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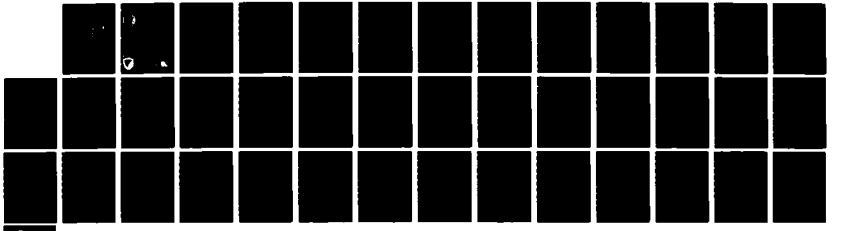

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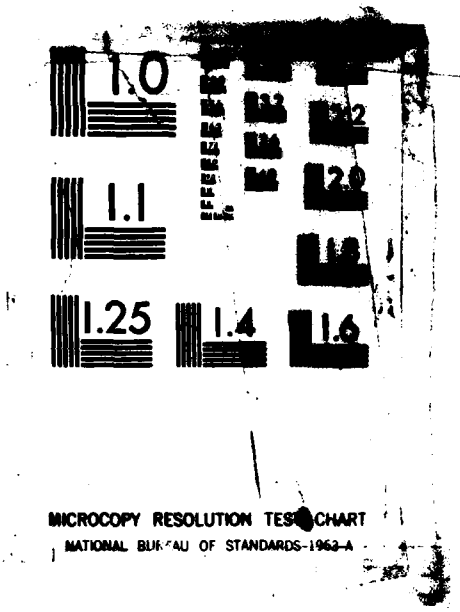

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CAI EVALUATION FOR BASIC TYPING IN MOS 72G10 COMMUNICATIONS SPECIALIST COURSE

DEVELOPED BY:

WALTER WAGER, Ed.D.

10 MAY 1984

APPROVED FOR PUBLIC RELEASE

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PREPARED FOR:

US ARMY COMMUNICATIVE TECHNOLOGY OFFICE
FORT EUSTIS, VIRGINIA

US ARMY SIGNAL CENTER & FORT GORDON
FORT GORDON, GEORGIA

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NOTICES

This report has been reviewed and is approved.

Frank E. Giunti

FRANK E. GIUNTI
Chief, TRADOC Instructional
Systems Division

Elmer E. Custer for

ROY B. BERND
Colonel, Signal
Chief, Army Communicative
Technology Office

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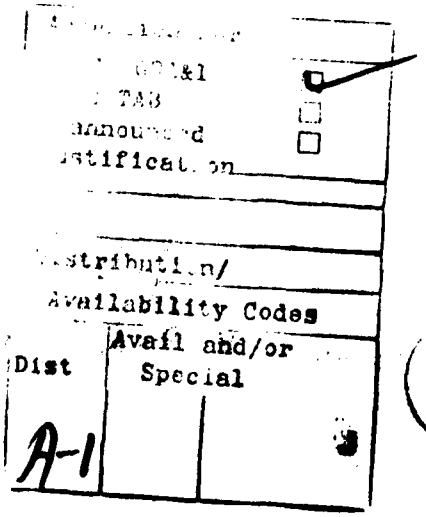

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER TR-84-4	2. GOVT ACCESSION NO. AD-A157893	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) CAI EVALUATION FOR BASIC TYPING IN MOS 72G10 COMMUNICATIONS SPECIALIST COURSE		5. TYPE OF REPORT & PERIOD COVERED FINAL REPORT JAN 84-MAR 84
		6. PERFORMING ORG. REPORT NUMBER TR-84-4
7. AUTHOR(s) WALTER WAGER, ED.D.		8. CONTRACT OR GRANT NUMBER(s) BATTELLE LABORATORIES DELIVERY ORDER NO. 0671
9. PERFORMING ORGANIZATION NAME AND ADDRESS BATTELLE MEMORIAL INSTITUTE, COLUMBUS LABS 505 KING AVENUE COLUMBUS, OHIO 43201		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS SCIENTIFIC SERVICES PROGRAM
11. CONTROLLING OFFICE NAME AND ADDRESS CHIEF, ARMY COMMUNICATIVE TECHNOLOGY OFFICE ATTN: AMSEL-FED FORT EUSTIS, VA 23604-0337		12. REPORT DATE MAY 1984 13. NUMBER OF PAGES 41
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) COMMANDER US ARMY SIGNAL CENTER AND FORT GORDON FORT GORDON, GA 30905		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVED FOR PUBLIC RELEASE. DISTRIBUTION UNLIMITED.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

CAI, TYPING, MOS 72G, TELETYPEWRITER TYPING, COMPUTER ASSISTED INSTRUCTION, COMPUTER BASED INSTRUCTION, CBI, MOS 72E, TELETYPEWRITER

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

THIS STUDY EVALUATES THE EFFECTIVENESS OF CAI TO TEACH TYPING AND COMPARES THIS METHOD WITH CONVENTIONAL METHODS OF TEACHING TYPING SKILLS REQUIRED OF TELETYPEWRITER OPERATORS AT FORT GORDON, GA. CONCLUSIONS INDICATE THE CAI SYSTEM TO BE EQUALLY EFFECTIVE IN TRAINING, MORE COST EFFECTIVE IN THE LONG TERM, AND READILY ACCEPTED BY STUDENTS AND FACULTY.

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CAI EVALUATION FOR BASIC TYPING IN MOS 72G10 COMMUNICATIONS SPECIALIST COURSE

Prepared for: U.S. Army, Army Communicative Technology Office
Fort Eustis, VA

May 10, 1984

by

Walter Wager, Ed.D.

under contract no. 0671
through Battelle Laboratories SSP Program

The views, opinions and/or findings contained in this report are those of the author and should not be construed as an official Department of Army position, policy, or decision unless so designated by other documentation.

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EXECUTIVE SUMMARY

Part 1. Implementation of training effectiveness analysis at the Signal School, Fort Gordon.

Requirement — The purpose of this study was to evaluate the effectiveness of a computer assisted instruction (CAI) system of instruction in comparison to conventional methods of teaching the typing skills required of teletypewriter operators at Fort Gordon, Georgia.

The study also focused on an investigation of the relative costs of each training system, and the attitudes of the students and instructors towards the systems.

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Procedure— A new class of 20 MOS-72G10 students was given an orientation to the course, and an entry typing skills test on the AN/FGC-20 teletypewriter. Eight students were then randomly selected from the group and assigned to the experimental (CAI) classroom. The remainder were taught by existing television tutorial methods presently in use at Fort Gordon. The CAI group learned and practiced their skills on the computer, the control group learned and practiced their skills on the teletypewriter.

Daily typing progress data was collected on days 4 through 10 of the course. On day 11 the experimental group was moved back onto the teletypewriter for training in format procedures. Approximately 5 days after being moved all soldiers completed a questionnaire regarding their opinions on the basic typing training they had received. The experimental group was queried about problems in transferring from the computer to the teletypewriter.

