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This report covers the PLATO IV activities during calendar year 1973 at the Computerized Training System. The work reported herein is supported by a program sponsored by the Advanced Research Projects Agency (ARPA) to evaluate the PLATO IV system for use in training, oriented to the needs of the Armed Services. The report presents a synopsis of each lesson written, a discussion of support routines for these lessons, a summary of demonstrations of PLATO IV given by the Computerized Training System (CTS), and the future PLATO IV plans of CTS. (Author)

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Report CTS - TR74-2

PLATO IV
First Year Report
Computerized Training System
Project ABACUS

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Computerized Training System
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1 April 1974

Approved for public release
Distribution unlimited

Prepared for
US ARMY TRAINING AND DOCTRINE COMMAND
Fort Monroe, Virginia 23651

NOTICES

This report has been reviewed and is approved.

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FOREWORD

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G. B. HOWARD
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Purpose

This report documents the Computerized Training System's accomplishments, findings and progress in the Joint Service/Advanced Research Projects Agency (ARPA) PLATO IV evaluation program. Site activities up to 31 December 1973 will be covered.

Introduction

The Computerized Training System's (CTS) involvement with the PLATO IV project began in early January 1973 with the delivery and installation of two PLATO IV student consoles. Two additional consoles were received in March giving the CTS project a total of four. These four student consoles operate over one voice grade commercial telephone leased line using an experimental multiplexer developed by the Computer-based Education Research Laboratory (CERL) at the University of Illinois, Urbana, Illinois. The four terminals were purchased by the Advanced Research Project Agency for use by CTS at the US Army Signal Center and School (USASCS), the leased line and maintenance cost are paid by ARPA.

The objectives of CTS in participating in this program are given below. Each of these objectives will be addressed in this report, as will the future PLATO IV plans of the CTS project. Also covered will be the PLATO IV demonstrations conducted by CTS.

a. Prepare course materials aimed at the development of technical and occupational skills.

b. Train instructional programmers in the development of computer-based instructional materials.

c. Develop techniques and procedures for developing and presenting computer-based course materials.

d. Evaluate the effectiveness and efficiency of the PLATO IV Plasma Terminals from the instructional and human factors points of view.

e. Evaluate system and terminal reliability.

Course Material Prepared

To date a total of 11 lessons have been developed by CTS. They each will be discussed in this section along with the lesson support routines that have been developed. Five lessons have been written in the electronic fundamentals area. They are as follows:

a. Ohm's Law

(1) This lesson was the initial CTS lesson and precipitated the development of a multiple choice test scoring driver for use in later lessons.

(2) The objective is to teach the relationship of current, voltage, and resistance as stated by Ohm's Law.

(3) Lesson was completed in April 1973.

(4) The author is Mr. Joseph Rich.

(5) One part lesson utilizing approximately 4,000 words External Core Storage (ECS).

(6) Material presented by tutorial mode.

(7) Average completion time is 30 minutes.

b. Series Circuits

(1) The objective is to teach the student to recognize schematic representation of short, simple and series circuits and to determine the polarity of a voltage source.

(2) The author is Mr. Tom Button.

(3) Lesson completed in July 1973.

(4) One part lesson using approximately 3,400 words ECS.

(5) Material presented by tutorial mode.

(6) Average completion time is 25 minutes.

c. Parallel Circuits

(1) The objective is to teach the student to identify parallel circuits and compute values of voltage, current, and resistance.

(2) The author is Mr. Joseph Rich.

(3) Lesson completed in June 1973.

(4) Three part lesson using approximately 10, 600 words ECS.

(5) Material presented by tutorial mode.

(6) Average completion time is 80 minutes.

d. Series-Parallel Circuits

(1) The objective is to teach the student to identify a series-parallel circuit and compute values of voltage, current and resistance.

(2) The authors are CPT John Lohr and Mr. Joseph Rich.

(3) Lesson completed in December 1973.

(4) Two part lesson approximately 6,500 words ECS.

(5) Material presented in tutorial mode.

(6) Average completion time 50 minutes.

e. DC Power

(1) The objective is to teach the definition of DC power to compute values using Ohm's Law.

(2) The authors are Mr. Ed Colliton and Mrs. Janet Lamb.

(3) Lesson completed in June 1973.

(4) Two part lesson approximately 5,500 words ECS.

(5) Average completion time 35 minutes.

f. Troubleshooting Procedures

One lesson has been developed to introduce the student to a systematic approach for troubleshooting electronic equipment. This lesson was to test the feasibility of using multimedia with PLATO IV.

(1) The objective is to teach the student a set pattern for locating problems in electronic equipment.

