

A STUDY OF FACTORS AFFECTING THE USE OF INSTRUCTIONAL
TECHNOLOGY IN THE ELEMENTARY SCHOOL CLASSROOM

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An Abstract
Presented to the
Graduate and Research Council
Austin Peay State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts in Education

by

Nell Meriwether Northington

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ABSTRACT

The major purpose of this study was to determine if three selected factors affect the frequency of use of instructional technology in the elementary classroom. The three factors were 1) availability of equipment, 2) training in the use of equipment, and 3) years of full time teaching experience. Data were collected by means of a questionnaire, portions of which were modifications of Streeter's 1967 Instructional Media Survey. The copies of the questionnaires were distributed by first class mail to the home addresses of 313 teachers. The subjects were identified as classroom teachers of kindergarten through fifth grade in the 1989-90 school year teaching in a school system in a Middle Tennessee county with a population of approximately 85,000. The Pearson Product-Moment test of correlation was used to test the major hypotheses. Preliminary results indicated that the frequency with which instructional technology was used in the classroom was affected by availability, but not by training or teaching experience.

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To the Graduate and Research Council:

I am submitting herewith a Thesis written by Nell Meriwether Northington entitled "A Study of Factors Affecting the Use of Instructional Technology in the Elementary School Classroom." I have examined the final copy of this paper for form and content, and I recommend that it be accepted in partial fulfillment of the requirements for the degree Master of Arts in Education, with a major in Elementary Education.

Dolores A. Gore
Major Professor

We have read this thesis
and recommend its acceptance:

Jeanette B. Holt
Second Committee Member

Richard C. Yarbrough
Third Committee Member

Accepted for the Graduate and
Research Council:

William J. Eells
Dean of the Graduate School

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CHAPTER 1

Introduction

From the earliest of times, man has concentrated his efforts on gaining the highest yields from his labors. Throughout the ages, successes have resulted from applying the creative mind to difficult problems. Especially in the years since World War II, rapidly emerging technology has eased our lives in many ways, but technology today contributes more to civilization than relief from the burden of work. It entertains, speeds communication, performs mathematical calculations with startling speed and increases the potential for learning some subject matter better and faster (Knezevich, 1970). How technology can contribute to human learning has been a question educators have examined for decades.

In a report to the President and Congress in 1970, a federal Commission on Instructional Technology declared "...that technology can make education more productive, individual and powerful, make learning more immediate, and make access to education more (nearly) equal..." and the commission recommended that the nation increase its investment in instructional technology. It should not be assumed that the mere availability of instructional technology will transform all pupils into successful students. However, it is suggested that the improvements which technology can provide have already contributed to important improvements in learning (U.S. Congress, 1988).

What is a more logical place to promote better living through technology than the field of education? The very nature of education is such that it is directed toward progress and change. However, use of technology must be viewed as a means to extend the teaching and learning processes, not just to provide change (U.S. Congress, 1988). Technology is a means to an end in instruction and its real value lies in its potential contributions to improvements in learning and financial savings. If it fails in these areas then its use is questionable. The "worship" of technology for the sake of technology is self-defeating (Knezevich, 1970).

To identify the parameters of instructional technology one must consider examples at both ends of the spectrum. Although the written word is no longer considered an innovation, it must be noted that when it was first introduced as a medium for learning, many educators feared that writing would eliminate the need to remember. Time has shown that handwritten manuscripts did not replace the memory, but serve as a supplemental instructional tool (Adams and Hamm, 1987).

Conversely, when computers were first introduced, predictions were made that they would revolutionize education. Some individuals viewed computers as a panacea for alleviating instructional ills, but others perceived them as a threat to the humanistic quality of education (Hayden and Torkelson, 1973).

Some teachers have feared being replaced by technological devices (Everson and Tobias, 1978), a factor which certainly interfered with

their desire to master the machines. Their fears now seem unfounded as research suggests that a primary reason for the failure of technological programs is their attempt to reduce contact among people (Gayeski, 1989). Educators now recognize that computers "will neither replace teachers nor make classrooms obsolete," but provide opportunities for enhanced learning (Connecticut State Board of Education, 1983).

Somewhere between the introduction of the written word and the computer, forms of educational technology have appeared which are now so familiar that they may be taken for granted (Carnegie Commission, 1972). The blackboard is practically a universal symbol in the classroom and offers many opportunities for the creative teacher. Charts, maps and models, although first introduced in the 19th century have been improved and modernized through the years. Movies were introduced into the classroom in 1910 and the radio became available in the 1920s. Other technological forms common to today's classrooms are the cassette tape recorders (replacing cumbersome reel-to-reel tape recorders), record players, video cassette recorders and television monitors, video cameras, and a variety of projectors.

In summary, technology has found its way into the classroom and has much to offer educators of today. Depending upon its use, each form of technology can add to the variety of the teaching experience and enhance the learning process, as well as help prepare students for the technological world outside the classroom.

Statement of Problem

Life in these United States seems to be undergoing a profound transformation. Almost daily, changes are taking place in every sector of society. At the center of this process are the extraordinary achievements of modern technology and their impacts on all aspects of human existence.