Part 2— Data Analysis

Findings — The null hypothesis of no statistical difference between the final test scores of the experimental and the control groups was not rejected. That is, both treatments are equally effective in teaching typing skills. Students reported only minor problems in transferring from the computers to the teletypewriters. An analysis of the typing scores on the teletype after the third week showed no significant difference between the performance of those trained on the teletypes and those trained on the computer.

An analysis of the costs associated with both treatments shows that a substantial amount of money could be saved by adopting the microcomputer delivery system. The system should be more dependable, require less maintenance and fewer supplies than the existing teletypewriter classrooms. The microcomputer classroom would pay for itself in approximately three years.

An analysis of student and instructor attitudes towards both treatments shows that both are regarded positively. One advantage of the microcomputer system, noted by both instructors, is that it scores the student exercises and progress checks thus saving instructor time, and providing students with immediate remedial feedback.

Conclusion/ Recommendations

The CAI system compares favorably with the traditional television tutorial system. It is equally effective, costs less to operate and maintain, and is liked by the students. The students in the CAI treatment suffer some setback when initially transferring to the teletype but overcome this quickly. It is my feeling that the use of CAI for basic typing training at Fort Gordon is feasible and desirable. Further applications of CAI should be explored. Keywords include:

1973 (FLD 19)

TABLE OF CONTENTS

I. INTRODUCTION:

Background

The U.S. Army Signal School at Fort Gordon, Georgia, teaches basic typing to over 2,000 radio-teletypwriter operators annually. Presently, students in the 72G and the 72E MOS spend 10 days in learning basic typing using 1950's vintage teletypewriter equipment that is both expensive to maintain and operate. An alternative approach to teaching basic typing would be to use modern, low cost microcomputer equipment.

The information is important to the Army due to the instructional problems with, and expense in teaching keyboarding skills on existing teletype (TTY) equipment. Presently, students enter with a wide range of skills. In the group paced classroom both the quicker learner and the novice must practice at the pace set by the instructor. This slows down the faster learners and creates a pace that is too fast for the slower learners. An individualized approach should decrease the instructional time needed for some of the students and allow the instructor to spend more time with slower students who need help or allow for advanced skill development. This would be a more efficient use of staff resources. Furthermore, teletype equipment is expensive to purchase and maintain. If modern, low-cost microcomputer equipment can be effectively used in place of actual equipment there is a possible savings of materials and maintenance costs.

Should the microcomputer prove effective in teaching typing to teletype operators, it is likely that it would be suitable for teaching keyboard skills in other military occupational specialties. It is also possible that the computer could simulate other tasks now trained on the teletypewriter, such as message format typing, and precedence. There are also many other communication courses that teach basic typing that might find CAI more efficient than present approaches.

Purpose

The purpose of this study was to compare the efficiency and effectiveness of a Computer-Assisted Instruction (CAI) method of teaching keyboarding skills with a traditional group-paced television tutorial approach.

The questions to be answered by this study are:

1) How does the CAI (experimental) treatment compare to the traditional treatment (control) with regard to effectiveness?
2) How does the CAI treatment compare to the traditional treatment with regard to efficiency (costs)?
3) How does the CAI treatment compare to the traditional treatment with regard to instructor and student attitudes?

Evaluation Design

1. In the traditional method, groups of 16 to 20 soldiers are taught in a group-paced classroom using instructional videotapes and classroom exercises. The soldiers in this group are taught and practice on actual teletype equipment. This treatment will be referred to as the Control Group.

2. In the Computer Assisted Instruction Method a group of 8 soldiers will be taught by computer programs that will allow for individualized work. The soldiers will work at their own pace, with the instructor being available to help individuals as needed. This treatment will be referred to as the Experimental Group.

The procedures for this study were designed to collect data, as unobtrusively as possible, that would allow the two approaches to be compared with regard to their effectiveness, their cost, and their acceptance by instructors and students. All procedures for the conduct of the tests and the collection of data were done to minimize any self consciousness or artificial motivating factors among either the instructors or students which might influence the test results. Further, to the extent possible, all data were collected on instruments presently used in the course. Aptitude data was taken from the Army Skills Vocational Aptitude Battery (ASVAB) that is administered to all soldiers upon enlisting.

The typing instructors were briefed on the nature of the experiment and the procedures to be used in the testing procedures.

Population description and treatment

The population was 67 soldiers entering MOS 72G level 10, in four different class groups.

1. Soldiers were randomly assigned to one of the two instructional groups.

2. Each class was taught in its own best mode: control groups in the present format, and experimental groups as individualized instruction. The basic classroom schedule for both groups remained as close to the same as possible so that all soldiers were exposed to instruction for the same number of hours.

3. The treatment period lasted 10 days with the instruction distributed as follows:

Day 1 — introduction to the course, maintenance and operation of the AN/FGC-20 teletypewriter. (4 hrs) Entry typing skills test.

Days 2 & 3 — Keyboard technique lessons (instruction and practice on typing)

Days 4-8 — Typing skill building exercises, performance progress tests given daily.

Days 9 & 10 — Typing skills building and remedial training. Final performance test given the afternoon of day 10.

4. At the end of two weeks the typing score of the two groups were compared on typing speed and accuracy.

5. On day 11 the experimental and control group were rejoined so that both groups were working on the teletypewriter. Both student report data and performance data were collected to examine any transfer problems of the experimental group to the teletypewriter.

6. At the end of the third week students in both treatment groups were given a questionnaire to gather their perceptions on the effectiveness of each treatment, and instructors were interviewed to identify instructional problems.

7. Performance data will be analyzed with an analysis of covariance using entry typing scores and ASVAB scores as the covariates. Net Words per Minute (NWM) and error rate were the dependent measures.

A. Instructional Setting and Monitoring of the Test:

1. Physical Setting: The daily progress tests were given in the classrooms where the instruction took place.

The experimental classroom contained 9 Radio Shack Model III computers, each with 48K of random access memory, networked via a Radio Shack Model III Network Controller to a host Radio Shack Model III (48K) computer. The host computer had two 160K floppy disk drives. All the lessons and related programs were distributed by the controller to the student terminals. A Radio Shack model DMP-400 printer was connected to the host, and it served any student terminal through the network. Eight of the nine student stations were actually used during the evaluation. One station was available as a back-up in case of failure, but was not used.

The control classroom was a large room containing twenty AN/FGC-20 teletypewriters. Two 25" television

monitors at the front of the room were connected to a 3/4" videotape player.

2. Materials: The CAI group had both commercially and locally produced CAI typing lessons. The commercial lesson were produced by Southwestern Publishers, Cincinatti, Ohio, and consisted of 30 keyboard lessons and five skill builders contained on four floppy disks. The locally produced materials contained practice exercises and skill performance tests. The materials were produced so that the experimental group would have the same performance tests as the control group. Although theoretically the CAI group could work through the lessons at their own pace, hardware limitations restricted the number of lessons that could be "on-line" at any one time. The lessons were made available to the students according to the schedule presented in appendix D.

