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A Study to Compare the Effectiveness of Using Stand-alone Computers and Networked Computers in Completing Classroom Keyboarding Assignments

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A STUDY TO COMPARE THE EFFECTIVENESS OF USING STAND-ALONE COMPUTERS AND NETWORKED COMPUTERS IN COMPLETING CLASSROOM KEYBOARDING ASSIGNMENTS

A Research Paper

Presented to the Graduate Faculty

of the Department of Occupational and Technical Studies

at Old Dominion University

In Partial Fulfillment

of the Requirements for

the Master of Science in Education Degree

By Angela M. Rockett

August 1996

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APPROVAL PAGE

This research paper was prepared by Angela M. Rockett under the direction of Dr. John M. Ritz in OTED 636, Problems in Education. It was submitted to the Graduate Program Director as partial fulfillment of the requirements for the Degree of Master of Science in Education.

APPROVAL BY: J.M. Ritz 7-31-96

Dr. John M. Ritz
Advisor and Graduate
Program Director

Date

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CHAPTER I

INTRODUCTION

Local Area Network (LAN) technology is becoming an essential communication component for many businesses. Not only are LANs becoming essential components in many businesses but many educational institutions also are realizing the benefits of networking technology (Groneman and Kaser, 1994). Because of the benefits of networking, many schools are creating LANs.

At Woodrow Wilson High School (WWHS), one networked computer classroom and two stand-alone computer classrooms are used. Utilizing the network system eliminates the use of several troublesome diskettes, as well as, many noisy printers. On the other hand, using the stand-alone computers develops the students understanding of basic DOS procedures. However, both the stand-alones and the networked system will get the task accomplished.

STATEMENT OF THE PROBLEM

The problem of the study was to compare the effectiveness of using stand-alone computers and networked computers in completing classroom keyboarding assignments.

HYPOTHESIS

The following hypothesis was developed to guide this study:

H1: Students who utilize stand-alone computers will perform more efficiently than students who utilize network computers in completing keyboarding assignments.

BACKGROUND AND SIGNIFICANCE

Before the arrival of adequately priced personal computers, few schools had experienced any opportunity of trying any simple software tool package, such as WordPerfect. After the rise of personal and home computers, however, that all changed rapidly. By the beginning of the 1980s, many local cities, as well as corporations, had put a number of computers at the disposal of schools (Kinnaman, 1991, p. 28).

Furthermore, the logic of operation of a personal computer is obviously 'personal'; but the school experience had suggested that even two or three students at a time can work together. "As a further step forward, there is the possibly of equipping an informatics classroom (Kinnaman, 1991, p. 28)!"

How things have changed. In the past, teaching your subject in the computer lab, at WWHWS, at the beginning of class students picked up a copy of the Disk Operating System

(DOS) disk and the software tool (word processing) disk, then booting and loading the program into individual computers have changed. Then they retrieved assignments from the template or their file disks. Eventually, all the students were working on their assigned task. Throughout the period, students would print by changing the switch box from A to B, since two workstations shared a dot-matrix or near letter quality (nlq) printer. While others stood in line waiting to print, because their computers were not connected to a printer. About ten minutes before the end of the period, students began saving their work and lining up, file, template, and DOS disk in their hand, by their file boxes to file the diskettes. Inevitably, some students were in line when the bell rang.

Today, many students in computer related classes arrive with no disks in hand. They turn on their computers, give their student identification numbers, then select the software tool from a menu and load their files from the same hard disk drive. Within two minutes, they are hard at work. When they are ready to print, they send their files to a control printer where the files print in the order they were initialized. And while the files are waiting to print, the students begin work on another assignment.

In the meantime, "in 1985, the Maryland Department of Education and five schools in Maryland began a study to determine the feasibility of networking computers in schools. Queen Anne's County High School (QACHS), located

in Centerville, Maryland, was one of two high schools selected to participate in the project funded, in part, by IBM Corporations. The QACHS is the only high school in the county and serves approximately 1,800 students with a full range of academic and vocational programs. The goal of the staff was to integrate computers into all areas of the schools. In keeping with the original goal, the networks have been configured in the following areas: writing, library/media center, computer science, business education, trades, and administrative. Today, the vast majority of teachers and administrators use the resources of the networks as part of their daily activities. The computer network has truly become integrated into this instructional process" (Windsor, 1991, p. 45).