Such rapid change is presenting major challenges to education in this country. Goslin (1965) stated, "As society changes technologically, it is apparent that the educational system must keep pace with it." The stakes are tremendous and are at least twofold: 1) students must acquire basic skills as effectively as possible; and 2) students must learn sophisticated skills so they can acquire and apply knowledge over their lifetimes (U.S. Congress, 1988).

Schools should attempt to make the best possible use of technological innovations as mechanisms to disseminate information to students. This effort is difficult to realize without first overcoming several obstacles. Each technology must be made available to a staff which is trained and competent in its use. Current software materials must be available and must be kept in working condition. These factors, at the least, are necessary before effective use of technology can be achieved.

Based on the philosophy that use of technology in education is desirable and necessary, this study investigated the factors which may affect use of technology in the elementary classroom.

Purpose of the Study

The purpose of this study was to attempt to determine if there is a relationship between selected factors (availability of selected forms of technology, self-reported training, and years of teaching experience) and the reported use of eleven technological innovations by elementary school teachers in the Clarksville-Montgomery County School System of Middle Tennessee. Specifically, the study attempted to answer the following questions:

1. Is there a relationship between the availability of selected forms of technology and its reported use?
2. Is there a relationship between the training received in the use of selected forms of technology and its reported use?
3. Is there a relationship between years of full time teaching experience and the reported use of selected forms of technology?

Statement of Hypotheses

Three null hypotheses were tested in this study:

HYPOTHESIS 1: There will be no significant relationship between the availability of selected forms of instructional technology and the frequency with which surveyed teachers use these forms in the classroom.

HYPOTHESIS 2: There will be no significant relationship between the training received for selected forms of instructional technology and the frequency with which surveyed teachers use these forms of instructional technology in the classroom.

HYPOTHESIS 3: There will be no significant relationship between the years of teaching experience and the frequency with which surveyed teachers use these forms of instructional technology.

Definition of Terms

- Educational Technology - (Used interchangeably with "Instructional Technology" and "Instructional Media") Technological innovations and audio visuals ranging from graphics to computers that teachers use to supplement or substitute for traditional means of communicating information to students (Henry, 1987).
- Equipment - Used interchangeably with machines and/or hardware.
- Hardware - The actual physical equipment or machine used in teaching, such as film projector, overhead projector, computer (Henry, 1987).
- In-Service Training - Actual planned training in the use of educational technology that is provided by the school district where the teacher is employed.
- Innovative Media - Materials and equipment, perceived as new, which are intended to bring improvement in desired learning objectives (Henry, 1987).
- Software - The materials, programs, films, etc. used with equipment (hardware) to send messages to the learner.
- Traditional Media - Materials and equipment which have been available in the classroom many years. Examples include 16mm films, records, cassette tapes and equipment to utilize them.

Limitations of the Study

Subjects were limited to individuals identified as classroom teachers of grades K-5. For the purpose of this study, resource teachers, librarians and content area teachers were not surveyed.

Importance of the Study

In the best of America's technology-using schools, one can witness on-going examples of what teachers have dreamed that education could be. Here students receive personalized and individualized instruction at the hands of educators who are thoroughly dedicated to the use of technology, and who fully utilize their electronic tools, be they computers, videocassette recorders, televisions or satellite dishes. These technologies make possible imaginative approaches to teaching traditional subjects and are motivating teachers and children to try new ways of information gathering and learning (U.S. Congress, 1988). Such electronic links can connect classrooms to homes, businesses, other schools, libraries and universities and provide diverse learning experiences for the students (Mecklenburger, 1989).

Unfortunately, many schools have yet to reach this level of technological sophistication. Many principals and teachers still lack the vision or the resources necessary to achieve significant use of electronic technology. Additionally, those who do attempt to incorporate technology into the curriculum must experience a period of transition from using traditional media (or no media) to modern forms. This transition is not always smooth due to many factors which may affect a teacher's choice to utilize a particular piece of equipment. If these factors can be identified, then obstacles can be eliminated that curtail technology use. This study will attempt to identify at least three factors and determine the effect they may have upon the use of instructional technology in the elementary classroom.

CHAPTER 2

Review of Literature

Whether a fan or a fanatic, a doubter or a disbeliever, one must accept the fact that the use of instructional technology in the classroom is currently one of the most controversial issues in education. Research exists to support almost every issue of the debate. In addition, periodicals are flooded with articles passionate with predictions that technology is the key to improving education in the United States (U.S. Congress, 1988).

A factor significant to its success is its utilization, and the factors that affect utilization have also been the topic of a great many publications. Availability of forms of technology must logically head the list of considerations. The Office of Technology Assessment (OTA) states one of its first priorities is to "expand the amount of technology in the schools" (U.S. Congress, 1988). According to studies conducted by the OTA in 1988, distribution of computers nationwide increased significantly since 1981, but the majority of schools still did not have enough to make the computer a central element of instruction. Students in relatively poor school districts have less potential access to computers than do their peers in wealthier areas, and black students have less access than white students (U.S. Congress, 1988).