The control group had locally produced television tutorial tapes that presented the instruction in accordance with the schedule in appendix D. The instructors would show the videotapes after which the students would practice the skill on the teletypewriter. Both groups used the same progress check materials.

The time frame for testing was as follows:

First two weeks of Program of Instruction (basic typing)

Wed	Thr	Fri	Mon	Tue	Wed	Thr	Fri	Mon	Tue	Wed
^				^						^
entry typing test				1st prog. check		daily checks				final test

3. Test monitoring: The tests were administered by the instructional staff. Staff and Faculty Development Division (SFDD) personnel monitored the test and conducted exit interviews with soldiers from the experimental and control group. The instructors kept daily maintenance and student assistance reports.

B. Instructor Briefing:

Experimental and control group instructors were informed about the nature of the experiment and data collection procedures.

C. Collection of Data:

The aim of the project was to collect only that data which is needed to answer the experimental questions. Sources of data include existing forms and special forms generated for the purpose of this study.

1. Background Data: This included the student's ASVAB scores in the areas of clerical and general technical. Initial typing ability was recorded as the entry typing test administered on the AN/FGC-20.

2. Student Performance Data: Starting on the 4th day of instruction student performance data was evaluated daily by current methods for the traditional group using Progress Check Typing Booklet #201-05C10/D-B; 580-72e10/G-B. The instructor recorded the daily progress for each student, including the gross words per minute (GWM), Errors and NWM.

3. Student Attitude Data: The Student Attitude questionnaire in Appendix B-1 & B-2 was administered by SFDD personnel, not the course instructors (to prevent possible instructor influence). The questionnaire was followed by an exit interview.

The questionnaire was administered at the end of week 3, after the experimental group had a chance to work on the TTY, as some of the questions relate to transfer problems from the microcomputer to the TTY.

4. Instructional Cost and Reliability Data: An attempt was made to evaluate the costs associated with operating each of the classes with regard to materials and maintenance.

D. Systems Cost and Reliability of Devices

A procedure for comparing the cost effectiveness of both treatments in terms of cost was undertaken so as to include the following factors:

1. Instructor costs (# of students per instructor)
2. Equipment maintenance costs
3. Equipment availability costs (back-up needed)
4. Materials costs
5. Space considerations

II. DISCUSSION:

Conduct of the study

The study was conducted between the dates January 25, and March 14th, 1984. During this time four classes of 72G 10 students participated in the study.

Findings

Entry tests: Sixty-seven (67) soldiers were randomly assigned to either the experimental group (CAI) or the control group (traditional), 31 soldiers in the experimental group and 36 soldiers in the control group. The mean entry typing score was 17.26 Net Words per Minute (NWM) for the control group and 19.53 NWM for the experimental group. The difference between the means of both groups was tested with an Analysis of Variance (ANOVA) and was not statistically significant ($F=1.50$, df 1,64; p .05).

Effectiveness: The means (X) and standard deviations (sd) for the experimental and control groups are presented below. The data show that there is no significant difference in exit performance as a function of the instructional treatment when entry test scores are not taken into account. NWM scores are derived from GWM scores adjusted for errors.

Exit test scores (Net Words per Minute, Day 10)

Experimental Group (CAI)	X= 33.17	sd= 9.68
Control Croup (TV Tutorial)	X= 28.89	sd= 9.40

($F=3.304$, df 1,64, $p > .05$) ** ANOVA summary tables Appendix A

An analysis of covariance was performed to determine the percentage of variance in the exit test score that could be attributed to the student's entry typing test score, the student's clerical and general technical score on the ASVAB test. The entry typing test score and ASVAB scores were used as covariates and the exit test score was the dependent measure. The analysis presented in Appendix A, Table 9, shows that the entry typing test score accounted for most of the variance and was the only significant factor. The ASVAB clerical (CL) score and the ASVAB general-technical (GT) scores did not account for a significant amount of the variance. Since complete ASVAB score data was not available, another analysis of covariance was performed using the entry typing scores as the covariate and the day 10 Net Word per Minute typing scores as the criterion variable (Appendix Table 10). This analysis also shows that the entry test score explains a significant amount of the variance in the final test scores (approx 65%). The treatment effect explains only 1% of the variance, and is not significant. Thus, there is no significant difference between treatments when the entry test scores are taken into account.

Analysis of Variance was run on daily performance test scores between day 4 and day 10. These analyses are presented in Appendix A, Tables Two through Eight. They show that early in

the instruction the experimental group was typing faster than the control group, however, toward the end both groups leveled out and were not typing at significantly different rates. These analyses should be viewed with caution since later analyses show that the initial typing test score is a strong covariate with terminal typing speed. These analyses are not adjusted for the entry typing test scores. Finally, a multiple regression analysis was run to determine if there might be an aptitude-treatment interaction (ATI) where one instructional method might be differentially more effective for a student with a high or low entry typing test score. The results of this analysis showed no significant interaction effect.

In answer to experimental question number one, this means that the CAI treatment is equally effective in teaching basic typing skills to the prospective teletypewriter operators.

Efficiency: If two methods of instruction have similar effect it becomes important to determine the cost of delivering the instruction. In this case there were two major differences between the CAI and the traditional method. The first is that the television group received their primary instruction from videotapes played to the group. They then got to practice the new skills on a teletype machine. In the CAI group the instruction was delivered by the computer, and the typing skills were practiced on the computer. The costs of delivering the instruction include the cost of the instructors, the maintenance costs of the machinery and the operating costs associated with expendable materials and instructional media. Each are discussed below:

1. Instructor costs (# of students per instructor)-

Presently two instructors are assigned to teach a class of 18-20 students by the television tutorial method. This is convenient because paper grading must be done manually, and a second instructor must be available to help students while one instructor grades papers from the daily progress checks. The CAI delivery system, however, allows the computer to score the student progress tests and allows the instructor to spend time with students having problems. It is the evaulator's opinion, from observation of both treatments, that the CAI treatment would allow as much as a 20:1 student/teacher ratio and still allow the instructor enough time to interact with the students that need extra help. The study does not suggest that instructors should be replaced by computers, however, the possible increase in student teacher ratio means more flexibility in student enrollment without over-taxing the system. Since student intake rates can fluctuate widely the flexibility afforded by the CAI treatment would seem to be an advantage.

2. Equipment maintenance costs -

Data collected on the maintenance costs for the mechanical teletypewriter equipment over an 8-week period between

January 25, 1984 and March 21, 1984 show that in the control classroom with 20 machines there were 17 repair requests. Extrapolated for one year this would be 110 repair requests or 5.5 repair requests per machine. The average time for repair was 2.5 hours at a cost of $14.50 per hour for an annual labor cost of $4,006.00/yr. The parts needed to repair a machine are estimated to be $375.00 per year, or $7,500. for twenty machines. The total cost of maintenance is $11,506 or $575.00 per machine. The initial purchase price of the AN/FGC 20 teletypwriters was $2,180.00 each, so the annual maintenance costs are approximately 26% of the cost of the machine. This cost included "on-site" maintenance.