In fact, according to Advanced Information Technologies, "the LAN has become an essential component in today's information systems. Productivity and competitive pressures have led the need for greater information access and improved managerial communication. Methodologies like the client server environment and integrated e-mail services have facilitated the design and delivery of business supportive solutions of which LANs are an essential part" (Lipman, 1993, p. 14).

LIMITATIONS

The limitations of this study were as follows:

1. First year keyboarding students were used for this study.

2. Test groups for this study included three classes; one class used stand-alone computers with 18 participants and two classes used networked computers with 24 and 18 participants.

3. The time period in which the teacher had used the networked system was limited to five months.

ASSUMPTIONS

This study was based on the following assumptions:

1. Participants differed widely in age, grade, and ability.

2. Participants my have had prior computer skills and knowledge.

3. Participants using stand-alones would learn more than a networked user.

4. Participants using a networked system would be able to share resources such as peripheral, input/output devices, and software.

5. Participants using stand-alones would use disk-based copies of programs.

PROCEDURES

Woodrow Wilson High School was the site of this study. First year keyboarding students made up the test groups for this study. The participants had little or no knowledge of computers.

Group A used stand-alone computers and floppy diskettes, while Group B used networked computers. Data was presented comparing the effectiveness of using stand-alone computers to networked computers in a classroom.

DEFINITION OF TERMS

The following definitions should be applied when reading this research paper.

Bit (*BI*nary digi*T*)	A basic unit of computer information expressed numerically as a 0 or a 1.
Bridge	A LAN computer that links two similar networks.
Bus topology	A network in which all workstations are connected to a linear transmission cable.

Cable	One or more conductors contained within a protective shell.
Collision	A simultaneous transmission of data by two or more LAN workstations.
Ethernet	A baseband LAN communications standard develop by Xerox.
File server	The computer in a LAN that stores and distributes the files for the workstations.
Gateway	A computer in a LAN that links two dissimilar LANs.
Hard disk drive	A high capacity disk usually sealed inside a computer.
Local Area Network (LAN)	An interlinked microcomputer system.
Network computers	10 to 20 workstations connected together.

Printer server	A computer on a LAN that runs software to control one or more shared printers.
Ring network	A LAN topology in which data are transmitted in one circular direction among workstations.
Stand-alone computer	A personal computer that is not connected to a network.
Star network	A LAN topology in which all workstations are connected directly to a central location.
Switch box	A box used to connect multiple computers to one printer.
Token	A special message or "flag" used in some LANs to prevent data collisions.
Token ring	A network standard that uses a ring topology with token-

	passing techniques to prevent data collisions.
Tree topology	A LAN topology in which all workstations are connected to a branching central transmission cable.
Workstation	Individual microcomputer on a LAN that is used by students and teachers to run programs.

OVERVIEW OF CHAPTERS

Chapter I provided an explanation for the need for research to be completed in the area of using stand-alone computers and networked computers in the classroom. The problem was stated with research goals, limitations, and assumptions. The procedures for the research were briefly explained with related terms defined.

A review of literature will be provided in Chapter II and Chapter III will provide an explanation of the methods and procedures used to obtain the research data, with Chapter IV stating the findings. Finally, Chapter V will provide a summary with conclusions and recommendations based on the findings of this study.

CHAPTER II

REVIEW OF LITERATURE

Chapter II is the Review of Literature section of this research paper. In this chapter, the reader will be provided with an overview of stand-alone computers and networked computers.

STAND-ALONE COMPUTERS

In the period 1980 through 1989, schools in the United States purchased more than 20 million microcomputers (Gross, 1991, p. 20). Most of these computers were placed in a central resource area such as a school library. As the number of computers began to exceed one per classroom, many schools began to group computers into a single classroom.

Historically, the tools of office workers have been pencils and pens, paper, typewriters, dictating machines, and calculators. Many of these office tools, some of which have been utilized for more than 100 years, are no longer in business because of microcomputers or stand-alone computers.

Advancing computer technology has brought computers into the home, the classroom, and the workplace. Stand-alones are powerful, yet easy to operate.

Stand-alones usually are equipped with the keyboard, display, disk drives, and printer. Unfortunately, most

stand-alones have the capacity to perform only one job at a time, but do handle real-time processing.