While lack of funds is cited as the primary barrier to innovative technological acquisitions (U.S. Congress, 1988), it also has an effect upon the availability of more traditional forms. In a survey conducted in 1987, Nelson, Prosser and Tucker found that the use of traditional media in the classroom is on the decline. They suggest that available money is being spent "in a recent rush to purchase computers and videocassette recorders." In addition, they found that money previously spent on equipment maintenance and materials for traditional media was no longer available and, consequently, broken equipment and damaged or outdated materials were not replaced.

In a study conducted in Kentucky schools in 1987, Henry investigated the relationships between the availability of equipment located in the classroom, in the school building, and in the district media center, and the frequency with which each form of equipment was used. She identified a significant positive correlation between that equipment found in the classroom and its frequency of use. While a positive correlation also existed between certain equipment (microcomputer, videocassette recorder) found in the building and/or district media center and its frequency of use, the most significant use was identified by equipment found in the classroom. Henry concluded that if technology use is to be increased, it would seem logical to place as much as possible in the classroom. Ennals (1986) agreed as he concluded, "if education is to play a leading role in innovation, then the clear implication is that the resources must be made available."

While it is understood that modern equipment must be present in the schools before it can be utilized, its mere presence is no guarantee of successful implementation in the curriculum. A commitment by the teacher to accept such a new educational concept is a necessary precondition for success (Lidtke, 1981). Teachers must decide if using technology fits their teaching style and if there is evidence of effective use of equipment for their needs and subject content. They must also be allowed planning time to make the necessary adjustments in their teaching (Lidtke, 1981).

A study conducted by Everson and Tobias (1978) suggested that teachers' attitudes and fear of automation must be overcome if they are to successfully use instructional technology and media. A teacher may not only be reluctant to use a machine that is unfamiliar, but may further be afraid of being replaced by the technology itself. Results of their study indicated that fear of automation had a great influence on teachers' attitudes towards instructional media and technology.

Another factor which may affect the use of technology is the availability of training in the various forms, especially innovative technology. Educational technologies are not self-implementing and cannot be fully effective unless teachers receive training and support. Recent studies show that most teachers want to use technology and want to prepare their students for the world outside the classroom (U.S. Congress, 1988). However, when left to their own means of training, many teachers will give up in frustration or overlook significant features of a machine (Collis and Martinez, 1989).

Reading and applying a user's guide or operating manual can be time consuming and demanding, especially if the teacher is unfamiliar with the technological language (Brooks and Kopp, 1989). From an administrative standpoint, it is an inefficient use of time to have individual teachers struggle with equipment, when training seminars, in-services or workshops could provide consistent instruction to groups of educators.

Although it is reasonable to expect new teachers fresh out of college to come to the classroom skilled in teaching with technology, data suggest otherwise (Fulton, 1989). Teacher training colleges are challenged in their pre-service responsibilities to future teachers. Basic introduction courses are not enough to prepare teachers to use technology in the classroom. Bransford et al. (1989) suggested that the most effective way to teach teachers is to use technology as a major part of their instruction. Fulton (1989) suggested that educational technology be introduced as a central element in all methods and theory courses in the education curriculum. As teachers have the opportunity to experience the advantages of these technologies for their own learning, they should be more likely to use the technology when they teach.

Training not only helps a teacher to feel confident in the use of technology, but it also gives a vision of what the technology can do and why it is worth the effort required to implement its use. Education and training are two coequal sides of the technology training issue. One is not appropriate without the other and neither can stand

alone (Fulton, 1989). Further, training is not static, but must continue as technology evolves. After teachers enter the classroom the local school districts, as primary providers of in-service education, have the most direct influence upon who is trained, how and where (U.S. Congress, 1988).

In her survey of Kentucky teachers, Henry found a significant positive correlation between both college training and in-service training and the use of both traditional and innovative media forms. However, no significant relationship existed between teachers who reported that they were "self taught" and their use of either type of media.

Streeter (1967) reported similar findings in his survey of media competencies in teachers. His results suggested that teachers who received college training in the use of media were likely to have more competency in media than those without such training. However, his evidence also supported the theory that similar media competencies can be acquired outside the college classroom, presumably on the job or in in-service settings.

Both Streeter and Henry also suggest that the more experienced teachers use technology more frequently than less experienced teachers. Their reasoning rests on the fact that these teachers have had more years to develop on-the-job competencies and are therefore more skilled than their colleagues. Less experienced teachers may have had more current training through college courses (U.S. Congress, 1988), but may lack the opportunity for practical application.

Only one with a limited perspective would assume that the aforementioned factors are the only ones that might affect technology use. The list is endless, but may include: 1) availability of current materials and software (Henry, 1987), 2) subject matter taught (Streeter, 1967), 3) age and gender of teacher (Henry, 1987 and Streeter, 1967), 4) attitude of teacher (Everson and Tobias, 1978), 5) supervisor's support (Henry, 1987), and 6) physical classroom limitations. However, for the purpose of this study references were cited that specifically addressed the significance of 1) availability of technology, 2) availability of training, and 3) years of teaching experience.