There are other factors to be taken into consideration with regard to equipment maintenance on the teletypewiters. The AN/FGC-20 is a 1950's vintage machines and is no longer being produced. This means that parts will become more scarce, and expensive with time.

The present microcomputer system consists of 12 pieces of equipment to serve 9 student stations. This includes the host computer, the network device, the printer, and 9 student terminals. The system cost $13,000, or $1,444. per student station. A single network is capable of serving 16 student terminals. Adding more terminals to the system lowers the cost of the individual student station to $1,140. since the extra stations use the same host, network, and printer. There is presently a maintenance contract on the system to cover the cost of parts and labor to repair any component. In spite of the fact that there was no direct expense associated with failure of microcomputer equipment during the period of the study, the cost of the maintenance contract must be considered in comparing the cost of maintenance on the computers to the teletypewriters. The cost of this contract is $1,250., or $138. per student station per year. This represents an annual maintenance cost of 9.6% of the cost of the machine. This maintenance requires that the machines be returned to a local dealer (off-site).

In consideration of the fact that the initial purchase price of the microcomputer equipment is lower, and the percentage spent on maintenance is lower, the computer system is a more efficient delivery system with regard to maintenance costs. A 20-station microcomputer system could save as much as $8,750. per year in maintenance costs alone over a 20-teletypewriter classroom.

3) Back-up Equipment Costs

One problem with the above figures is that they do not show the effect of down-time on instruction. When the soldiers are in a training situation for a limited time it is not desirable to delay their instruction because of a faulty piece of equipment. This means that there must be back-up equipment. One way to solve this problem is to purchase enough extra equipment so that there is a back-up when needed. Maintenance statistics on the AN/FGC 20's show that approximately 10% of the equipment is

unavailable for use at any particular time. In a classroom of 20 machines this would mean having a back-up of two machines at a cost of $4,360. There is not enough data to know the failure rate of the microcomputer system, however, we can compare the systems by projecting the same 10% rate of failure. Since there are more different pieces of equipment, back up would have to include an extra host, network, printer, and two student terminals. The cost of the back-up equipment would be approximately $4,890. This cost is comparable to the cost of back-up teletype equipment.

4. Materials costs --

Another expense in instruction is the expense associated with expendable materials. The teletypewriters use ribbons and paper, and the videotapes have to be replaced periodically. In the CAI classroom supplies include printer paper, printer ribbons, and floppy disks. The cost per student in the teletypewriter treatment is approximately $4.00, and in the CAI treatment is $2.00. This adds up to a $2,050 savings in the CAI course over the period of one year (assuming a weekly input of 20 soldiers.)

5. Space (needed per learning station)

The physical space taken up by a microcomputer station and a teletype machine are comparable. However, a classroom with 40 teletypes is very noisy, while a classroom with 40 computer terminals is very quiet. This means that more terminals can be placed together without disrupting the students. Furthermore, since the instruction is individualized there is no problem with the student having to hear the instructor, or see a television monitor in the front of the room.

In summary, the microcomputer proves to be a more efficient delivery system when the above factors are taken into consideration.

Student and Instructor Acceptance:

The student attitude questionnaires are very positive for both instructional treatments as shown in the response summaries (see APPENDIX B1 and B2 for the response summaries).

The most negative comment for the microcomputer treatment seemed to be boredom after day 6, since most of the students had been through all the materials by that day. The students expressed the fact that they enjoyed working with the microcomputers, and working at their own pace, but they wish that they had more varied materials. Part of the problem may be due to an equipment limitation that only allows a portion of the instruction to be on line at any one time. Since the instructors must make lessons available for the slower learners, the faster learners can not move on as quickly as they would like to. This leads to boredom. Student responses to questions about transfer

problems from the computer to the teletypewriter indicate that there is an initial transfer problem moving to the teletype keyboard, but this is only temporary. In order to test for a transfer problem the scores for both groups on a format typing test, given on the teletype at the end of the third week of instruction, were compared for both groups. A "T" test shows that students who learned on the computer did as well as those who learned on the teletype (see Appendix A, Table 11).

The most negative comments for the control treatment were directed toward the talent in the videotapes, but on the whole the students felt that they were acceptable and effective.

The instructors in the experimental group felt that the treatment was very effective and that the materials worked quite well (after correcting an initial programming problem). They felt that the instructional time spent in typing might be reduced by as much as three days, and that the microcomputer could possibly be used to allow those students typing at fairly high speeds to advance individually to lessons on precedence and format typing (advanced topics).

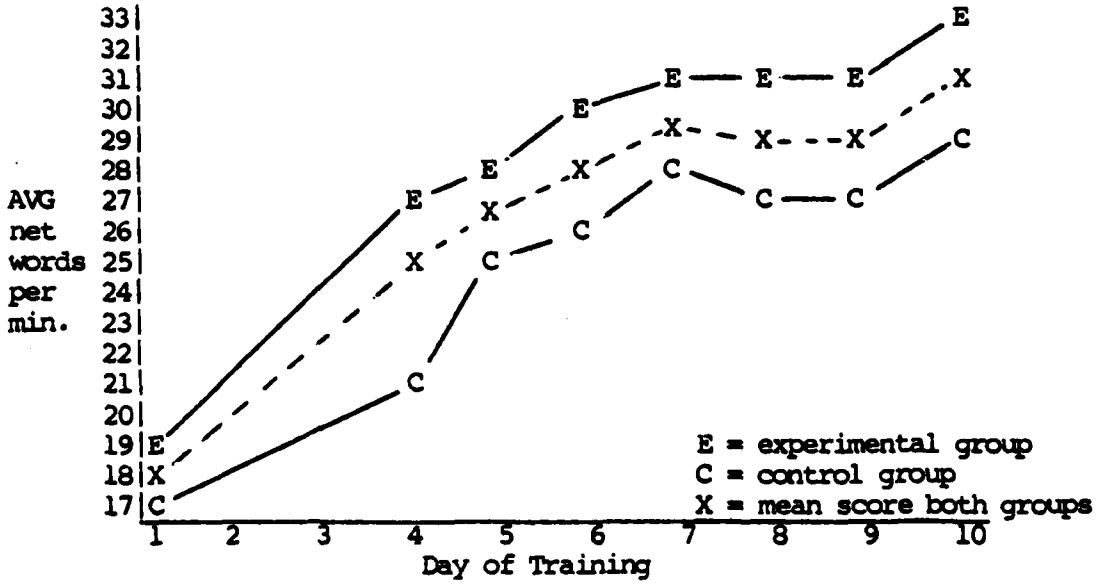

FIGURE 1, Plot of daily progress scores for both groups

The observation that the instructional treatments might be shortened is supported by the data from the daily progress test as shown in Figure 1 above. As Figure 1 shows, there is no significant gain after day 7 for either group. A visual inspection of the data shows that only 6 (10%) students that had not reached the acceptable typing speed by day 7 reached it after 3 additional days of instruction.

The instructors in the control situation seemed bored with the videotapes, and it is possible that some of their attitudes towards the tapes were reflected in the student comments. They seemed to feel that the biggest plus of the CAI treatment would be the automatic grading of student progress and performance tests.

