Furthermore, social
studies teachers are just beginning to make use of computers and computer-assisted instructional materials. CAI research has also concentrated on material which utilized large mainframe systems, sponsored by academic and commercial enterprises. CRAM, utilizing an easy to learn authoring language for microcomputers, is teacher written.

This research began as an attempt to determine the effectiveness of CRAM on unit test achievement. As the literature was reviewed and the study designed, it became apparent that the effectiveness of CRAM at varying student achievement levels was of interest. Student attitudes and reactions to CRAM were viewed as important, especially in the context of the social studies and the concerns expressed by professional social studies educators.

The Problem

This study was designed to determine the effectiveness, at varying levels of student achievement, of teacher written Computer Review Assistance Modules (CRAM) upon student achievement in United States history. Information was secured from those subjects who used CRAM regarding their attitudes toward the structure of this computer-assisted instruction material, the help provided by the reinforcers used, and their view of CRAM as a supplemental study method for unit test preparation.
Research Questions

There were three specific questions to be statistically analyzed in this study. They were:

1. Are there significant differences in achievement on the unit test between subjects who utilized teacher written Computer Review Assistance Modules (CRAM) in test preparation in United States history and those who did not?

2. Are there significant differences in achievement on the unit test, at varying student achievement levels, between students who utilized teacher written Computer Review Assistance Modules (CRAM) in test preparation in United States history and those who did not?

3. What are the subject's affective responses to the use of Computer Review Assistance Modules (CRAM) for unit test preparation?

Procedures

The study involved eleven United States history classes with approximately 250 secondary students. Five classes were randomly assigned to the control group and five to the treatment group.

Composite scores of the Science Research Associates (SRA) Achievement series were used to establish three
levels of achievement. These three groups—low, medium, and high—were used as blocking variables in determining CRAM effectiveness. Treatment consisted of the use of Computer Review Assistance Modules (CRAM) in preparation for the final unit exam. The final unit exam, or posttest, was used as the dependent variable to measure achievement of United States history content.

Simultaneously, the control group was given a study guide which paralleled the CRAM material. This procedure caused no disruption to normal classroom routine. All instructional methods and materials, with the exception of treatment, remained as prescribed by the school district's United States history curriculum and the United States history teaching team. After the posttest was given, the CRAM Evaluation survey was administered to the treatment group.

Analysis of variance was used to determine statistically significant differences between control and treatment groups. SPSS-X crosstabulation procedures were used on the survey material. The "N" of the study was 216.

SUMMARY OF FINDINGS

An analysis of the data resulted in the findings related to the research question posed in Chapter I.
1. The utilization of CRAM resulted in no statistically significant difference between the mean scores of those subjects who used CRAM and those that did not leading to the inference that no treatment effect occurred.

2. At the low, medium, and high achievement levels there was no statistically significant difference between the mean scores. The inference is that a treatment effect had not occurred at any of the three achievement levels.

3. According to the CRAM Evaluation survey of those subjects who utilized the program:
   a. 82.6% had no problem finding a computer on which to use CRAM.
   b. 65.0% felt that the immediate feedback was helpful in locating their weaknesses.
   c. 87.4% enjoyed working with the computer program.
   d. 79.6% did not find working with the computer cold and impersonal.
   e. 77.7% believed that the computer program helped them review for the final unit exam.
   f. 83.5% enjoyed reviewing for the exam in this manner.
   g. 86.4% would use the computer review if
given the chance in the future to 
prepare for a United States history unit 
exam.

h. 72.8% believed they learned something 
new by using the computer review.

i. 51.4% felt that using the computer 
review program encouraged them to study 
for the final exam.

j. 77.6% rated the overall experience with 
the computer review program a positive 
one.

k. 54.4% would recommend the use of this 
program to a friend reviewing for United 
States history exams in the future.

l. a large majority indicated, from free 
responses, that they wished to eliminate 
the waiting periods between questions 
which had been programmed into CRAM.

INSTRUCTIONAL IMPLICATIONS

Implications for instruction, which are suggested by 
this study, fall into two categories of importance—
statistical and practical. The statistical analysis 
suggests, in this instance, that no difference exists 
between the performance of those that use CRAM in final
unit test preparation and those who used a more traditional study guide. CRAM usage apparently did not result in any detectable effect upon posttest performance. Such was also the case when the subjects were divided into low, medium, and high achievement levels and CRAM usage was compared to the traditional review method.

Despite a lack of statistically detectable treatment effect by CRAM, certain practical implications for social studies education might be suggested. A close examination of mean score student performance on the posttest in combination with student survey responses suggests that CRAM material may have a place in the classroom. The mean score of all students who used CRAM was slightly higher than the mean score of all those students who did not use CRAM.

Of further practical interest is the student response to the Computer Review Assistance Modules. Students, generally, enjoyed working with the computer and reviewing for the exam in this manner. They also believed CRAM helped them in their review by posing simulated test questions which they themselves could not or would not have considered on their own. Interestingly, the low achievement group reported a 31.6% neutral position toward CRAM as a help in review.

Few students, only 4.9%, found the computer to be cold and impersonal, and many found the immediate feedback
beneficial. Although 65.0% found the immediate feedback to be helpful, 25.9% took a neutral position to it, and 9.7% disagreed/strongly disagreed. It would appear that a substantial number of students may not have used the cues, hints, and suggestions for study built into CRAM to the fullest possible degree.