CHAPTER 3

Methodology

Descriptive research was conducted according to the following research plan. This account includes both the design of the test instrument and a description of the subjects who were surveyed.

Design

Data to test the hypotheses were collected by means of a questionnaire, portions of which included modifications of Streeter's widely recognized Instructional Media Survey (1967). A general description of the questionnaire follows.

Part One asked for a profile of the teacher as to gender, age, grade presently taught, total years of full time teaching experience, and highest level of education.

Part Two was designed to determine the respondent's perception of the availability of eleven forms of instructional equipment commonly found in the elementary school. Equipment included the 16mm film projector, slide projector, filmstrip projector, overhead projector, opaque projector, cassette recorder, record player, television, video recorder, video camera and microcomputer.

Part Three was designed to identify various types of training the teacher may have had in order to operate each piece of equipment. Possible answers included methods of formal training (college course or teacher in- service), as well as informal training (self taught). Columns were also provided for "Other" and "Cannot Operate." Teachers could indicate more than one method if appropriate.

Part Four was designed for the teacher to report frequency of use of equipment by circling the number of days per month (from 0 to 20) that he/she used each piece of equipment.

Part Five asked for conditions which have discouraged the teacher from using instructional technology.

The instrument was checked for content validity by a professor in the Department of Education with a specialty in the field in instructional media. A pre-test was also conducted using a select group of classroom teachers as subjects.

Subjects

Subjects in this study were teachers of grades K-5 in a public school system serving all socio-economic levels in a Middle Tennessee county. A total of 313 teachers in 12 schools were identified as teachers of the appropriate grades. Resource teachers, librarians and content area teachers were not included in this study. Questionnaires were distributed by first class mail to home addresses and self-addressed stamped envelopes were provided for return responses. Two mailings and one post card follow-up were sent, followed by a third mailing to a random sample of those who had not yet responded. Twenty questionnaires were returned with insufficient addresses. Of the remaining questionnaires, 192 responses were received, for a 66% return.

Table 1 was constructed to provide a descriptive portrayal of the demographic data. It includes the number of respondents, distribution of teachers by age, gender, years of experience, grade taught and highest level of education.

TABLE 1
DEMOGRAPHIC SUMMARY OF RESPONDENTS

CATEGORY	TOTAL N	PERCENT (%) OF POPULATION SAMPLE
Elementary Teachers K-5	192	100.00
Gender:		
Female	186	97.00
Male	6	3.00
Age:		
20-29	25	13.00
30-39	82	43.00
40-49	45	23.00
50-59	26	13.00
60+	11	6.00
No response	3	2.00
Mean age: 40.14 (Both genders)		Male: 46.40 Female: 39.86
Years of Teaching Experience:		
1- 5	27	14.00
6-10	48	25.00
11-15	39	21.00
16-20	47	24.00
21-25	16	8.00
25+	13	7.00
No response	2	1.00
Mean experience: 13.40 years (Both genders)		Male: 14.16 years Female: 13.37 years
Grade Level:		
Kindergarten	38	20.00
First	37	19.00
Second	30	16.00
Third	26	13.00
Third/Fourth	1	1.00
Fourth	30	16.00
Fourth/Fifth	3	2.00
Fifth	27	14.00
Education:		
Bachelor's Degree	79	41.00
Master's Degree	108	56.00
Education Specialist	3	2.00
No Response	2	1.00

An examination of the questionnaires returned indicated that 97% of the respondents were female. The mean age was calculated at 40.04, with 56% reporting that they are under age 40. The mean age was also calculated by gender, resulting in a mean age of 46.40 for men and 39.86 for women.

In reporting years of experience, teachers indicated in 60% of the instances that they had 15 years of experience or less, with a mean of 13.4 years. Again the mean was calculated by gender, showing that men had 14.16 years of experience while women had 13.37 years.

The grade level most widely represented was kindergarten, with 20% of the total respondents, followed by first grade, with 19%. One person reported that he/she was a teacher of a split grade 3/4, while three persons reported teaching a split grade 4/5.

In reporting highest level of education, 41% indicated that they had earned a Bachelor's Degree, while 56% had earned a Master's Degree. Only three individuals, or 2%, had earned an Education Specialist Degree.

CHAPTER 4

Results

Data were analyzed in terms of percentages and correlation coefficients. The Pearson Product-Moment Correlation Coefficient was used for testing the three hypotheses. Degrees of freedom for a Pearson correlation are $n - 2$, or $192 - 2 = 190$, for this study.

HYPOTHESIS 1: There will be no significant relationship between the availability of selected forms of instructional technology and the frequency with which surveyed teachers used these forms in the classroom.

The first step in determining whether the data supported the hypothesis was to indicate numbers and percentages of each type of equipment identified in each location. These findings appear in Table 2.