The computer is an integral part of the modern educational system. Understanding how to use a computer system in the processing, storing, accessing, and communication of information is an important part of job transition skills.

As users have become more experienced with microcomputers, demands have grown. These demands have promoted the development of even more powerful microcomputers and the software to support them.

NETWORKED COMPUTERS

What is a LAN? It is a software and hardware system that connects computers, printers, and other devices. Depending on its capability, it allows file sharing, application storage and sharing, electronic mail, and dial-in remote access from home and more.

Each LAN contains a network operating system (NOS), software, file server, workstations, cabling and network interface cards. LANs are as powerful as the NOS. The NOS controls how a user can access information on the file server.

The heart of a LAN is the file server. This computer "serves" the "file" needs of its users. The file server is normally not directly used by students or staff.

LANs eliminate the need for data disks. All data residing on the file server is backed up on a regular basis and is available by the student from any computer on the network.

File servers are accessed from the computer attached to the network, called workstations. Workstations are attached to the file server by cabling.

Workstations and file servers communicate over the cable by way of a protocol usually contained on a network interface card. Protocols are standardized rules describing how the various parts of the network "talk" to each other (Molettiere, 1991, p. 40-42).

"To illustrate the use of networks, let us look at the LANs used at Omaha North High School in Omaha, Nebraska. Starting with one file server and eight workstations in 1984, Omaha North added its 6th and 7th file servers during the 1991-92 school year. Over 200 of the 350 computers in the building are networked; over 650 students, out of 1,600 access the network every day.

Students and staff use the network on a daily basis. Some classes use the computer for one or two periods a day, five days per week; others on an every-other-day basis; still others whenever the needs arises. The networked "classroom" does not have student desks, but tables with

networked computers for each student. They are a vision of tomorrow, today.

In many classes, assignments, tests and research papers are completed online. Students access the teacher's gradebook (a spreadsheet with names replaced by student numbers) and instantly see their grade while network security prevents the student from changing the grade. CD-ROMs of the *Readers's Guide, Grolier's Encyclopedia* and others will be added this year, joining a large collection of maps and graphics already available" (Molettiere, 1991, p. 43).

In addition, the electronic blackboard is a reality with networks. Third party products such as LinkWay Systems allow a teacher to broadcast their screen to student screens and lock student keyboards. Once finished discussing the assignment or demonstrating a concept, the teacher can release the student screens or keyboards for their individual use (Molettiere, 1991, p. 76).

Technology will change not only what we teach, but how we teach it. Networks can be a medium for this change by allowing and encouraging access to unlimited information and sharing. If information is power, then easily accessed information is even more powerful. Students exposed to the technology and concepts of networking benefit from its use.

SUMMARY

Chapter II, Review of Literature, presented the different views about stand-alone and networked computers. There was a lack of research in the literature comparing the two types of computers and use of these systems in Business Education classrooms. The next chapter will present the methods and procedures utilized to compare the results of stand-alone versus networked computers in completing keyboarding assignments.

CHAPTER III

METHODS AND PROCEDURES

Chapter III, Methods and Procedures, establishes the procedures to be used to compare the effectiveness of using stand-alone computers and networked computers in a classroom to complete keyboarding assignments. The topics explored in this chapter includes: 1) Population, 2) Research Variables, 3) Instrument Design, 4) Methods of Data Collection, 5) Statistical Analysis, and 6) Summary.

POPULATION

The population of the study was made up of first year keyboarding students. The selected sample within this population was three keyboarding classes. Each class was held for 50 minutes Monday - Friday. The classes had 18, 24, and 18 students, respectively.

RESEARCH VARIABLES

The independent research variables were the utilization of the textbook and the operation of software and equipment on networked and stand-alone computers. The dependent research variables were the student's comprehension and their achievement.

INSTRUMENT DESIGN

The instrument used to gather data was a performance test. The test was used to determine and compare the effectiveness of performance using stand-alone and networked computers in completing keyboarding assignments. A copy of the instrument is found in Appendix A.

CLASSROOM PROCEDURES

The networked classroom had 22 networked computers. Each student's work was monitored via LinkWay Software. In addition, there was only one laser printer. However, the stand-alone computer classroom had 26 computers. In order to monitor the progress of each student, observations were made throughout the classroom. Even though there was 26 computers, there were only 13 printers.