Students found that CRAM was not only a review but also instructional. Although CRAM covered only the basic knowledge and concepts that had been covered in regular instruction, for any number of reasons a significant number of students regarded parts of CRAM as initial instruction. As such, CRAM provided some subjects with the advantage of repeated instruction.

From the viewpoint of social studies instruction CRAM might be used as a means to vary instructional techniques and increase student interest in the subject. The use of CRAM also provided additional motivation for students to study—providing them with direction or parameters while revealing to them their strengths and weaknesses. From an instructional perspective CRAM might be viewed as a tutor or guide when the teacher is not available to the student. Since CRAM was not viewed as impersonal the student may find CRAM less judgmental than their instructor, the display of weak content mastery less embarrassing, and the use of CRAM more conducive to their own learning style. Some students may in fact prefer to use CRAM rather than
work with the teacher.

CRAM is relatively inexpensive to produce with regard to both time and money expended. It is easily modifiable, and once the paradigm has been learned by the teacher, it may be applied to many curricular situations. The paradigm used by CRAM may, however, necessitate modification based upon student feedback. A specified amount of time was programmed to pass between presented questions. The purpose of this waiting period was to allow students time to take notes or consult class notes or the textbook. Based upon the survey, it would appear that the waiting period was either not necessary, not profitably used, or simply not desirable. Another implication may be that the students need more teacher direction on the reason the time is present within the program, and the ways CRAM might be effectively utilized by the student.

RECOMMENDATIONS, ISSUES, AND QUESTIONS

A number of possible recommendations, issues, and questions have arisen during the course of this study. Although, they are only indirectly related to this specific study and no definite answers may be provided, their examination at this time may lead to investigation in the future.
The first issue deals with the performance on the posttest by the subjects in the three ability groups who used CRAM. The results are contrary to the box-score and meta-analysis reviewers who found that the benefits of CAI were significant and applicable across aptitude levels. However, since little research has been done in the social studies regarding the effectiveness of CAI, the results of this study should be viewed as initial. The study should be replicated to ascertain whether the effects of CRAM are unique to this sample or are consistently of no statistical significance.

A second and more important issue centers upon the impact of CRAM as a motivational device for student study and improved performance. Collectively, 51.4% asserted that the use of CRAM encouraged them to study more. The question arises as to whether the encouragement the subjects assert was provided by the use of CRAM resulted in a quantitative improvement in performance or a qualitative improvement. As determined, the quantitative differences appear to be negligible. However, there is the possibility that CRAM provided its users with a feeling of self-confidence or self-assurance resulting from having experienced a simulated testing situation and perhaps spending more time in test preparation than normal. Did those who used CRAM spend more time or less than they normally would have in final unit test
preparation?

An issue that arises from a reading of the free responses to the open-ended questions on the CRAM Evaluation survey focuses upon the student's need for more compatible and even more enjoyable learning situations. The students regarded CRAM as enjoyable and many wrote that they would use it again in United States history. Several suggested that this method of review and study be applied to other curricular areas. Consequently, how does adjunct CAI, such as CRAM, fit into the different modes of learning that each student possesses? CAI requires a student to interact, through the keyboard, and to read from the monitor utilizing both visual and kinesthetic modes of learning. This may be of benefit in contrast to their being a passive and sometimes non-attentive learner as sometimes happens in the classroom. With this in mind, and since the microcomputer and authoring language upon which CRAM is based can utilize graphics, sound—including voice, and computer activated laser disc material, would these additions to the CRAM paradigm help or hinder student usage and performance?

The paradigm around which CRAM was programmed was a traditional multiple choice, response, second chance, corrective feedback model that began in programmed instruction and has been borrowed for use in computer-assisted instruction. Two questions arise based upon
student response and performance. What kind of reinforcer
should be used and to what degree should CRAM provide
remedial instruction? With only slight modification CRAM
could be adapted to provide remedial instruction rather
than only the correct answer and the location of the
information. If this were done, would performance levels
be enhanced? Both reinforcers and the possibility for
remedial instruction will improve when computer
technology, hardware and software, incorporates CAI which
utilizes artificial intelligence, thereby allowing for
greater student individualization by the the computer.

CRAM incorporated questions which would be
categorized in the first three levels of Bloom's Taxonomy—
knowledge, comprehension, and application. A number of
students in the free-response section of the survey called
for a greater diversity of questions and increasing the
degree of difficulty of the questions. It is not known if
what the students were calling for would be questions
which cover the three upper categories of Bloom's
Taxonomy. If the questions in CRAM were to be
diversified, would the effect upon student performance
improve or not? A further consideration would be, can the
existing limitations of computer software and hardware
accommodate such levels of questioning which might well
require the student to respond freely rather than choose
from listed choices?
Finally, one thing this study attempted to maintain was the reality of educational settings while recognizing practical limitations of time, logistics regarding available machinery, and personnel constraints. It was felt that this was necessary for the use of CRAM and other adjunct CAI material will not take place in the vacuum of a laboratory or in a special academic/learning environment. Therefore, one must wonder about the performance of CRAM users under a different set of circumstances and in a more controlled environment. Such a variable as the time lag between the initial teaching of a fact or concept, the use of CRAM, and the posttest, if narrowed, may posit different results. Nevertheless, CRAM, in this instance, was tested in a real-life educational setting, wherein it would be used.