(2) The authors are Mr. Tom Button, Mr. Ed Colliton, Mrs. Janet Lamb, SP5 Joseph Martinez, Mr. Joseph Rich and Mr. Kermit Van Pelt.

(3) Lesson completed in August 1973

(4) One part lesson approximately 2,100 words ECS.

(5) Material presented in syncronized tutorial and sound on slide mode.

(6) Average completion time 45 minutes.

g. Two lessons were written to present Army common subjects.

(1) First Aid and Safety

(a) The objective is to determine the student's level of first aid knowledge and to provide instruction if needed.

(b) The author is SP4 Tom Plunk.

(c) Lesson completed in August 1973.

(d) One part lesson approximately 3,000 words ECS.

(e) Material presented in on-line test and instruction in closed circuit television cassette.

(f) Average completion time 40 minutes.

(2) Subversion and Espionage Directed Against the Army

(a) The objective is to create awareness of SAEDA in student.

(b) The author is SP4 James Samuelson.

(c) Lesson completed in August 1973.

(d) One part lesson approximately 2,000 words ECS.

(e) Material presented in a test and instruction in closed circuit television cassette.

(f) Average completion time 65 minutes.

a. Recruiting

A career guidance lesson was written for use by recruiters.

(1) The objective is to inform prospective enlistees of the career opportunities existing in the Army.

(2) The author is CPT Larry Hinkle.

(3) Lesson completed in November 1973.

(4) Two part lesson approximately 4,000 words ECS.

(5) Material presented in an informative reference mode.

(6) Average completion time 50 minutes.

b. Drivers

A lesson was written to explain operation of the multiple choice and numeric drivers.

(1) The objective was to teach instructional programmers how to use CTS drivers.

(2) The authors are SP4 Peggy McClintock and CPT Larry Hinkle.

(3) Lesson completed in June 1973.

(4) One part lesson approximately 4,000 words ECS.

(5) Material presented in a tutorial and drill mode.

(6) Average completion time 30 minutes.

c. Index

An index lesson was written to provide a list of all available CTS lessons. The index includes the electronic symbol set, schematics, the ABACUS symbol, and a slide program.

(1) The objective is to provide easy reference to CTS lessons.

(2) The author is SP4 Peggy McClintock.

(3) Lesson completed October 1973.

(4) One part lesson approximately 2,500 words ECS.

(5) Material presented in demonstrative mode.

d. Short Demonstrations and Administrative Routines

Several short demonstrations and administrative routines have been written. Details on these routines are available upon request from CTS. The demos and routines are listed below:

(1) Multiple choice drivers

(2) Numeric judging drivers

(3) Student comment collection routine

(4) Electronic symbol character set

(5) Student date file manipulator

(6) Career guidance charset

(7) Move the tile game

(8) Electron flow demonstration

Instructional Programmer Training

Eight instructional programmers received their initial training in PLATO IV authoring at the University of Illinois. Six received one week of training while two received an additional week of instruction. After this initial period, further training was conducted at Fort Monmouth using material provided by CERL.

A total of 15 individuals became proficient enough in authoring to develop material suitable for student use. Six of the instructional programmers are no longer involved with CTS. Currently three instructional programmers are undergoing instruction at CTS in authoring techniques.

The self-paced material provided by the CERL was found to be a very good workbook for new instructional programmers. After the new author had completed most of the CERL material he was given an assignment and then as he developed the material he could use the more experienced instructional programmers to assist him through difficulties. We have found the best results in training new authors are obtained when they are working on a terminal. Developing material on-line will rapidly train an author.

Technique Development

In developing lesson material for PLATO IV, experience has shown that a minimal team concept will produce the fastest results and therefore, CTS uses basically a three man lesson development team. The instructional programmer is responsible for the total lesson and as such writes and codes his lesson off-line, on coding sheets. He can be assisted in special coding problems by a system programmer from the Systems Operations and Programming Division when required. Prior to on-line entry the lesson is reviewed by the Course Development Chief. The third person in the team is the entry specialist. The coding sheets of a completed lesson are turned over to the entry specialist, this individual enters the lesson into the computer making minor editing changes as needed. The instructional programmer with the assistance of the entry specialist and a systems programmer then debugs the lesson. Finally, the completed lesson is subjected to peer review.