TABLE 2

NUMBERS AND PERCENTAGES OF EQUIPMENT FOUND IN CLASSROOMS AND SCHOOL BUILDINGS

EQUIPMENT	CLASSROOM		BUILDING		NOT AVAILABLE OR DON'T KNOW	
	#	%	#	%	#	%
1. 16mm film projector	4	2%	184	96%	4	2%
2. Slide projector	3	2%	140	73%	49	25%
3. Filmstrip projector	158	82%	34	18%	0	0%
4. Overhead projector	149	77%	42	22%	1	1%
5. Opaque projector	2	1%	177	92%	13	7%
6. Cassette tape recorder	190	99%	2	1%	0	0%
7. Record player	187	97%	5	3%	0	0%
8. Television	4	2%	184	96%	4	2%
9. Video recorder (VCR)	2	1%	188	98%	2	1%
10. Video camera	0	0%	138	72%	54	28%
11. Microcomputer	26	14%	127	66%	39	20%

An examination of the data indicated that four pieces of equipment (filmstrip projector, overhead projector, cassette recorder, and record player) were most often found in the classroom, while the 16mm projector, slide projector, opaque projector, television, video cassette recorder, video camera and computer were available in the building, but not in the classroom.

Correlation coefficients were then computed to test the relationship between the availability of the equipment and the frequency of its use. The results appear in Table 3.

TABLE 3

CORRELATIONS BETWEEN AVAILABILITY OF EQUIPMENT
AND FREQUENCY WITH WHICH IT IS USED

EQUIPMENT	CORRELATION COEFFICIENT
1. 16mm film projector	.03868
2. Slide projector	-.01901
3. Filmstrip projector	.09133
4. Overhead projector	.14588*
5. Opaque projector	.13424*
6. Cassette tape recorder	.17418*
7. Record player	.16922*
8. Television	.16399*
9. Video recorder (VCR)	.14162*
10. Video camera	-.05618
11. Microcomputer	.16902*

N= 192

*Significant at the .05 level

An examination of the data indicates a significant positive correlation between availability and usage in seven of the eleven forms of equipment: the overhead projector, opaque projector, cassette

tape recorder, record player, television, video cassette recorder and the microcomputer. Correlations are positive but moderate for the 16mm film projector and the filmstrip projector, and slightly negative correlations are shown for the slide projector and video camera.

Under the circumstances, with more than half (64%) of the equipment showing a significant correlation, it would appear that availability is a factor that attributes to the usage of equipment. The null hypothesis was therefore rejected.

Additional testing of the significant correlation coefficients was conducted using the Fisher-Z Transformation. Each coefficient fell within the approximate boundaries of the 95 percent confidence interval for the population correlation coefficient. The results appear in Table 4.

TABLE 4

RESULTS OF FISHER-Z TRANSFORMATION
ON SIGNIFICANT CORRELATION COEFFICIENTS BETWEEN
AVAILABILITY OF EQUIPMENT AND FREQUENCY OF USE

EQUIPMENT	LOW BOUNDARY	CORRELATION COEFFICIENT	HIGH BOUNDARY
Overhead projector	.003	< .14588	< .280
Opaque projector	-.007	< .13424	< .272
Cassette tape recorder	.034	< .17418	< .310
Record player	.029	< .16922	< .305
Television	.024	< .16399	< .300
Video recorder (VCR)	.000	< .14162	< .295
Microcomputer	.029	< .16902	< .305

HYPOTHESIS 2: There will be no significant relationship between the training received for selected forms of instructional technology and the frequency with which surveyed teachers use these forms of instructional technology in the classroom.

The first step in determining whether the data supported the hypothesis was to indicate numbers and percentages of type of training received for each form of equipment. These findings appear in Table 5.

TABLE 5

NUMBERS AND PERCENTAGES OF TEACHERS
WHO HAVE RECEIVED TRAINING
IN THE USE OF EQUIPMENT

EQUIPMENT	COLLEGE		TEACHER IN-SERVICE		TRAINING		CANNOT OPERATE		OTHER	
	#	%	#	%	#	%	#	%	#	%
1. 16mm film projector	185	96%	18	9%	61	32%	4	2%	1	1%
2. Slide projector	68	35%	8	4%	107	56%	8	4%	4	2%
3. Filmstrip projector	120	62%	8	4%	86	45%	1	1%	1	1%
4. Overhead projector	106	55%	8	4%	87	45%	1	1%	1	1%
5. Opaque projector	109	57%	8	4%	77	40%	4	2%	5	3%
6. Cassette tape recorder	46	24%	2	1%	151	79%	1	1%	0	0%
7. Record player	33	17%	1	1%	162	84%	1	1%	1	1%
8. Television	16	8%	0	0%	171	89%	1	1%	0	0%
9. Video recorder (VCR)	8	4%	5	3%	165	86%	5	3%	6	3%
10. Video camera	16	8%	5	3%	92	48%	68	35%	7	4%
11. Microcomputer	45	23%	90	47%	61	38%	39	20%	10	5%

Percentages may exceed 100% as some items received more than one response.