Thus, the value of CRAM in the social studies becomes an issue. As described in Chapter II, social studies teachers have avoided using computers and, to date, little formal study of their use and effectiveness has been undertaken in social studies. This study is but a beginning.

Closely related to the issue of the question types contained in CRAM is the debate regarding the type of CAI to be used in social studies education. Drill and practice, tutorials, simulations, and CRAM might contribute to the knowledge approach in social studies
education. CAI which concentrates on skills development, such as problem-solving, is also necessary. Research into the effective use of computers within both approaches in social studies education must be pursued if optimum use of computers is to ever be achieved.

More importantly, however, social studies educators must recognize and understand the impact of computer technology on contemporary society. Such steps are being taken in futuristic studies, but social studies teachers must come to grips with the fact that computers are not only the object of instruction; but they can also be the means of, as well as an aid to, instruction. It is just that the question remains concerning what place and role that might be and whether social studies teachers will accept a leadership position in the use of computers.
REFERENCES


Appendix A
Print of lesson HELLO

Press Space Bar To Continue...

Print of lesson C1

*Intro

This review quiz is designed to help you study for the test on the Constitution Unit in U.S. History. Written by Mark W. Feldhausen Ralston High School, Ralston, NE July, 1983

Choose the best answer possible.

Type only the letter of your choice before you press "return". No other information is needed.

Good Luck!

Press Space Bar To Continue

This practice review contains a file
of 40 questions. You may do between
5 and 20 questions at a time. The
program selects questions randomly,
therefore, it is suggested that you go
through this review at least twice so
that you may experience the majority
t of the questions. Remember this pro-
gram keeps score for you and selects
questions so that no question is
repeated during any single run through
this review. Because of these condi-
tions you may have to be patient while
the computer finds a question you have
tot yet seen. Have fun!!!!!

How many questions do you wish to
try?
The number must be between
5 and 20. Try again, please!
Thank you!

How many questions do you wish to try?
The number must be between
5 and 20. Try again, please!
Thank you!
1. Question #1
   a: A. Oligarchy
   b: B. Tyranny
   c: C. Federalism
   d: D. Theocracy

   t: How is a(n) ?
   a: A.
   n: D
   t: ty: Well done!

   tnl: Let's try again! You know this one.
   tnl: Study those terms. The answer is D
   w: 5
   g1: score
   y1: score2
   sj: 1 q1
   jnl: questions
   g1: 2

   2. Question #2
   c: A. Rousseau
   b: B. Montesquieu
   c: C. Locke
   d: D. Jefferson

   t: The idea of three branches of
government each checking the others
t: power was the idea of ?
   a: A. Rousseau
   b: B. Montesquieu
   c: C. Locke
   d: D. Jefferson

   t: ty: Excellent!
   tnl: Think again!
   tnl: Sorry, the answer is B
   w: 3
   g1: score
   y1: score2
   sj: 1 q2
   jnl: questions

   n: ???
A loosely knit cooperative between the states in which the state viewed itself as superior to the cooperative body is an:

A. Federal System
B. Democracy
C. Republic
D. Confederation

Magnificent!

Better study those types of governments. Let’s try again.

Study!!! The answer is D

Which of the following concepts was not a part of the newly written and immediately after the Revolutionary War?

A. a written document
B. separation of powers
C. abolition of slavery
D. separation of church and state
E. None of the Above

Great job!

Think again, please.

Sorry! The answer is C
Question #5

A Republican form of government may be defined as one in which the citizens:

A. All have the right to vote and make laws
B. May elect representatives who vote and make laws for them
C. Select a small ruling body
D. Usually from the wealthy to rule
E. None of the Above

Your answer is B

You really need to study. The answer is B.

Now try again.

Question #6

If you believed in a strong central government you would have been known as an:

A. Sovereignist
B. Federalist
C. Anti-Federalist
D. Loyalist

Your answer is B

Good job! Please try again.

The answer is B.

Question #7

Your answer is B.
(n7>1):random
(n7=1):q7
=q7
?:
The decision by the states under the
Articles of Confederation that rivers
be recognized as boundaries occurred
at the ?

A. Mt. Vernon Conference
B. Annapolis Conference
C. Constitutional Convention
D. New York Conference

11:Super!
11:Think again. It’s important that
11:you know the differences between
11:these conferences!
12:Sorry! Study some more! The
12:answer is A

8:es
1:score
2:score2
3:7
4:questions
5:es

8:Question #8
8=8=8=1
(n=8>1):random
(n=8=1):q8

?8
?:
Which of the following was not a part
of the Land Ordinance of 1785?

A. land would be surveyed into
townships
B. land would be allocated for public
and government use
C. specific provisions for governing
the area was included
D. Section 16 was set aside for
public education

11:Plus
11:Correct

11:Nicely done!
11:Don’t confuse this with the
11:Northwest Ordinance. Try again.
12:Sorry. The answer is C

8:es
1:score
2:score2
3:8
4:questions
5:es

8
According to the Treaty of Paris (1783)

A. American territory stretched from the Atlantic to the Mississippi River and from the Great Lakes to Florida. The colonies became free and independent. All of the above.