In summary, the results show that the student and instructor attitudes are generally positive for both instructional treatments. In both cases the instruction is "canned" so that the instructors are more in the role of facilitators and evaluators than in presenting new information. Since the skill of typing involves great amounts of student practice this seems an appropriate role. Furthermore, the computer allows for a detailed analysis of student errors and prescription for corrective practice exercises, something that the instructors can not do.

V. SUMMARY/ CONCLUSION:

It appears that when adjusted for initial typing entry scores, the two treatments in the study are equally effective in teaching typing skills. Of interest in this study was the possibility of a more efficient instructional treatment when time and instructor resources are considered. One way of effecting an economy in instruction is to reduce the costs associated with delivering it. It this regard the microcomputer classroom is superior to the teletypewriter classroom. Extrapolating the cost figures for a class of 20 to the total number of students in the basic typing course at one time (40), the annual savings in maintenance and supplies costs could amount to as much as $25,000 annually.

The CAI equipment needed to effect such a saving would include 4 network systems of 10 terminals each, plus a back-up system consisting of one host, one printer, one network controller, and 4 student terminals. The total cost of the initial installation would be approximately $65,000. including the backup equipment and the first year's maintenance agreement ($59,000 equipment and $6,000 maintenance). Therefore the CAI system would pay for itself in approximately three years. These figures are based on the assumption that the instructor student ratio stays the same as it is presently. Even greater savings would be realized in a situation of increased student load as would be the case during mobilization.

Another question of interest is how well the skills taught on the microcomputer transfer to the teletypewriter. The teletypewriter keyboard is different from the microcomputer keyboard, and it has a different tactile feel. This question was addressed in this study by asking the students in the attitude questionnaire about transfer problems and by comparing the groups test on the teletypewriters one week after they had transferred from the microcomputers. All the students mentioned

some degree of transfer problem, but stated that it lasted only a few days. A "T" test of performance on the teletype given one week after transferring onto the machines shows no significant difference between the typing scores of those soldiers who learned on the computers and those who learned on the old teletypewriters.

This finding leads to the speculation that other communications specialist tasks could be trained on the microcomputer. For example, the typing of format messages. Out of the 6-week training course for 72G 10 MOS, it might be possible to reduce time on the teletype to one week, given at the end of the course, to familiarize the soldiers with that piece of equipment. This might also be useful with other MOS's (e.g., 72E). The reduction of time on the teletype would lead to further savings in maintenance costs.

The data implies that the basic typing component of the course could be reduced in length by 3 days (in either treatment). This suggestion should be carefully reviewed, however, as the data indicates that it will increase turnbacks by 10% (those who were not passing on day 7 that did pass on day 10). The problem of student boredom in the CAI treatment must also be addressed. One possible cause of this boredom is that the faster learners must wait on the slower learners because the machinery can not make all the lessons available at one time. This is due to hardware limitations and can be solved in a number of ways. One way would be to use a "hard disk" in conjunction with the host machine. This would increase storage and enable all lessons to be available at all times. Another way would be to have different levels of lessons on different networks. A student would move to a terminal on a higher level network when finishing all the lessons on a lower level network. Of the two alternatives the hard disk would be more costly but easier to manage.

With regard to predicting how well a soldier will do in the course, the data shows that the single best predictor is the entry typing test score. The correlation between the entry test and the exit test score is .80 . Those who type faster coming in are the fastest going out. Neither the CAI treatment nor the television tutorial on the teletypes seems differentially better for the slow or fast typist.

Instructor attitude toward the treatment seems favorable toward the CAI treatment. Instructors in the Army do not complain about their assignments (at least not to project evaluators), so I could not say that the CAI instructors were any more or less happy with their assignments. However, the computer takes a lot of the drudgery out of teaching typing. It allows the students to work at their own pace, and it individually corrects the students typing exercises and gives them feedback in the form of a detailed error analysis. The computer assisted instruction is also capable of providing appropriate remedial instruction based on the type of mistakes the learner is making.

The computer saves a great deal of the instructor's time and eliminates possible errors in grading student papers by scoring daily progress checks and recording the scores on the computer's printer. This savings in time allows the instructor more time to observe the students while they work, and to make helpful suggestions. One frequent comment regarding the CAI classroom was that the students enjoyed the relaxed atmosphere and the quiet as compared to the teletype classroom.

Finally, the CAI approach allows a student who has been called out of the classroom for other reasons to easily make up a missed lesson. This is more difficult in the group paced television tutorial treatment.

IV. RECOMMENDATIONS:

The CAI treatment was successful in that the instruction was equally effective with the method that used teletype equipment, and that it has the potential to substantially reduce costs associated with delivering instruction. Favorable student and instructor attitudes suggest that the CAI delivery system be tried and evaluated with regard to its ability to deliver instruction associated with other communications skills.

APPENDICES

A. ANOVA Summary Tables for Performance Scores

B-1 Student Attitude Summary (experimental)

B-2 Student Attitude Summary (control)

C. Instructor Attitude Questionnaire

D. Program of Instruction Schedule

APPENDIX A

ANOVA STUDENT PERFORMANCE SUMMARY TABLES
(unadjusted means net words per minute)

TABLE ONE

CRITERION VARIABLE Entry typing test score
BROKEN DOWN BY Group

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		18.308	7.483	65	
Control	1.	17.257	7.386	35	
Experimental	2.	19.533	7.533	30	

TOTAL CASES = 67
MISSING CASES = 2 OR 3.0 PCT.

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQRS	MEAN SQUARE	F RATIO	F PROB.
BETWEEN GROUPS	1	83.69	83.69	1.506	.224
WITHIN GROUPS	63	3500.15	55.56		
TOTAL	64	3583.85			

****

TABLE TWO

CRITERION VARIABLE Net Words per Minute, Day 4
BROKEN DOWN BY Group

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		24.688	10.619	64	
Control	1.	21.667	10.228	33	
Experimental	2.	27.903	10.222	31	

TOTAL CASES = 67
MISSING CASES = 3 OR 4.5 PCT.

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQRS	MEAN SQUARE	F RATIO	F PROB.
BETWEEN GROUPS	1	621.71	621.71	5.947	.018
WITHIN GROUPS	62	6482.04	104.55		
TOTAL	63	7103.75			

TABLE THREE

CRITERION VARIABLE Net Words per Minute, Day 5
BROKEN DOWN BY Group

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		26.484	10.251	64	
Control	1.	25.000	10.097	34	
Experimental	2.	28.167	10.333	30	

TOTAL CASES = 67
MISSING CASES = 3 OR 4.5 PCT.

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQRS	MEAN SQUARE	F RATIO	F PROB.
BETWEEN GROUPS	1	159.82	159.82	1.534	.220
WITHIN GROUPS	62	6460.17	104.20		
TOTAL	63	6619.98			

****

TABLE FOUR

CRITERION VARIABLE Net Words per Minute, Day 6
BROKEN DOWN BY Group

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		28.185	10.549	65	
Control	1.	26.343	9.777	35	
Experimental	2.	30.333	11.164	30	

TOTAL CASES = 67
MISSING CASES = 2 OR 3.0 PCT.