An examination of data indicated that a majority of the respondents had college training in the use of 16mm film projector, filmstrip projector, overhead projector and opaque projector, while indicating self-training in the use of the slide projector, cassette tape recorder, record player, television and video cassette recorder, tape recorder, record player, television and video cassette recorder,

equipment often found in the home as well as the classroom. Training in the use of the microcomputer was reported most often by teacher in-service, in 47% of the responses, with 23% reporting college training. This indicated 70% of the respondents had received formal training in the use of the microcomputer.

Correlation coefficients were then computed to test the relationship between the training received for each form of equipment and the frequency of its use. The results appear in Table 6.

TABLE 6

CORRELATIONS BETWEEN TRAINING IN THE USE
OF EQUIPMENT AND THE FREQUENCY OF ITS USE

EQUIPMENT	CORRELATION COEFFICIENT
1. 16mm film projector	.04012
2. Slide projector	-.09551
3. Filmstrip projector	.05891
4. Overhead projector	-.07683
5. Opaque projector	-.01691
6. Cassette tape recorder	.06161
7. Record player	.02801
8. Television	.02995
9. Video recorder (VCR)	.01791
10. Video camera	-.05299
11. Microcomputer	.34541*

N = 192

*Significant at .05 level

The data indicated a significant positive correlation between training and frequency of use only on the microcomputer. This may be attributed to the number of respondents who had received both college training and in-service training on the computer. Correlations were

positive for the 16mm projector, filmstrip projector, cassette tape recorder, record player, television and videocassette recorder, however the coefficient was not significant. Negative correlations are shown for the slide projector, overhead projector, opaque projector and video camera. Again, however, the coefficient was not significant. Therefore the null hypothesis was accepted.

Results of the Fisher-Z Transformation supported that the one significant correlation coefficient (microcomputer) fell within the approximate boundaries of the 95 percent confidence interval for the population correlation coefficient. Results can be found in Table 7.

TABLE 7

RESULTS OF FISHER-Z TRANSFORMATION
ON SIGNIFICANT CORRELATION COEFFICIENT BETWEEN TRAINING
IN THE USE OF EQUIPMENT AND FREQUENCY OF ITS USE

EQUIPMENT	LOW BOUNDARY	CORRELATION COEFFICIENT	HIGH BOUNDARY
Microcomputer	.218	< .34541	< .556

HYPOTHESIS 3: There will be no significant relationship between the years of teaching experience a teacher has and the frequency with which the teacher uses these forms of instructional technology.

To determine if the data supported the hypothesis, the numbers and percentages of years of teaching experience were charted for each of the respondents. These findings appear in Table 8.

NUMBERS AND PERCENTAGES OF TEACHERS'
FULL TIME TEACHING EXPERIENCE

24

YEARS OF EXPERIENCE	NUMBER OF TEACHERS	PERCENTAGE
1	6	3%
1.5	3	2%
2	3	2%
2.5	1	0%
3	2	1%
4	6	3%
5	6	3%
5.5	1	0%
6	11	6%
7	11	6%
8	5	3%
8.5	1	0%
9	13	7%
10	6	3%
11	4	2%
12	12	6%
13	8	4%
14	9	5%
15	7	4%
16	11	6%
17	7	4%
18	9	5%
19	4	2%
20	15	8%
21	3	2%
22	4	2%
23	2	1%
24	3	2%
24.5	1	0%
25	3	2%
26	4	2%
27	0	0%
28	1	0%
29	0	0%
30	5	3%
31	0	0%
32	0	0%
33	0	0%
34	0	0%
35	1	0%
36	0	0%
37	0	0%
37.5	1	0%
38	0	0%
39	0	0%
40	0	0%
41	1	1%
No response	2	
TOTALS	192	100%

In examining the data, the range of experience reported is from one year to 41 years, with a mean of 13.40. The median length of experience is 13 years, while the mode is 20. Sixty percent of the teachers have less than 15 years teaching experience.

Correlation coefficients were then computed to test the relationship between the years of teaching experience and the frequency of use of instructional equipment. Results appear in Table 9.

TABLE 9

CORRELATIONS BETWEEN YEARS
OF FULL TIME TEACHING EXPERIENCE
AND FREQUENCY OF USE OF EQUIPMENT

EQUIPMENT	CORRELATION COEFFICIENT
1. 16mm film projector	.01889
2. Slide projector	-.09152
3. Filmstrip projector	.09061
4. Overhead projector	.08821
5. Opaque projector	.09561
6. Cassette tape recorder	-.14859*
7. Record player	.03141
8. Television	.01649
9. Video recorder (VCR)	-.02011
10. Video camera	-.08288
11. Microcomputer	-.07861

N = 192

*Significant at .05 level

An examination of the data indicated a positive correlation between experience and frequency for six pieces of equipment, although none are significant at the .05 level. There are five negative correlations, one of which is significant at the .05 level, the cassette tape recorder. A significant negative correlation may be

indicated since teachers with little experience (low x-coordinate) may have reported frequent usage of the cassette recorder (high y-coordinate). Since there was a significant correlation between experience and only one piece of equipment, the null hypothesis was accepted.