Explain:

Excellent!

Sorry, try again.

Better study the Treaty. The answer is D.

r: Question #10
c:y0=yy+1
j(y0>l): random
j(y0=1): q10

According to the Land Ordinance of 1785, a section of land:

A. was 1 mile square
B. consisted of 640 acres
C. was called a township
D. All of the above

Explain:

Fantastic!

Reread the question carefully.

The answer is E.

r: Question #11
c:y0=yy+1
j(y0>l): random
j(y0=1): q11

According to the Land Ordinance of 1785, a section of land:

A. was 1 mile square
B. consisted of 640 acres
C. was called a township
D. All of the above

Explain:
r:Question #11
c:y1=1
j(y1):1:random
j(y1):1:q11
*q11
t:According to the Northwest Ordinance
t:of 1787 a constitution could be
w:written and congress petitioned for
t:statehood when the population of a
w:territory had reached how many free
w:nhabitants?

A. 5,000
B. 20,000
C. 50,000
D. 60,000
E. 100,000

p:Stupendous!
t:Think again!
t:Better study. The answer is D
w:3
g:es
j:y1:score
j:y2:score2
j:n1:q11
j:n2:questions
g:es
*12
r:Question # 12
c:y2=2+1
j(y2):1:random
j(y2):1:q12
*a12
t:Which of the following states was not
w:created out of the Old Northwest
w:Territory?

A. Wisconsin
B. Minnesota
C. Ohio
D. Indiana
E. Michigan
F. None of the Above

p:Awesome!
t:Better study the geography of the
w:time period. Try again.
t:You really need to study! The
w:answer is B
w:3
g:es
j:y1:score
j:y2:score2
j:n1:q12
j:n2:questions
In the Constitution, powers held only by the states are called?

A. Delegated Powers  
B. Reserved Powers  
C. Concurrent Powers  
D. Enumerated Powers

Good job!

Think again!

Sorry. The answer is B.

The right to coin money and declare war are examples of?

A. Delegated Powers  
B. Reserved Powers  
C. Concurrent Powers  
D. Shared Powers

Well thought out!

Think about it before you answer!

Think harder next time! The answer is A.

In the Constitution, powers held only by the states are called?

A. Delegated Powers  
B. Reserved Powers  
C. Concurrent Powers  
D. Enumerated Powers

Think again!

Sorry. The answer is A.

The right to coin money and declare war are examples of?

A. Delegated Powers  
B. Reserved Powers  
C. Concurrent Powers  
D. Shared Powers

Well thought out!

Think about it before you answer!

Think harder next time! The answer is A.
t: The Virginia Plan called for
  t: A. representation by population
  t: B. a strong President
  t: C. seven supreme court justices
  t: D. equal representation
  t:
  pv:us
  a:
  m:A
  t:
  ty: Excellent!
  tn1: Think large! Try again
  tn2: You didn't think large enough.
  tn3: The answer is A
  w:J
  q:es
  jy1: score
  jy2: score2
  jn1: qie
  jn2: questions
  q:es

Print of lesson C2

*16
r: Question #16
ct: yo=va=1
l1:vo=1; Cl.random
j1:vo=1; qie
*16
q:ie
t: The New Jersey Plan called for
  t: A. representation by population
  t: B. a weak President
  t: C. no judicial branch
  t: D. equal representation
  t:
  pv:us
  a:
  m:D
  t:
  ty: Magnificent!
  tn1: Think small. Try again.
  tn3: Sorry! The answer is D
  w:J
  q:es
  jy1: Cl.score
  jy2: Cl.score2
  jn1: qie
  jn2: Cl.questions
  q:es
r:Question #17
c:y7v7y7=-
l(y7l1):C1.random
r(y7l1):q17
#q17
t:The supreme court, as outlined in the
t:Constitution, has how many judges?
t:
t:A. 3

t:B. 5

t:C. 7

t:D. 9

t:E. 11

t:F. 13

t:
pr:us
a:
m:D

t:
v:Nicely done!

tn1:You can do better. Try again.

tn2:Sorry! The answer is D

w13
g:es
l[y1:C1.score
l[y2:C1.score2
j[n1:q17
in2:C1.questions

g:es
+18
r:Question #18
c:y8v8y8=-
l(y8l1):C1.random
r(y8l1):q18
#q18
t:To enforce the laws of the country is

t:the duty of which branch of

t:government?
t:
t:A. Legislative

t:B. Executive

t:C. Judicial

t:D. All of the Above

t:
pr:us
a:
m:8

t:
v:Super!

tn1:Think again.