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQRS	MEAN SQUARE	F RATIO	F PROB.
BETWEEN GROUPS	1	257.23	257.23	2.361	.129
WITHIN GROUPS	63	6864.55	108.96		
TOTAL	64	7121.78			

TABLE FIVE

CRITERION VARIABLE Net Words per Minute, Day 7
BROKEN DOWN BY Group

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		29.182	9.517	66	
Control	1.	27.417	9.141	36	
Experimental	2.	31.300	9.678	30	

TOTAL CASES = 67
MISSING CASES = 1 OR 1.5 PCT.

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQRS	MEAN SQUARE	F RATIO	F PROB.
BETWEEN GROUPS	1	246.77	246.77	2.800	.099
WITHIN GROUPS	64	5641.05	88.14		
TOTAL	65	5887.82			

****

TABLE SIX

CRITERION VARIABLE Net Words per Minute, Day 8

BROKEN DOWN BY Group

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		28.903	9.762	62	
Control	1.	26.667	9.366	33	
Experimental	2.	31.448	9.734	29	

TOTAL CASES = 67
MISSING CASES = 5 OR 7.5 PCT.

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQRS	MEAN SQUARE	F RATIO	F PROB.
BETWEEN GROUPS	1	352.91	352.91	3.878	.054
WITHIN GROUPS	60	5460.51	91.01		
TOTAL	61	5813.42			

TABLE SEVEN

CRITERION VARIABLE Net Words per Minute, Day 9
BROKEN DOWN BY Group

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		28.578	8.894	64	
Control	1.	26.206	7.804	34	
Experimental	2.	31.267	9.406	30	

TOTAL CASES = 67
MISSING CASES = 3 OR 4.5 PCT.

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQRS	MEAN SQUARE	F RATIO	F PROB.
BETWEEN GROUPS	1	408.18	408.18	5.531	.022
WITHIN GROUPS	62	4575.43	73.80		
TOTAL	63	4983.61			

****

TABLE EIGHT

CRITERION VARIABLE Net Words per Minute, Day 10
BROKEN DOWN BY Group

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		30.833	9.687	66	
Control	1.	28.889	9.395	36	
Experimental	2.	33.167	9.667	30	

TOTAL CASES = 67
MISSING CASES = 1 OR 1.5 PCT.

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQRS	MEAN SQUARE	F RATIO	F PROB.
BETWEEN GROUPS	1	299.44	299.44	3.304	.074
WITHIN GROUPS	64	5799.72	90.62		
TOTAL	65	6099.17			

TABLE NINE

* * * * * * * A N A L Y S I S O F C O V A R I A N C E * * * * * *

Criterion Variable — Net Words per Minute, Day 10
By Group
With Covariates — Entry typing score (ESCORE), ASVAB Clerical score (CL), ASVAB General Technical score (GT)

* *

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
COVARIATES	1736.902	3	578.967	10.703	.001
ESCORE	1490.535	1	1490.535	27.556	.001
CL	12.401	1	12.401	.229	.636
GT'S	100.754	1	100.754	1.863	.184
MAIN EFFECTS	61.686	1	61.686	1.140	.295
GRP	61.686	1	61.686	1.140	.295
EXPLAINED	1798.589	4	449.647	8.313	.001
RESIDUAL	1406.379	26	54.092		
TOTAL	3204.968	30	106.832		

* * M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S * *

GRAND MEAN = 32.03

VARIABLE + CATEGORY	N	UNADJUSTED DEV'N	UNADJUSTED ETA	ADJUSTED FOR INDEPENDENTS DEV'N	ADJUSTED FOR INDEPENDENTS BETA	ADJUSTED FOR INDEPENDENTS + COVARIATES DEV'N	ADJUSTED FOR INDEPENDENTS + COVARIATES BETA
GRP							
Control	17	-1.39				-1.31	
Experimental	14	1.68				1.60	
			.15				.14

MULTIPLE R SQUARED .561; MULTIPLE R .749

Note: On the basis of this analysis CL and GT scores were removed from further consideration as predictors of performance.

TABLE TEN

* * * * * * ANALYSIS OF COVARIANCE * * * * * * * *
Net Words per Minute, Day 10
BY GRP
WITH Entry typing test score (ESCORE) as a covariate
* *

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
COVARIATES	3592.347	1	3592.347	104.509	.001
ESCORE	3592.347	1	3592.347	104.509	.001
MAIN EFFECTS	50.297	1	50.297	1.463	.231
GRP	50.297	1	50.297	1.463	.231
EXPLAINED	3924.205	2	1962.102	57.082	.001
RESIDUAL	2096.780	61	34.373		
TOTAL	6020.984	63	95.571		

Mean scores adjusted for Entry Typing Scores:

Control 30.72 Net Words per Minute
Experimental 33.63 Net Words per Minute

The Null Hypothesis can not be rejected at alpha = .05

****

TABLE ELEVEN

T-TEST FOR DIFFERENCES IN THIRD WEEK TELETYPE SCORES

EXPERIMENTAL N = 26 MEAN = 22.769 ST.DEV. = 4.00
CONTROL N = 36 MEAN = 21.917 ST.DEV. = 5.07

APPROX. DEGREES OF FREEDOM = 59

TEST OF THE NULL HYPOTHESIS THAT THE MEAN OF EXPERIMENTAL GROUP EQUALS THE MEAN OF THE CONTROL GROUP

T = .739

The probability is .4629
The null hypothesis can not be rejected at alpha = 0.05

Note: These are format typing speed scores, not straight text typing as tested in former typing performance tests.

STUDENT ATTITUDE QUESTIONNAIRE SUMMARY

Experimental Group

Read each of the following questions carefully and circle the response that best describes your feelings.

Frequency reported in percent of those responding (rounded)

	SD	D	N	A	SA
1. The classroom was comfortable	0	3	3	59	34
2. I enjoyed using the computer	0	3	0	30	67
3. I had trouble learning to use the computer	47	43	3	3	3
4. I had no trouble typing on the TTY after using the computer	6	40	23	20	10
5. The computer often broke down	53	40	3	3	0
6. The computer screen (monitor) was hard to read.	57	43	0	0	0
7. I got the help I needed from my instructor	3	0	3	37	57
8. Outside duties interfered with my class	47	37	13	3	0
9. I found the instruction to be boring	10	37	30	20	3
10. The computer screen hurt my eyes	33	50	13	3	0
11. The instructions for using the computer were hard to follow	73	27	0	0	0

N= 30

12. Have you ever used a computer before for any reason?
(yes) 58% (no) 42%

13. Explain in your own words: what are the good and bad points of this method of teaching typing? How could it be improved?_____

_____

_____

_____

APPENDIX B-2

STUDENT ATTITUDE QUESTIONNAIRE SUMMARY

Control group

Read each of the following questions carefully and circle the response that best describes your feelings.	Frequency reported in percent of those responding (rounded) SD	D	N	A	SA
1. The classroom was comfortable	0	0	14	78	8
2. I enjoyed using the TTY	0	11	28	47	14
3. I had trouble learning to use the TTY	33	48	3	17	0
4. I had no trouble typing on the TTY after learning the keyboard	0	11	17	58	14
5. The TTY often broke down	6	46	9	20	20
6. The television screen was hard to see	15	68	18	0	0
7. I got the help I needed from my instructor	0	0	6	53	42
8. Outside duties interfered with my class	15	59	12	5	10
9. I found the instruction to be boring	8	19	33	31	8
10. The instructions for using the TTY were hard to follow	33	58	10	0	0
			N= 36		

11. Have you ever used a TTY before for any reason?
(yes) 6% (no) 94%

12. Explain in your own words: what are the good and bad points of this method of teaching typing? How could it be improved?_____

(see content summary sheets that follow) _____

_____

_____

_____

Experimental Group - Comment Summary

"I found it easier to type on the computer. It improved my typing greatly. The bad point is that I had trouble typing on the TTY after the computer."