METHODS OF DATA COLLECTION

The test to determine keyboarding efficiency was given to the 60 first year keyboarding students of Woodrow Wilson High School in Portsmouth, VA. All classes were given a performance test.

STATISTICAL ANALYSIS

A statistical analysis was conducted to compare the test results of each class. The t-test was used to determine if there was a significant difference between the two sample means.

SUMMARY

Chapter III presented a description of the population, research variables, instrument design, classroom procedures, methods of data collection, and statistical analysis to compare the effectiveness of using networked computers and stand-alone computers in a classroom to complete keyboarding assignments. The next two chapters will present the findings, summary, conclusions, and recommendations of this study.

CHAPTER IV

FINDINGS

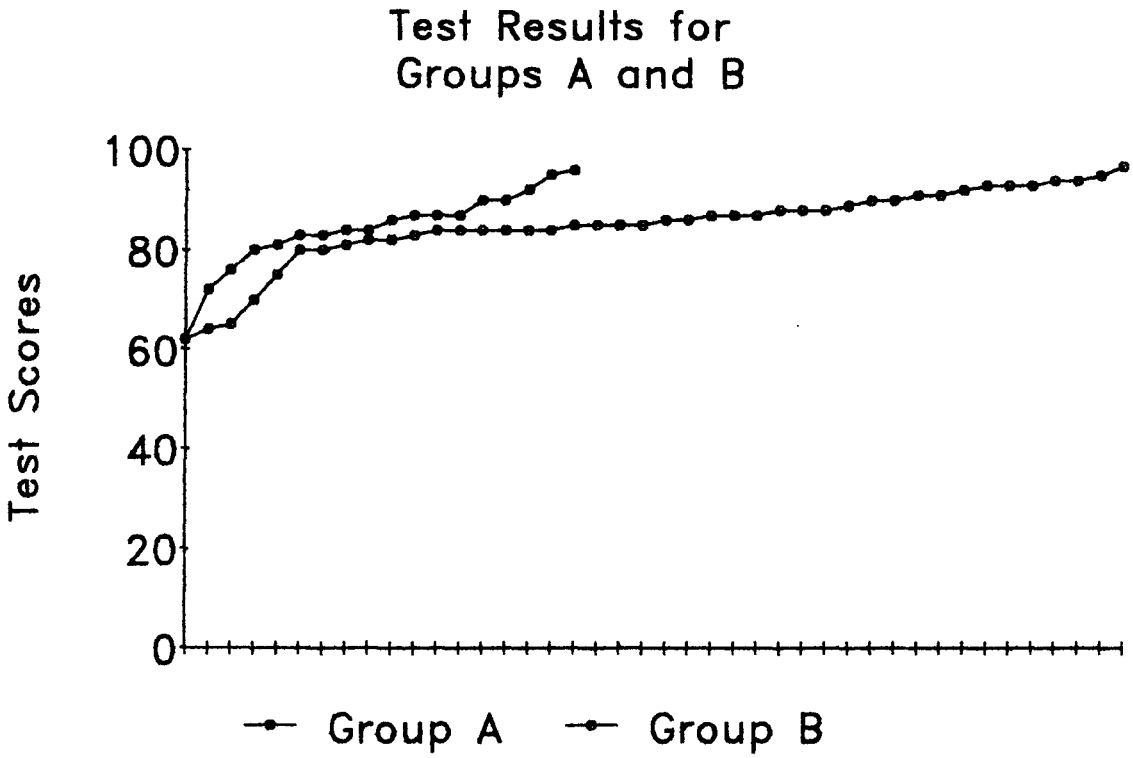
This study was conducted to determine the effectiveness of using stand-alone computers and networked computers in completing keyboarding assignments. The topics that were explored in this chapter included: (1) Assessment of Data and (2) Summary.

ASSESSMENT OF DATA

Measures of central tendency were calculated to find the mean for each group. Figure 1 shows the test results for both Groups A and B. Figure 2 shows the mean, which is the average score for each group. The mean score for the control group was 84.9; the mean score for the experimental group was 84.1. This shows that the initial performance of both groups were comparable.