Results of the Fisher-Z Transformation supported that the one significant correlation coefficient (cassette tape recorder) fell within the approximate boundaries of the 95 percent confidence interval for the population correlation coefficient. Results can be found in Table 10.

TABLE 10

RESULTS OF FISHER-Z TRANSFORMATION
ON SIGNIFICANT CORRELATION COEFFICIENT BETWEEN FULL TIME
TEACHING EXPERIENCE AND FREQUENCY OF USE OF EQUIPMENT

EQUIPMENT	LOW BOUNDARY	CORRELATION COEFFICIENT	HIGH BOUNDARY
Cassette Tape Recorder	-.008	< -.14859	< -.304

CHAPTER 5

Discussion and Conclusions

As in all descriptive studies which rely on self-reporting questionnaires, there are some areas of weakness. Subjects may misunderstand instructions or poorly stated questions or be tempted to report what they perceive to be the most socially acceptable response.

With these factors in mind, the results of this study suggest that, of the three factors tested, availability of equipment has more affect on frequency of use than does formal training and teaching experience. Therefore, if use of equipment is going to be encouraged, it seems logical to make it as available as possible. In other words, school officials must provide equipment in the classroom where it is accessible, provide adequate maintenance to keep it in working order, and provide materials and software for the particular equipment.

While formal training was not found to be a significant factor in equipment usage, it is important to note that a majority of the respondents (57%) consider themselves to be "self-taught" on five of the eleven pieces of equipment. While probably not as desirable as formal training, a teacher's perception of his/her ability to operate equipment could lead to his/her utilization of the machines.

Finally, teaching experience seemed to have little effect upon equipment usage. Therefore, other factors must be affecting the use of instructional technology in the classroom. Part Five of the questionnaire was an open-ended question that asked the respondents to

identify conditions or situations that have discouraged them in the use of instructional equipment and/or materials. Eighty-nine percent (171 out of 192) of the respondents listed one or more items that discouraged their use of instructional technology. These responses centered around ten topical areas and a list was constructed of the rank ordered factors. The results are presented in Table 11.

TABLE 11
CONDITIONS THAT HAVE DISCOURAGED
TECHNOLOGY USE IN THE CLASSROOM

CONDITION	NUMBER OF RESPONSES	PERCENTAGE OF RESPONSES*
Materials in poor condition	157	81%
Lack of time	151	78%
Materials not available when needed	135	70%
Equipment does not work	111	57%
Materials outdated or inappropriate	90	46%
Too much trouble to use	83	42%
Not enough equipment to go around	73	38%
Not enough materials	59	30%
Equipment use restricted by principal	9	4%
Not knowing what is available	4	2%

*Total percentage exceeds 100% as some teacher identified more than one factor.

An examination of the data indicates that teachers cited four problems directly related to the materials/software that are available to them. The response most often listed dealt with the poor condition of the materials, followed by an indication that they are not available when needed. Materials that are outdated or inappropriate

can be discouraging factors, as well as not having a large enough selection. With modern technology becoming more and more popular, the older forms of materials/software may not be kept in good repair and some purchases may be halted in favor of more current types. In a school system where much software is requested through a Central Office, materials are not always available at the time needed and are not always current or usable.

Another factor often identified was lack of time. Additional comments included such issues as having time to preview, order, set up, arrange and retrieve equipment and materials. This factor was closely related to the general comment that technology was "too much trouble" to use in the classroom.

The final general factor identified was related to the equipment itself. Broken equipment, lack of equipment, and restriction in use of equipment were cited as the obstacles that prevented teachers from using technology.

From the responses received it appears that single factors related to technology use cannot be examined in isolation, but must be a part of the entire picture when making decisions that affect technology usage in the school. Teachers and administrators should keep this in mind when planning a technology program for their schools.

Implications for Further Study

While similar studies have been conducted with larger populations, it would now seem reasonable to look at smaller groups and fewer

factors to help identify specific ways that technology can be implemented in the classroom. Teachers of the handicapped, the learning disabled or the disadvantaged may find creative uses for technology which would never appeal to a traditional classroom teacher. Teachers of science or language arts may have different uses for technology than teachers of mathematics or music.

Based upon the responses concerning factors that were discouraging to the teacher, further study could be conducted to determine how availability of software affects technology use, as well as input into the purchase of software. An attempt was made to gather such information in this study, but data were discarded due to inconsistent responses to what appeared to be a poorly constructed item.

As studies continue to be conducted to test students' ability to learn using various forms of modern technology, one factor sure to be considered is the cost of the technology. Studies will surely be conducted to compare the apparent improvement in student learning with the budget increases necessary to provide technological opportunities. As the results of these studies are made known, teachers and administrators will have more information with which to base their decision on technology use in the classroom. The story is far from over. In fact, it may well still be in technologically primitive stages. It will take farsighted and creative educators in the schools to keep pace with what is to come.

APPENDICES

COVER LETTER
(FIRST AND SECOND MAILINGS)

<date>

Dear Elementary Teacher:

The enclosed questionnaire is being distributed to teachers of grades K-5 in the Clarksville-Montgomery County School System in order to gather information concerning the availability and frequency of use of selected forms of instructional technology in the elementary classroom. The data collected will be used in a Master's Degree Thesis.