tn2:Better study the function of each

tn2:branch of government. The answer

tn2:is B

w13
g:es
l[y1:C1.score
l[y2:C1.score2
j[n1:q18
in2:C1.questions

g:es
+19
r:Question #19
c:y9v9y9=-
l(y9l1):C1.random
q19
To be elected President of the U.S. one must have reached the age of ?
A. 25
B. 30
C. 35
D. 40
E. 45

pt: superb!
tn: Think President! Try again.
tn: Sorry! The answer is C
w: Q
pt: superb!
pt: C1:score  ,
pt: C1:score2 
pt: C1:questions
pt: superb!
pt: Question #20
c: (C1:0) = 20
l: (C1:1) = C1:random
j: (C1:2) = C20
pt: The length of a term of office for a senator is ?
A. 2 years
B. 4 years
C. 6 years
D. None of the Above
pt: pt: superb!
pt: C1:score  ,
pt: C1:score2 
pt: C1:questions
pt: superb!
pt: Question #21
c: (C1:1) = 21
l: (C1:1) = C1:random
j: (C1:1) = C21
pt: Which of the following is not a method of imposing the checks and balances on the President?
pt: -a. impeachment
t:B. the veto
a:

b:

a:

ty: Perfect!

a:

n1: Which is not used against the President? Try again!

n2: Better study! The answer is B

w3:

q:

v1: C1.score

v2: C1.score2

j

n2: C1.questions

q:

=3

r: Question #22

a:

c1: 2 = 2 + 1

l: (2 > 1): C1.random

j: (c1 = 1): q22

=23

a:

n1: Which of the following best describes the weaknesses of the Congress under the Articles of Confederation?

a:

A. no power to make laws

B. no power to enforce laws

C. no power to control interstate trade

D. All of the Above

E. B & C Above

a:

b:

n1: Well thought out!

n2: Let's try this one again!

n3: Better study the Articles a little more closely. The answer is E

w3:

q:

v1: C1.score

v2: C1.score2

j

n2: C1.questions

q:

=3

r: Question #23

a:

c1: 3 = 3 + 1

l: (3 > 1): C1.random

j: (c1 = 1): q23

=23

a:

n1: The counting of five slaves to be equal to three free whites was a compromise related to which of the following issues?

a:

A. trade and voting

B. trade and taxation
tx: C. taxes only
tx: D. taxation and voting
tx: E. voting only

pr: us
at
m: 0

ty: Superb! This one was tricky.
tn: Think again this one is tricky.
tn: Better look at the differences
tn: between the 3/5's compromise and
tn: the commerce compromise. The
tn: answer is D
w: 3
g: 0
ly: C1.score
ly: C1.score2
jn: q23
ln: C1.questions
g: 3
r: Question #24
c: c4:=c4+1
l((c4=1)::C1.random
j(c4=1)::q24
q: 24
t: The Constitutional Convention met in
philadelphia in what year?
t: A. 1781
B. 1790
C. 1787
D. 1799
E. 1791

pr: us
at
m: C

ty: Good job!
tn: Please try again.
tn: Sorry. The answer is C
w: 3
g: 0
ly: C1.score
ly: C1.score2
jn: q24
ln: C1.questions
g: 3
r: Question #25
c: c5:=c5+1
l((c5=1)::C1.random
j(c5=1)::q25
q: 25
t: Which of the following means to
accept or approve?
t: A. veto
B. ratify
C. override
D. judicial review
t:
pr:us
a:
mi8

n:

n:

n:

n:

n:

n:

n:

n:

n:

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tv: Fine job!
tn: Think again!
tn: Study those qualifications for elected officials. The answer is A.

q: es
ly: C1.score
ly: C1.score2
jn: q27
ln: C1.questions
g: es
r: Question #28
c: B
l: C1.random
j: q28
q: B

T: The Supreme Court’s right to examine a law and pass on its constitutionality is known as?

T: A. the Supreme Right of the Judicial Branch
T: B. Judicial Review
T: C. the question of constitutionality
T: D. the decision of the bench

T: prius
A: B
T: tv: Superb!
tn: C’mon, you know this! Try again.
tn: Study!!!!!!! The answer is B.

q: es
ly: C1.score
ly: C1.score2
jn: q28
ln: C1.questions
g: es
r: Question #29
c: D
l: C1.random
j: q29
q: D

T: The first ten amendments to the Constitution are known as the?

T: A. Civil Liberties
T: B. Bill of Rights
T: C. Rights and Responsibilities
T: D. the Protection of Fundamental Liberties

T: prius
A: B
T: tv: Magnificent!
tn: You know this one. Try again.
tn: Did you read the question?

r: n? The answer is B.
Which of the following provided assistance to the founding fathers in writing the Constitution?

A. The Magna Carta
B. The Right of Petition
C. The Mayflower Compact
D. The Declaration of Independence
E. All of the Above

Well thought out!
Let's try again.
Sorry. The answer is E.

Print or lesson C1

In Congress, under the Articles of Confederation, each state was entitled to how many votes?