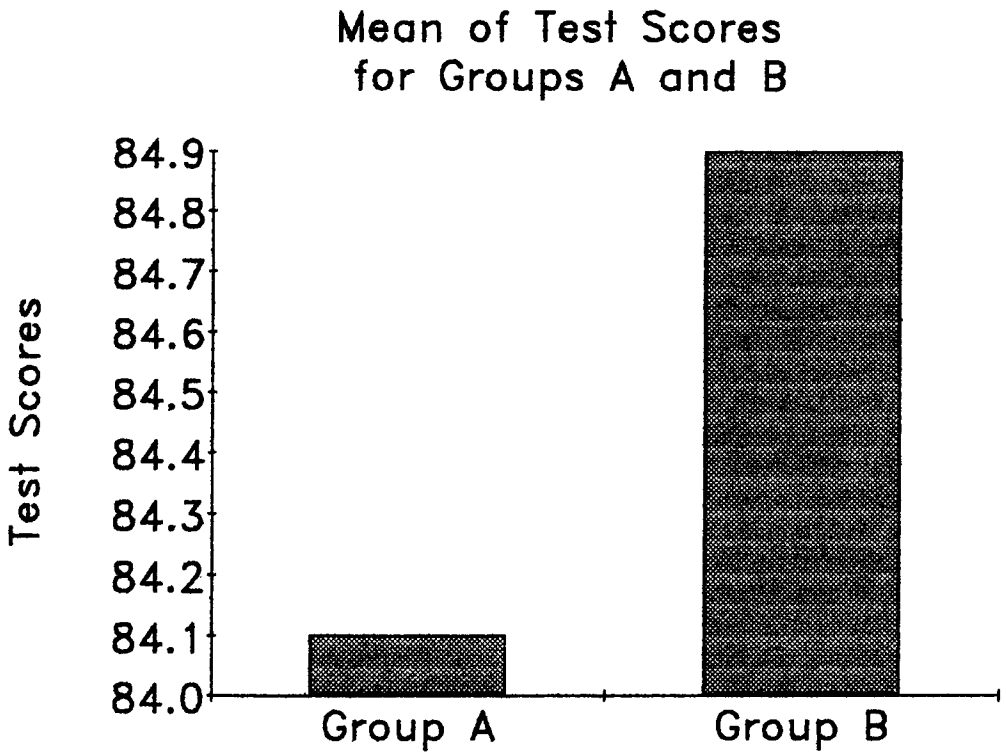
The t-test was applied using the findings of this study. The t-test calculations can be found in Appendix B. The results were as follows: The t-test was used to determine if there was a significant difference between completing classroom keyboarding assignments using stand-alone computer and network computers. The test calculated was -.38.

Figure 1



Note: Group A is the experimental group using stand-alone computers. Group B is the control group using networked computers.

Figure 2



SUMMARY

This chapter has reported the findings of the test results from the classes utilizing stand-alone and network computers to complete classroom keyboarding assignments. Chapter V will analyze these findings as well as provide conclusions and recommendations.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this chapter was to report the summary, conclusions, and recommendations to summarize the findings of the research report.

SUMMARY

This research was conducted to compare the effectiveness of using stand-alone computers and network computers in completing classroom keyboarding assignments. It was hypothesized that students who utilize stand-alone computers will perform more efficiently than students who utilize network computes in completing keyboarding assignments.

The significance of this study was based on the fact that LANs have become an integral part in today's information systems. One of the reasons for installing LAN's was to perform integrated services such as: e-mail.

The limitations of this study were as follows: (1) first year keyboarding students were used for this study, (2) three classes consisting of 18, 24, and 18 participants, respectively, were used for the test groups, and (3) the teacher had limited experience on the networked system.

The population of this study was made up of keyboarding students. From this sample, 42 used network computers and 18 used stand-alone computers.

A performance test was administered to the participants. The test had four keyboarding documents. Each document was graded individually, then all documents were averaged together for an overall score.

Statistical analysis was completed to compare the test results of those utilizing networked and stand-alone computers. A t-test was used to determine if there was a significant difference between two sample means.

CONCLUSIONS

The hypothesis in this study was that students who utilize stand-alone computers will perform more efficiently than students who utilize network computers in completing classroom keyboarding assignments. Based on calculated results, this hypothesis was not accepted. The calculated t-test was .38. There was no significant difference at the .05 level between the group who utilized stand-alone computers and networked computers.