Under this concept the Systems Operations and Programming Division developed several routines and drivers to assist the instructional programmer. They are:

a. On-line electronic graphics symbol set. This is described in more detail in CTS Technical Report 73-3.

b. Multiple choice answer judging driver. This driver judges multiple choice answers with 3, 4, or 5 distractors, prohibits use of the same wrong answer twice, provides and unrecognized answer message, and after n wrong attempts (n specified by author) locks the keyboard thus forcing the student to seek help from the classroom proctor or instructor.

c. Numeric answer judging driver. This driver allow the instructional programmer to specify tolerance, high remediation, low remediation, provides an unrecognized answer message, and after n wrong attempts the keyboard will lock.

d. Student comment collection routine. This routine was copied from an existing routine created by an author at CERL. It was modifed to suit CTS requirements and allows the instructional programmer to collect student comments on his lesson, to aid in improving instruction.

e. Data manipulation. This routine was written to facilitate collection of student data and to allow the semi-permanent saving of desired information.

Terminal Operations

To evaluate the effectiveness and efficiency of the PLATO IV Plasma Terminals from the instructional and human factors points of views, CTS surveyed each CTS instructional programmer and system programmer for their comments about the terminals. The major responses are listed below:

a. Insufficient lesson and core space

b. Inadequate microfiche production techniques

c. Projector bulb short lifetime

d. Premature requirement for slide projector

e. Spacers in screen not lighting

f. Glare from panel

g. System crashes

h. Terminal malfunction

i. Documentation off-line non-existent

j. Excessive parity

k. Key arrangement on keyboard

Many of these complaints are in the process of being satisfied and all others have been at least discussed with CERL during the PLATO User Group meetings.

System and Terminal Reliability

To evaluate system and terminal reliability, CTS initiated a log book policy. Each terminal was given a log book and terminal users were required to log into the book when they used the terminal. The logs were then used to report both system and terminal problems encountered by the terminal user. The following data are summarized from the logs up to 31 December 1973.

During this reporting period terminal usage averaged 6 hrs a day of the available time. Data shown in Table 1 below are the average time for the four terminals in each category and are reported in hours.

Table 1. Average PLATO IV Terminal Usage

Month	Authoring Time	Downtime	Available Time
March	16.50	2.75	30
April	53.25	10.25	126
May	51.00	8.75	132
June	32.25	2.75	126
July	31.00	1.5	126
August*	—	—	—
September *	—	—	—
October	79.25	6.50	126
November	63.75	.50	114
December**	53.00	1.50	96

*In August and September CTS was relocating and logging procedures were suspended.

**In December three terminals were inoperative due to the failure of the A9 modem in each.

Two problems arose with the log on policy. First there was no way to insure the logs were filled in so the actual times recorded are less for both authoring and downtime, and the second was that during the actual authoring process, system crasher, ECS shortages and parity errors were often not recorded when they occurred.

A conclusion drawn from the data collected is that the system reliability improved over the reporting period as shown below in Table 2. Percentages shown in the first column are the ratios of authoring time to available time and the percentages shown in the second column are the ratio of downtime to available time.

Table 2. Percentage of Authoring and Downtime

Month	Authoring Time	Downtime
March	55%	9.17%
April	42%	8.53%
May	39%	6.63%
June	26%	2.18%
July	25%	1.19%
August*	—	—
September*	—	—
October	63%	5.16%
November	56%	0.44%
December	55%	1.56%

*In August and September CTS was relocating and logging procedures were suspended.

Demonstrations

Table 3 lists the PLATO IV demonstrations given by the Product Manager's Office, CTS, during the reporting period. For each of these demonstrations it was necessary to request a dial up telephone and modem from CERL. The Product Manager, CTS, recommends that a dial up telephone and modem be given to CTS to facilitate future demonstrations.

Table 3. Demonstrations 1973

Date	Location	Recipient
26 April	Fort Monmouth, N. J.	Association of US Army Armed Forces Communication Electronics Associates
7-8 May	Pentagon, Wash, D.C.	MG Fair
17-20 Sep	Fort Gordon, GA	Fourth Communications System Program Review

Table 4 reflects the number of individual requesters, and gives on-site demonstrations of PLATO IV during the reporting period.

Table 4. On-Site Demonstrations 1973

Category	Number
General Officers	8
Other U. S. Military	36
Foreign Military	12
ROTC	185
Civilian Educators/Students	293
Industry	12
Total	546

Future Plans

In order to refine existing lessons and to provide input for satisfying the objectives of CTS in participation in the PLATO IV program, plans are being made to run student trials of the CTS PLATO IV lessons at Fort Monmouth.

The CTS Project has recommended to ARPA that consideration be given to reassigning two of CTS's terminals as follows: One terminal to Army Research Institute (ARI) and one to Brook Army Hospital. The remaining two terminals to remain with the PMO, CTS for continued participation in the Joint Service ARPA PLATO IV evaluation program. Consistent with this recommendation CTS is revising its "Plan for Use and Evaluation of PLATO IV Plasma Terminals at the US Army Signal Center and School."

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