"I believe it is alot easier to type on the computer keyboard, and can learn form the programs you type. There's something interesting about a machine responding to you when you do good or bad. I believe the method should be used for other types of courses also. We had one test lesson on there, and it's already helped me prepare for my next class. The only thing that would make the class alot more interesting would be to have the 8 hours of typing broken up: either different paragraphs, or maybe some verbal lessons in between. It's hard to keep your concentration with so much repetition."

"I loved its better equipment. The program was boring because it was too repetitive, but if there was greater variation, it would be excellent! I think they should put the computers to a much larger use, for example, self-paced classes on procedures and classification, and so on."

"I believe that it could be improved by putting more paragraphs in for paragraph practice. Typing the same paragraphs all day was hard. If that was changed, I would have marked box 9 "d". Other than that, I found the TRS-80's to be a good learning tool."

"Computers are better to type on than the TTY. I have learned to type."

"Good points: machine is quiet, easier to use than the TTY, and more relaxing. The software programs were good for practice. Course was great and I didn't want to leave. Once you get past the SHIFT key differences, then the TTY is all right to use."

"Good points: you work at your own pace, in a more relaxed atmosphere. Can't think of any way to improve it."

"Computer allowed you to move at your own pace; it was easier to type on, and quieter. I learned to type on it and would like to continue work on it, step by step. We need to know the TTY, but the computer is more up to date."

"It's easier to type on the computer than on the TTY, but more interesting programs might be helpful. I thought it was a great class and wish we could stay in here for the entire six weeks. The TTY we'll probably be using in the field is more like the computer."

"Improved typing on the micro. The micro class is better because all lessons and instructions are right there: you can see your mistakes. I enjoyed it. The whole course should use the computers."

"Improvement: needed to type format instead of paragraphs; didn't have to wait long for the test results; class was more relaxed and it was

easier to type."

"I didn't like the TTY's, I liked typing on the computers because it's modern. Add more paragraph practice."

"The method would save the government alot of money. They hardly break down. I think it could be improved by having more programs to run."

"This method kind of messes you up when you get on the TTY because you have to learn the keyboard all over again. But the class is alot better than the TTY class."

"The computer is good for building typing speed, but the transition from the TRS-80 to the TTY was a little hard. More programs used would improve the course."

"One good point is that it taught me not to look at the keys and also lets individuals work at their own pace. There weren't enough programs to practice, and after awhile I got bored typing the same thing."

"Prior typists should be advanced through the course...A good way to learn how to type — the computer instructions did a good job" (2 yrs of prior high school typing)

"Computer flashed mistakes immediately so that you didn't learn bad habits. Lessons were well prepared and advanced at a comfortable rate. Could improve the course by making more challenging programs." (1 semester high school typing)

"This method is great for those who have to learn keyboard typing and for those who need to increase speed. It is difficult to switch from the computer to the teletype due to some characters being in other locations on the keyboard and the touch system being different. The TTY slows you down. Overall, my computer class was enjoyable; both the instructors and the method."

"One good point is that you can go at your own pace and learn from your mistakes yourself."

"I think we spent too much time on paragraphs and should have spent more time on lessons. I think format lines could be taught in the second half of the course. I had problems getting adjusted to the teletype in upper case, and I think there should be a period of a few days (of no format typing) where you can adjust to upper case instead of being tossed in!"

"Operation was easy, instructions were easy, and using the monitor made things less tedious."

"It could be improved by not just typing all day. We could do other things also."

"More time needs to be spent with the people who have never typed before. A little bit of instructor input would help greatly. Moving back to the TTY slowed my speed down to what it originally was the first day."

"I felt that on the TRS-80 we were on our own too much." I had 1 year of typing in the 12th grade.

"I thought the computer was fun to work with"

"Helps you advance at your own pace."

"I feel very strongly that the military should train the student on the equipment they will someday be working with (UGC-74 teletype)."

"Add a variety of programs"

"Teaching methodology was good. Mr. Steve was helpful, but boring to typists. If you're going to be using the TTY, you should learn to type on it, as opposed to the regular typewriter."

"Mr. Steve was kind of slow; I didn't need the keyboard introduction. I think it was a pretty good class."

"Good points: instructors were good and kept you motivated, and tapes were funny but interesting. Bad points: tapes were too long."

"I feel that the method used is a very good one. I feel that it doesn't have any bad points about it at all. This method should be continued to be used."

"Shorter course in typing. I now feel confident on the TTY. The tapes helped out, but were too slow."

"Good point: you're learning on a machine you'll actually be using in the Comm. Center. Need to improve maintenance on the machines; minor things, like breakdowns, added up."

"Teaching methods good. Less time consuming using tapes than conventional".

"Separate typists from non-typists into 2 classes. Tapes were boring."

"Get rid of Mr. Steve and let the instructor teach. The TTY is hard to type on, and slow."

"Music on the Mr. Steve tapes was boring. The tapes are well done."

"I feel that this method of teaching is very effective. I had never touched a typewriter in my life before entering this course, and now I am very confident in my typing skills. But the equipment can be improved. I believe that it would be found that typing scores depend heavily on the quality of the equipment."

"I feel that it is a good method because I learned well from it. However, I feel that it is a little too fast for many beginners. I have kept up with typing requirements, but I have seen many who haven't. I think we need more classroom time learning to type, but not with remedial work. Remedial seems to me to have a negative psychological effect on students. I think we need more daytime classes."

"There aren't any real bad points about this method of teaching. It has to be learned even if it is sometimes boring. The good points are that you learn to type faster and you don't spend as much time trying to learn how to type. Also, moving as fast as they do, it doesn't get as boring because you're busy."

"Need to have different typing; booklets need to have more variety. You can almost put some of the practice material to memory. Remedial

typing should start at 7:30 PM; sometimes I'm not released from my company until 6:15 or 6:30 PM."

"I have a habit of looking at the keys, and I wish there was something I could use to help me break this habit. I also think that remedial typing should be on a daily basis, instead of the three nights in a row. If you pass the typing test the next day, you shouldn't have to go back."