RECOMMENDATIONS

Based on the results and conclusion of this study, the following recommendations were made:

1. Teachers should continue to use both stand-alone computers and networked computers in their classrooms.

2. Further research should be conducted comparing the performance of using stand-alone and networked computers.
3. Further study should include the comparison of performance in operating stand-alone and networked computers.

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Kinnaman, Daniel E. Networking-The Missing Piece. Technology and Learning, November/December 1991.

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Molettiere, Richard. A Guide to Networking. Media and Methods, November/December 1991.

Windsor, Francis A. LANS: A Tool for Successful Computer Education. Media and Methods, January/February 1991.

APPENDICES

APPENDIX A

Performance Test

PERFORMANCE TEST

Problem 1: Business Letter with Mailing Notation, Enclosure, and cc Notation

Directions: Modified block; blocked paragraphs; mixed punctuation; correct errors

Current/ AIRMAIL/ Mr. Norman C. Jerome, Manager/ Edgewood Pottery Company/ 1603 Comanche Avenue/ Corpus Christi, Texas 78401/ Dar Mr. Jerome/ SUBJECT: Revision of Office Systems

Dr. George S. Patterson will call at your office Tuesday at 9:30 a.m. to discuss the proposed revision of your filing and records control system. This is part of the general overall revision we discussed at the convention last week in San Antonio.

It might interest you to know that Dr. Patterson has just completed a similar assignment as consultant to the Houston Tool and Die Company, and they report that they are highly satisfied with the results he obtained.

In anticipation of Dr. Patterson's visit, you may find it interesting to read the enclosed pamphlet which presents in brief form some of the cost-reducing, efficiency-increasing changes that have been adopted by other companies. If I can be of additional help to you, please let me know. /Sincerely yours/ J. Arthur Frank, Director/ Systems Analysis Department / Your Initials/ Enclosure/ cc Mr. James P. Higgenbotham

COLLEGE TYPEWRITING, Seventh Edition
by Lessenberry, Wanous, and Duncan
Copyright, 1965
by South-Western Publishing Company

Problem 2: Personal-Business Letter

Directions: Type in correct format; correct errors

2711 East 66th Place, South/ Tulsa, Oklahoma 74105/ Current Date/ Sound Equipment Systems, Inc./ 2925 Alta Monte Avenue, N.E/ Albuquerque, New Mexico 87107

Model 620-B Ensco radio discontinued. None available here. Model 610-T Ensco is suitable for substitute. We can ship immediately. Notify if substitute is satisfactory. /Thank you/ Markham Finch/ Your Initials

Problem 3: Interoffice Memorandum with Table

Directions: Type in correct format; 5 spaces between columns; correct errors

TO: Miss Jackson, Travel Office
FROM: Eldon Roberts, Sales Manager
SUBJECT: Travel Arrangements
DATE: December 28, 19--

Will you please arrange travel and hotel accommodations that will enable me to meet the following schedule:

Chicago, Illinois	2 p.m.	January 15
Urbana, Illinois	9 a.m.	January 16
St. Louis, Missouri	10 a.m.	January 17

Each of these appointments should take no longer than three hours. I must be back at my desk by the morning of January 18 for an appointment at 9:30. / Your Initials

Problem 4: Leftbound Manuscript

Directions: Type in correct format; correct errors

OFFICE AUTOMATION

We have had automation in some sense ever since man first used a jagged piece of rock to help him do things better than he could do them with bare hands. The automation to which we refer today, however, is the carrying out of tasks (factory and office) electronically at a more rapid rate than ever before. Man is no longer a slave to machines, but is finally beginning to make machines his slave. As Daniel R. Mason points out, old machines depended upon man to operated them. They were no better than the men who ran them. Our new machines control their own operations. They are not restricted in their production to the limitations of man. "To me," writes Mason, "this is the distinctive fact about automatics."[1]

To some, automation is a monster--a power-hungry octopus that will take away jobs and limit a man's thinking to those ideas that can be expressed in a mathematical formula. On the other hand, others see it as a modern-day miracle that will save man from performing deadly, routine tasks, give him more free time, improve his decision-making powers, and increase his take home pay.