A. it depended on their population
B. it depended on their geographic size
C. one vote each
D. between 2 & 5


m:C
t:
tv:Excellent
tn1:Remember the differences between
tn1:the A of C and the Constitution.
tn1:Try again.
tn2:Better Study! The answer is C
w:3
g:es
ly1:C1.score
ly2:C1.score2
jn1:q31
ln2:C1.questions
gles
*w:2
rq:Question #32
ci:w2=m2+1
l(w2):1:C1.random
j(w2)=1:q32
*q32
t:A: all 13 states, which was not a present at the Constitutional Convention?
t:
t:A. Rhode Island
t:B. Georgia
t:C. Maine
t:D. New Hampshire
t:
t):
pr:us
a:
m:A
t:
tv:Good job!
tn1:Try again.
tn2:Sorry! The answer is A
w:3
g:es
ly1:C1.score
ly2:C1.score2
jn1:q32
ln2:C1.questions
gles
*w:3
rq:Question #33
ci:w3=m3+1
l(w3):1:C1.random
j(w3)=1:q33
*q33
t:As a result of the commerce compromise:
t:
t:A. there would be tariffs on imports but not exports
t:B. Congress would regulate foreign trade
t:C. slave importation would continue until 1808
t:D. All of the Above
t:E. A & C Above
t:
t):
pr:us
a:
*:0
t: Marvelous!
tn1: Please try again!
tn2: Better study in more detail! The answer is D
w: J
q: es
ly1: C1.score
ly2: C1.score2
jn1: q:sc
ln2: C1.questions
q: es
+sc
r: Question #34
ci: w:4=m-1
li: w:4=m-1:C1.random
j(w:5=m-1):q:sc
+sC

According to the Constitution the system known as the electoral college:

t: A. the people vote directly for the President

B. the people vote for representatives who in turn vote for the President

t: C. only educated males could vote for the President

t: D. None of the Above

pr: us
at
ai:B
t: Perfect!
tn1: Let’s try again.
tn2: Not quite! The answer is B
w: J
q: es
ly1: C1.score
ly2: C1.score2
jn1: q:sc
ln2: C1.questions
q: es
+sC
r: Question #35
ci: w:5=m-1
li: w:5=m-1:C1.random
j(w:5=m-1):q:sc
+sC

Although held in secret, our knowledge of what happened at the Constitutional Convention was a result of the writings/notes kept by?

t: A. James Madison

B. George Washington

t: C. Benjamin Franklin

t: D. Alexander Hamilton

t: pr: us
at
ai:
The right to raise money, tax and borrow are examples of?
A. Delegated Powers
B. Reserved Powers
C. Concurrent Powers
D. None of the Above

The right to make "necessary and proper" laws to allow the constitution to grow and be flexible is known as the?
A. Amendment Process
B. Elastic Clause
C. Adaptability Clause
D. Growth Law

Super!
ty: A tell of law which calls for the appropriation of money must originate where? (begin) in the?
t: A. House of Representatives
t: B. Senate
t: C. Executive Branch
t: D. there are no specific requirements
t:
t: prius
a:
mi:B
 ty: Superb!
 tn1: Not quite. Try again.
 tn2: Sorry. The answer is A
 w:3
g:es
 ty: Correct!
 tn1: You really know your dates!
 tn1: Let's try again.
 tn2: Better study those dates. The answer is B
 w:3
g:es
 ty: Correct!
 tn1: Happy to help.
 tn1: What more can I ask?
 tn1: Congratulations!
t:To amend the constitution of the U.S.
t:shall propose amendments or
-t:2/3's of the state legislatures
-t:shall call for a constitutional
-t:convention for proposing amendments.
t:The proposed amendment is ratified
-t:only if?
-t:A. the amendment waits 7 years
-t:B. 3/4's of the state legislatures
-t:approve it
-t:C. 3/4's of the state conventions
-t:approve it
-t:D. All of the Above
-t:E. B & C Above

pr:us
at
me

ty:Absolutely correct!
tn1:Think a little harder!
tn2:Better study the amendment process.
tn2:The answer is E
w:13
g:es
ly1:C1.score
lv2:C1.score2
jn1:q40
ln2:C1.questions
g:es
*end
t: The results of your practice review
-t:quiz are as follows:
t:   #s  CORRECT FIRST TRY
-t:   #s2  CORRECT SECOND TRY
-t:   #t  QUESTIONS ATTEMPTED
-w:10
g:es
;j:final
++final
t:
t:
t:
t:
t:
t:
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t:
t:

HOPE YOU ENJOYED THIS
PRACTICE REVIEW

-t:
t:
t:

REMEMBER TO STUDY FOR
-t: THE UPCOMING UNIT EXAM

-t:
Press Space Bar To End.....
Appendix B
STUDY GUIDE FOR THE CONSTITUTION UNIT
U.S. HISTORY

1. Forms of Government
2. Philosophers and Government
3. Impact of State Constitutions and Past Documents
4. Treaty of Paris, 1783
5. Land Ordinance of 1785 and Land Survey
6. Northwest Ordinance of 1787 and Territorial Government
7. Reserved, Delegated, and Concurrent Powers (Definition and Examples)
8. Virginia Plan
9. New Jersey Plan
10. Convention Compromises (Great, Commerce, 3/5's, Electoral)
11. Duties of Executive, Legislative, & Judicial Branches
12. Elastic Clause
13. Amendment Process
14. Supreme Court
15. Qualifications and Terms of Office for Pres., Rep., Senator
16. Checks & Balances (Definition and Examples)
17. Articles of Confederation—Strengths and Weaknesses
18. Bill of Rights
19. Dates: 1787, 1789
20. Prohibitions: Ex Post Facto, Bills of Attainder
21. Constitutional Convention (People & Conditions)
Appendix C
MULTIPLE CHOICE

1. The compromise that provided the entire population of slaves not be counted for representation and for taxation purposes.
   A. Three-Fifths Compromise
   B. Commerce Compromise
   C. Great Compromise
   D. None of the above