"More time should be spent on learning the keyboard from memory, and the learning environment should not be so rigid. The students put on extra typing at night should be taught, not just mark the 2 hours. The time should be changed to allow students time to eat and attend to personal hygiene between PT and the evening class."

"It frees the instructor so that he may help individuals having trouble while not slowing down the ones that aren't. My eyes would get tired of staring at the TV screen, but it was not hard to see."

"Mr. Steve was boring but teaches very well."

"I believe that the instructions were explained thoroughly and slowly enough for everyone to catch on. I like the color TV better than the Black and White one."

"If a person knows how to type fairly well they should not have to go through the first two weeks being that it is all typing. That time could be used for learning format or another part of the course. The equipment frequently broke down thus causing me to lose valuable learning time."

"Good point: Instructors helped: TV tapes were helpful but boring"

"Got tired of Mr. Steve, but he was helpful"

"Staying awake was a problem. Mr. Steve was like a tranquilizer. Need new machines because of maintenance problems, previous typing helped (1 yr in high school)."

"Add more practice"

"Tapes were good but boring. No complaints"

"Update the machine. Tapes were boring" (1 yr. high school)

"Wait for the rest of the group to learn the keyboard -- very boring (tv tapes) -- The rest was specific, very interesting"

"It works for me, but I am in remedial typing. It would be helpful if equipment wouldn't break down. "

"I thought it was good because it took the time to teach the people how to type. However, for the people who know how to type the day was very long!"

"For me the class was pushed too fast to really become proficient in using th TTY. The course should teach ways to improve speed rather than just make one practice until his/her hands hurt. Remedial typing lasted too late at night. The equipment malfunctioned too frequently. The classroom was too noisy to concentrate on typing"

"I already knew how to type. I think I just needed to practice to bring up my speed. Mr. Steve was boring and I feel it was a waste of time to re-teach me to type."

"Satisfied with the present method of instruction. A relaxed classroom environment enhances learning."

"Method is fine but the teletypes are old and need work".

"The bad parts about teaching typing are the outside duties, not being able to study, or progress at your own rate, too much pressure on students."

"I prefer it over the way they taught it in high school."

APPENDIX C.

INSTRUCTOR ATTITUDE QUESTIONNAIRE
(provided for reference, summary included in text)

NAME _____ Group # _____

SYSTEM ASSESSED _____ CLASS STARTING DATE _____

1. Did use of the microcomputer encourage interaction between students and instructors? _____YES _____NO
   Explain _____

2. Did use of the microcomputer assist the instructor in the teaching process?
   _____YES _____NO
   Comments _____

3. Did the students easily adjust to using the teletypewriter after using the microcomputer _____YES _____NO
   Observations _____

4. Did the students seem to understand the operation of the microcomputer system?
   _____YES _____NO
   Why, or why not? _____

5. Were repairs on the system easy to arrange for and promptly received?
   _____YES _____NO
   Explain _____

6. Did you enjoy teaching typing using the microcomputer?
   _____YES _____NO
   Why, or why not? _____

7. Was the instruction, by using the microcomputer system, effective?
_____YES _____NO

Why or why not? _____

_____

8. Was the material in logical order? _____YES _____NO

Explain _____

_____

9. Was the material consistent with good teaching practice?
_____YES _____NO

Explain _____

_____

10. Were the contents taught valid? _____YES _____NO

Explain _____

_____

11. Were the instructional units of the right length?
_____YES _____NO

Observations and suggestions: _____

_____

_____

APPENDIX D.

PROGRAM OF INSTRUCTION SCHEDULE

Automatic Data Telecommunications Center Operator Course
Training Schedule

Week #1

Wednesday

PDS 5-8 Students will receive course introduction, operation of AN/FGC-20, and operators preventive maintenance on AN/FGC-20 (4 hrs)

Thursday

PDS:		
1	KEYBOARD TECHNIQUES - GUIDE KEYS EXER-1	(B02-LP1)
2	KEYBOARD TECHNIQUES - GUIDE KEYS EXER-2	(B02-LP2)
3	KEYBOARD TECHNIQUES - (H,E,&O KEYS)	(B02-LP3)
4	KEYBOARD TECHNIQUES - (T,I & L SHIFT)	(B02-LP4)
5	KEYBOARD TECHNIQUES - (R, PD(.) & W)	(B02-LP5)
6	KEYBOARD TECHNIQUES - (N,G & R SHIFT)	(B02-LP6)
7-8	REVIEW	(B02-LP7)

Friday

PDS:		
1	KEYBOARD TECHNIQUES - (U,C, & P)	(B02-LP8)
2	KEYBOARD TECHNIQUES - (Y,X, & CMM (,))	(B02-LP9)
3	KEYBOARD TECHNIQUES - (M & Z KEYS)	(B02-LP10)
4	KEYBOARD TECHNIQUES - (B, ?, and Q)	(B02-LP11)
5	KEYBOARD TECHNIQUES - (V KEY)	(B02-LP12)
6	KEYBOARD TECHNIQUES - (REVIEW)	(B02-LP13)
7-8	KEYBOARD TECHNIQUES - (NUMBERS)	(B02-LP14)

Monday

PDS:		
1-2	KEYBOARD TECHNIQUES - (SYMBOLS)	(B02-LP15)
3-5	Building Typing Skills (practice)	(B03-LP1)
6-8	Building Typing Skills (8-10 wpm)	(B03-LP2)

Tuesday

PDS:		
1	Building Typing Skills (8-10 wpm)	(B03-LP2)
2-5	Building Typing Skills (9-11 wpm)	(B03-LP3)
6-9	Building Typing Skills (10-12 wpm)	(B03-LP4)

Wednesday

PDS:		
1	Building Typing Skills (10-12 wpm)	(B03-LP4)
2-5	Building Typing skills (11-13 wpm)	(B03-LP5)
6-8	Building Typing Skills (practice)	(B03-LP6)

Thursday

PDS:		
1-4	Building Typing Skills (practice)	(B03-LP6)
5-9	Building Typing Skills (13-15 wpm)	(B03-LP7)

Friday

PDS:		
1-2	Remedial Training	
3-4	Performance Test (building typing skills and operator preventative maintenance	(B04-CTI)
5-9	Building Typing Skills (general practice upper and lower case)	(B05-LP1)

Monday

PDS:		
1-2	Building Typing Skills (general practice upper and lower case)	(B05-LP1)
3-6	Building Typing Skills (15-19 wmp)	(B05-LP2)
7-8	Building Typing Skills (General Practice upper and lower case)	(B05-LP3)

Tuesday

PDS:		
1-2	Building Typing Skills (general practice upper and lower case)	(B05-LP3)
3-5	Building Typing Skills (15-19 wpm)	(B05-LP4)
6-8	Building Typing Skills (general practice upper and lower case)	(B05-LP5)

Wednesday

PDS:		
1-5	Building Typing Skills (general purpose upper and lower case)	(B05-LP5)
6-7	Remedial Training	
8	Performance Test (Building Skills)	(B06-CTI)

END

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