I would appreciate your help in collecting this information, however participation is strictly voluntary. Completing the questionnaire should take no more than ten minutes. All information will be confidential and no names of individuals will be used.

A copy of the finished thesis will be made available to the Clarksville-Montgomery County School System Central Office.

A self-address stamped envelope is enclosed for your convenience. Please return your completed survey by <return date>.

Thank you for your assistance in this project. Your help is greatly appreciated.

Sincerely,

Nell Northington
Graduate Student

INSTRUCTIONAL TECHNOLOGY QUESTIONNAIRE

Your completion of this questionnaire is strictly voluntary, and your doing so will indicate your consent to participate. All responses will be kept strictly confidential. Please mail your response in the enclosed self-addressed stamped envelope by April 23, 1990. Thank you for your assistance.

PART ONE

PROFILE OF THE TEACHER

Please provide the following information.

1. Male _____ Female _____ 2. Present Age _____ 3. Grade Now Teaching _____
 4. Total Years of Full-Time Teaching Experience _____ 5. Highest Level of Education _____
- *****

PART TWO

A. AVAILABILITY OF FORMS OF INSTRUCTIONAL TECHNOLOGY

Please check the appropriate column below to indicate which of the following pieces of equipment are available to you 1) in your classroom, 2) in your building (such as in your library or media center or if you share with another classroom), or if they are 3) not available/don't know.

	AVAILABLE IN CLASSROOM	AVAILABLE IN BUILDING	NOT AVAILABLE OR DON'T KNOW
1. 16mm film projector			
2. Slide projector			
3. Filmstrip projector			
4. Overhead projector			
5. Opaque projector			
6. Cassette tape recorder			
7. Record player			
8. Television			
9. Video recorder (VCR)			
10. Video camera			
11. Microcomputer			

B. AVAILABILITY OF FORMS OF INSTRUCTIONAL SOFTWARE

Please check the appropriate column below to indicate the availability of various types of instructional software. Also, please indicate if you provide input into the purchase of material, and if material is current enough to meet your instructional needs.

	Is Quantity Adequate?		Check If You Provide Input Into Purchase	Is Material Current?	
	Yes	No		Yes	No
1. Filmstrips					
2. Films					
3. Slides					
4. Transparencies					
5. Audio Cassette Tape					
6. Records					
7. Computer Software					
8. Video Cassettes					

PLEASE COMPLETE PARTS THREE, FOUR AND FIVE ON THE BACK OF THIS PAGE. THANK YOU.

PART THREE
TEACHER TRAINING IN USE OF INSTRUCTIONAL TECHNOLOGY

Please indicate training received in connection with the each of the following. Designate more than one source if appropriate.

	College Course	Teacher In-Service	Self-Taught	Cannot Operate	Other
1. 16mm film projector					
2. Slide projector					
3. Filmstrip projector					
4. Overhead projector					
5. Opaque projector					
6. Cassette tape recorder					
7. Record player					
8. Television					
9. Video recorder (VCR)					
10. Video camera					
11. Microcomputer					

PART FOUR
FREQUENCY OF USE

Listed below are some of the most popular forms of instructional equipment. Beside each item is a twenty-point scale. Assuming that there are twenty teaching days in a month, CIRCLE the number that approximates the number of days per month that you use each item in your teaching. Example: If you use a television in your teaching once a month, circle the number 1. If you use an overhead projector three times a week, circle 12, as you would use the projector 12 days each month.

1. 16mm film projector	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2. Slide projector	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3. Filmstrip projector	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
4. Overhead projector	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
5. Opaque projector	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
6. Cassette recorder	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
7. Record player	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
8. Television	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
9. Video recorder	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
10. Video camera	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
11. Microcomputer	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

PART FIVE

In terms of your own experiences, what conditions or situations have most discouraged you from using instructional equipment and/or materials?

POST CARD REMINDER

<date>

Dear Teacher:

About three weeks ago you received a questionnaire asking for information concerning the use of instructional technology in your classroom. If you have already returned your survey, thank you very much. If not, let me assure you that it is not too late to do so. In fact, your response is still greatly needed in order to assure the success of this study. Could you please take a few minutes to complete and return the questionnaire?

Thank you.

Nell Northington
P.O. Box 5263
Clarksville, TN 37044

COVER LETTER
(THIRD MAILING)

<date>

Dear Elementary Teacher:

I know that summer is here and school is probably the last thing you want to think about. You previously received a copy of the enclosed instructional technology survey, and if you have already completed and returned it, please do not return a second one. Thank you very much for your participation.

If you haven't returned your form, please be assured that it is not too late and that your input is still greatly desired. I know how busy things can get and a survey is easily put aside, but if you can find about ten minutes to complete and return the form, I will be very grateful. Participation is voluntary, however, and your decision will be respected.

If you choose to participate, please return your completed form in the enclosed self-addressed envelope no later than <date>.

Thanks again for your help.

Sincerely,

Nell Northington
Graduate Student

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