2. The provision in the Constitution that provides that the state governments keep certain powers that the federal government has no control over.
   A. Northwest Ordinance
   B. Concurrent Powers
   C. Reserved Powers
   D. Delegated Powers
   E. Separation of Power

3. The document that contains the beliefs that all men have freedom of speech and religion.
   A. Articles of Confederation
   B. Tolerance Act of 1703
   C. Declaration of Independence
   D. Bill of Rights

4. The document which provided for the governing of our western lands.
   A. Northwest Ordinance
   B. Land Ordinance of 1785
   C. Great Compromise
   D. Articles of Confederation

5. The compromise that provided for a bicameral government, with equal votes in the Senate and votes in the House of Representatives based on population.
   A. Three-Fifths Compromise
   B. Petition of Rights
   C. Virginia Compromise
   D. Great Compromise

6. The federal government should be divided into three branches so that all the power of government is not concentrated in one branch giving rise to tyranny.
   A. Separation of Powers
   B. Checks and Balances
   C. Elastic Clause
   D. Ex Post Facto
7. The process provided for in the Constitution which enables each branch of government to control the other two branches, in the event the other branch is doing something wrong.
   A. Checks and Balances
   B. Separation of Power
   C. Delegated Powers
   D. Judicial Review

8. Under the Constitution, both the federal and state governments share certain powers such as taxation.
   A. Delegated Powers
   B. Concurrent Powers
   C. Reserved Powers
   D. Separation of Power

9. A loosely organized group of states working independently of each other with the individual states having more power than the national government.
   A. Sovereignty
   B. Oligarchy
   C. Confederation
   D. Republic

10. The English philosopher who wrote about the natural rights of man (life, liberty, and property).
    A. Rousseau
    B. Locke
    C. Montesquieu
    D. Hobbs

11. Under the Constitution, powers that only the federal government can exercise.
    A. Delegated
    B. Limited
    C. Reserved
    D. Separation of Powers
    E. Concurrent

12. The French philosopher who stated that there should be a definite distinction or separation between the branches of government.
    A. Locke
    B. Montesquieu
    C. Rousseau
    D. Lafayette
13. The French philosopher who stated that the purpose of government is to serve the people rather than the people serving the government.
   A. Locke
   B. Rousseau
   C. Montesquieu
   D. Voltaire
   E. D'Albert

14. Under the Constitution Congress was given the power to make all laws necessary for carrying out the specific powers given to them.
   A. Ex Post Facto
   B. Writ of Habeas Corpus
   C. Elastic Clause
   D. Bill of Attainder

15. The compromise in the Constitution which provided for tariffs on imported goods and one on exported goods.
   A. Commerce
   B. Interstate Trade of 1780
   C. Three-Fifths
   D. Great
   E. Products

16. Conflicts of economic interests between northerners and southerners were resolved by
   A. the commerce compromises
   B. the three-fifths compromise
   C. the great compromise
   D. both A and B
   E. all of the above

17. Weaknesses of the government under the Articles of Confederation included
   A. lack of executive
   B. limit of one vote to each state delegation
   C. lack of central national court
   D. all of these

18. Appointment to the United States Supreme Court is made by the President, and must be approved by
   A. House of Representatives
   B. U.S. Senate
   C. United States Supreme Court
   D. state legislatures

19. The Supreme Court is made up of
   A. 10 justices and 2 chief justices
   B. 6 justices and 3 chief justices
   C. 8 justices and 1 chief justice
   D. none of these
20. A senator in congress serves
A. 2 year term
B. 4 year term
C. 6 year term
D. for life

21. Which one of these is incorrectly paired?
A. Senate: power to ratify treaties
B. President: power over military
C. Congress: power to declare war
D. Supreme Court: power to control trade between countries

22. Which of these was not one of the original southern states?
A. Georgia
B. Maryland
C. Mississippi
D. South Carolina

23. The House of Representatives has the power to
A. pass bills after the Senate approves them
B. pass bills that require money (taxes) to fund them before the Senate
C. run for the office every 2 years if they want to be reelected
D. all of these are correct
E. none of these are correct

24. Which came last in time?
A. Convention in Annapolis
B. Second Continental Congress
C. Convention in Philadelphia
D. Delaware ratifying constitution

25. All of these were a part of the Land Ordinance Act except
A. Quebec Act
B. section for schools
C. townships for organization
D. selling of land by government

26. Problems on the early frontier included all of these except which one?
A. expensive land
B. Indian attacks
C. British forts
D. equal political power
27. The Articles of Confederation could not enforce treaties because
A. taxes were different in the states
B. British forts were still in control of the west
C. any one of the 13 states could ignore the treaty
D. there was no control of the seas

28. Which of these men was at the Constitutional Convention?
A. Alexander Hamilton
B. John Adams
C. Patrick Henry
D. Thomas Jefferson
E. Gerald Ford

29. The Convention in Philadelphia was held in secret because
A. the British had spys in Philadelphia
B. Daniel Shays would rebel with the farmers
C. George Washington wanted to be President by unanimous consent
D. the common people might argue and revolt

30. Which of these does not concern the beginning of the legislative branch of government?
A. Great Compromise
B. Commerce Compromise
C. Virginia Plan
D. Connecticut Compromise