In the business and industrial office, automation is directed toward doing away with the manual rewriting of

information beyond the first recording. On this timely subject, Howard S. Levin writes in his book:

> What has been needed in a common language for office work. A common language enables machines to interact . . . . If a record can be prepared in a common language the first time information is handled, that information is available, without recouping, for subsequent data-processing operations.[2]

At present, automation is taking the place of clerks who are not available because of the scarcity of good clerical workers. In the long run, it will take over many of our routine clerical jobs. Data processing machines will, however, create more highly skilled jobs that will make better use of the talents of man. All evidence points to the fact that as industry automatizes, more workers may actually be needed. Kenneth P. Morse writes that clerks will need a broader concept of what business is and does. New opportunities will be opened to them leading to jobs of greater responsibility. "One of the requirements of Integrated Data Processing," Morse writes, "is a higher proportion of supervisory personnel than is currently to be found in most business."[3]

---

[1]Daniel R. Mason, "Data Processing in Business," The National Business Education Quarterly (December, 1957), p. 32

[2]Howard S. Levin, Office Work and Automation (New York: John Wiley and Sons, Inc, 1956), p. 19.

[3]Kenneth P. Morse, "Automation Demands Training in Fundamentals," Business Education World (December, 1957), p. 12.

APPENDIX B

T-test Calculations

T-Test Calculations

Performance Test Results

	GROUP A	d of 1	d2 of 2
s1	62	-22.1	488.41
s2	72	-12.1	146.41
s3	76	-8.1	65.61
s4	80	-4.1	16.81
s5	81	-3.1	9.61
s6	83	-1.1	1.21
s7	83	-1.1	1.21
s8	84	-0.1	0.01
s9	84	-0.1	0.01
s10	86	1.9	3.61
s11	87	2.9	8.41
s12	87	2.9	8.41
s13	87	2.9	8.41
s14	90	5.9	34.81
s15	90	5.9	34.81
s16	92	7.9	62.41
s17	95	10.9	118.81
s18	96	11.9	141.61

$$\Sigma_1 = 1515$$

$$M_1 = 18$$

$$\bar{X} = 84.1$$

$$\Sigma d_1^2 = 1142.17$$

	GROUP B	d of 2	d2 of 2
s1	62	-22.9	524.41
s2	64	-20.9	436.81
s3	65	-19.9	396.01
s4	70	-14.9	222.01
s5	75	-9.9	98.01
s6	80	-4.9	24.01
s7	80	-4.9	24.01
s8	81	-3.9	15.21
s9	82	-2.9	8.41
s10	82	-2.9	8.41
s11	83	-1.9	3.61
s12	84	-0.9	0.81
s13	84	-0.9	0.81
s14	84	-0.9	0.81
s15	84	-0.9	0.81
s16	84	-0.9	0.81
s17	84	-0.9	0.81
s18	85	0.1	0.01
s19	85	0.1	0.01
s20	85	0.1	0.01
s21	85	0.1	0.01
s22	86	1.1	1.21
s23	86	1.1	1.21
s24	87	2.1	4.41
s25	87	2.1	4.41
s26	87	2.1	4.41
s27	88	3.1	9.61
s28	88	3.1	9.61
s29	88	3.1	9.61
s30	89	4.1	16.81
s31	90	5.1	26.01
s32	90	5.1	26.01
s33	91	6.1	37.21
s34	91	6.1	37.21
s35	92	7.1	50.41
s36	93	8.1	65.61
s37	93	8.1	65.61
s38	93	8.1	65.61
s39	94	9.1	82.81
s40	94	9.1	82.81
s41	95	10.1	102.01
s42	97	12.1	146.41

$$\Sigma_2 = 3567$$

$$M_2 = 42$$

$$\overline{X} = 84.9$$

$$\Sigma d_2^2 = 2614.82$$

$$t = \frac{M1 - M2}{\sqrt{\frac{(d1^2 + d2^2)}{(N_1 + N_2)} \quad \frac{(N_1 + N_2)}{(N_1 N_2)}}}$$

$$t = \frac{84.1 - 84.9}{\sqrt{\frac{(1142.17 + 2614.82)}{(18 + 42 - 2)} \quad \frac{(18 + 42)}{(18 * 42)}}}$$

$$t = \frac{-.8}{\sqrt{\frac{(3756.99)}{(58)} \quad \frac{(60)}{(756)}}}$$

$$t = \frac{-.8}{\sqrt{(64.77)\ (.07)}}$$

$$t = \frac{-.8}{\sqrt{4.53}}$$

$$t = \frac{.8}{2.13}$$

$$t = -.38$$