31. Which of these dealt with the issue of slavery?
A. 3/5 Compromise
B. Great Compromise
C. Commerce Compromise
D. answer A and B
E. answer A and C
F. all are correct

32. Under the Articles of Confederation, the central government consisted of a congress in which each state had
A. votes proportionate to its size
B. votes proportionate to its population
C. one vote
D. seven votes
33. The government under the Articles accomplished all of the following except:
   A. successful conclusion of the Revolutionary War
   B. provision for an orderly system of government for the territories
   C. conclusion of a commercial (trading) treaty with Great Britain
   D. cession (surrender to the central government of claims made by several states to western lands)

34. Although the Confederation could coin its own money, it
   A. could not obtain the gold and silver
   B. refused to do so
   C. circulated money from other nations
   D. forced that states to coin money

35. During the Constitutional Convention this man kept unofficial records which today give us a good complete picture of what took place during the writing of the Constitution.
   A. Alexander Hamilton
   B. George Washington
   C. George Mason
   D. James Madison

36. The constitutional Convention met in Philadelphia in the year
   A. 1781
   B. 1783
   C. 1787
   D. 1789

37. What is the smallest number of members of Congress that a state regardless of population may have?
   A. five
   B. three
   C. two
   D. four

38. The power of the Supreme Court to decide the constitutionality of a law or treaty is known as the power of
   A. equity
   B. judicial review
   C. appellate jurisdiction
   D. impeachment

39. The President is elected by
   A. direct vote of the people
   B. a majority of the Electoral College
   C. a majority of both houses of Congress
   D. majorities in the state legislatures
40. An amendment to the Constitution needs to be ratified by
A. the President and Congress
B. a majority of the Supreme Court justices
C. a majority of voters
D. legislatures or conventions in three-fourths of the states

41. Which illustrates the fact that the United States has a federal system of government
A. Congress passes laws, but the President enforces them
B. the President appoints cabinet members, but the Senate must approve them
C. the Supreme Court has the power to declare laws of Congress unconstitutional
D. the national government regulates interstate commerce, but the state governments regulate commerce within the states

42. At the Philadelphia Convention, on which issue was there the most agreement?
A. method of electing the President
B. increased power for the central government
C. importation of slaves
D. representation in a new Congress

43. The Articles of Confederation provided for all of these except
A. name of the country
B. formation of a league of states
C. voting power according to population
D. common defense against attacks

44. Which of the following was not created out of the Northwest Territory?
A. Indiana
B. Michigan
C. Ohio
D. Minnesota

45. A law which is passed after the "action" is committed can only be enforced in the future not the past. This refers to
A. Habeas Corpus
B. Ex Post Facto
C. Bill of Attainder
D. Judicial Review
E. all of these
46. Control of education, transportation, marriage and divorce laws comes under the Constitution and are examples of
A. Concurrent Powers
B. Reserved Powers
C. Delegated Powers
D. None of the above

47. The process by which the House of Representatives files charges and the Senate acts as trial jury is called
A. veto
B. over-ride
C. impeachment
D. treason

48. Which of the following was not a power granted to the central government by the Constitution?
A. to regulate interstate commerce
B. to levy a tariff on imports
C. to regulate the slave trade after 1808
D. to levy a tax on exports

49. This provision in the Constitution requires a person to be charged with a crime within a reasonable amount of time
A. trial by jury
B. Writ of Habeas Corpus
C. Bill of Attainder
D. Ex Post Facto

50. Having reached the age of 35 years and fourteen years a citizen of the United States are the qualifications for
A. Senators
B. President
C. Supreme Court
D. Representatives
Appendix D
COMPUTER REVIEW ASSISTANCE MODULES (CRAM) EVALUATION
U.S. History

Unit Name ___________________________ Period ______
Teacher _____________________________ Period ______
Student Name _________________________

Please answer all of the questions below in terms of your experience with the computer program.

1. How many times did you use the computer review? ______
   (This includes class and the one required time.)
2. How many total questions did you go through each time you used the review? 1st _____ 2nd _____ 3rd _____ 4th _____ Other ______
3. Approximately how many answers did you get correct on each run through the review? 1st _____ 2nd _____ 3rd _____ 4th _____ Other ______

Mark the different aspects of your experience with the computer program by circling one of the areas on each scale that most nearly describes your reaction to the question.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. I had trouble finding a free computer.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>5. The immediate feedback was helpful in locating my weaknesses.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>6. I enjoyed working with the computer program.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>7. Working with the computer seemed cold and impersonal.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>8. I feel the computer program helped me review for the final unit exam.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>9. I enjoyed reviewing for the exam in this manner.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>10. I would use the computer review if given the chance in the future to prepare for a U.S. History unit exam.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>11. I learned something new by using the computer review.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>12. Using the computer review program encouraged me to study for the final unit exam.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>13. How would you rate your overall experience with the computer review program.</td>
<td>Very Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>14. Would you recommend this program to a friend reviewing for U.S. History exams in the future?</td>
<td>Definitely Yes</td>
<td>Probably Yes</td>
</tr>
</tbody>
</table>
15. What did you like best about the computer program?

16. What did you like least about the computer program?

17. What other suggestions, comments, questions or information could you, would you make about the computer program? (These can be positive or Negative!!)

Thank you!