

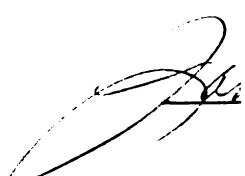
This is to certify that the
thesis entitled
A STUDY OF SELECTED NEWER EDUCATIONAL
MEDIA VARIABLES AS COMPARED TO UPPER
ELEMENTARY STUDENT STANDARDIZED
ACHIEVEMENT SCORES

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Clair L. Rood

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ABSTRACT

A STUDY OF SELECTED NEWER EDUCATIONAL MEDIA VARIABLES AS COMPARED TO UPPER ELEMENTARY STUDENT STANDARDIZED ACHIEVEMENT SCORES

By

Clair LaVern Rood

This exploratory field research developed from involvement in exemplary programs of student instruction, which made use of New Educational Media (NEM) as the tools for individualized learning. In order to bring about improved student achievement, educators must isolate the many environmental variables which affect students. It was the design of this study to select seven NEM variables, accept the remaining influencing variables as a part of normal classroom conditions, and attempt to measure their relationship to student achievement.

Survey instruments were developed and data gathered from administrators, principals and teachers on the following NEM Independent Variables:

- A. Does teacher ability to recognize behavioral objectives have an effect on student achievement?
- B. Does teacher attitude toward NEM have an effect on student achievement?
- C. Does the administrative attitude support of NEM have an effect on student achievement?
- D. Does the amount of teacher training in NEM have an effect on student achievement?
- E. Does the availability of NEM software have an effect on student achievement?

- F. Does the availability of NEM hardware have an effect on student achievement?
- G. Does administrative financial support of NEM have an effect on student achievement?
- H. Do all of the preceeding seven NEM variables, taken as a whole, have an effect on student achievement?

A weighting scale of relative value, was established for NEM which provided a single Standard Score value for identifying each school on NEM. This value was compared to the Dependent Variable - Student Achievement. Student Achievement was established on a post-testing of 1,808 4th, 5th, and 6th grade students from 13 rural school districts in the Cooperative Educational Service Agency #11 of the State of Wisconsin. The Composite Grade Equivalent Score and the Student Study Skills Score, from a Spring 1970 teacher-administered California Comprehensive Test of Basic Skills-Level 1 test battery, was used as Dependent Variables.

A Standard Composite Grade Equivalent Score was calculated across all schools. An Analysis of Variance statistical treatment of the data revealed that as a group the NEM Independent Variables had no significance to the Dependent Variables. Additional analysis of each Dependent Variable and each Independent Variable revealed two hypotheses, "Teacher Training" and "Availability of Hardware," which did show a correlation of at least $\bar{r} = .56$ at the .05 level of probability.

The results of this investigation indicate a desperate need for the identification of the environmental factors which do have an effect on learning, and the effect of NEM in particular, which the instruments used in this investigation did not adequately identify.

A STUDY OF SELECTED NEWER EDUCATIONAL MEDIA VARIABLES
AS COMPARED TO UPPER ELEMENTARY STUDENT
STANDARDIZED ACHIEVEMENT SCORES

By
John
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C.L.R.

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CHAPTER I

THE PROBLEM

Introduction

The American educational scene had been one of slow continuous change from the pre-World War II years to the present. With the return of great numbers of service men, the tenor of the educational progress quickened. The availability of Federal Funding, to the states and the local school districts, played an important roll in not only creating new educational programs, but also in providing new methods through which technology could be utilized as a teaching tool. Morris, writing in a position paper of a sub-committee of the NEA in 1963 which was created to study the function of media in the public schools, has defined educational media as 'those things which are manipulated, seen, heard, read or talked about, plus the instruments which facilitates such activity.'¹ It would seem that educational media could then be classified in the following several forms. (1) A better tool for teaching, (2) a more complete communicational tool, and (3) a more competent research reporting method.

Ely describes the role of media or technology in education in the following manner:

Methodology based on the principle that a variety of audiovisual media and experiences correlated with other instructional materials

¹Barry Morris, "The Function of Media in the Public Schools," (A Task Force Position Paper), Audiovisual Instruction, 8, No. 1 (January 1963), p. 11.

overlap and reinforce the value of each other. Some of the material may be used to motivate interest; others, to communicate basic facts; still others to clear up misconceptions and deepen understanding.²

Investigation into teacher attitudes toward media utilization has been extensive since about 1954. In 1959, Kelly identified 16 factors related to teacher attitudes toward instructional media. In 1963, Knowlton found disagreement with other research findings that indicated additional preparation in the area of audiovisual instruction changed attitudes. Rather, he suggested that information concerning audiovisual instruction was instrumental only in slightly changing attitudes shown.³ Working with the same population in 1962, Knowlton and Hawes found that the negative attitudes were reflected by the barriers created through utilization and not alone through the lack of understanding of educational media.

While reporting on Project Discovery in 1966, Eboch commented that teachers tend to use media as they are found available, but he did not comment on the effectiveness of media in the learning situation.

With the increased availability of funds from the Office of Education, as well as such other sources as the Ford Foundation, there has appeared a great influx of software and hardware with which educators

²Donald Ely, "Alphabetical Listing of Terminology," *Audiovisual Communications Review*, 11, No. 1, Supp. 6 (January 1963), p. 44.

³Charles Aquino, "Teacher Attitudes Toward Audiovisual Instruction as They are Influenced by Selection Factors Within Teaching Environments," *Audiovisual Communication Review*. Vol. 18, No. 2, 1970. pp. 187-195.

needed to become proficient if they were, in fact, to be able to compete on an equal footing with commercial distribution systems. Godfrey, in 1965, documented this growth of school inventories; while only a short time before, in 1963, Battram found that with the availability of software and hardware teachers tended to show greater interest in its use and tended to learn more.

Previous researchers have studied various factors which could have an influence on teacher understanding and utilization of New Educational Media. (Abbreviated as NEM in the balance of this report). Over 1,000 physical barriers to media utilization were identified by Miller in 1965.⁴ Fear of mechanization and the loss of self-importance were identified by Handleman in 1960 as negative influences by teachers for the lack of utilization of the NEM, specifically television.

The major implication of the search of the literature is that educational NEM is utilized to a higher degree when there is also a higher availability ratio. However, Aquino says:

there is little evidence to indicate that increased utilization arising from availability of audiovisual equipment and materials is linked with improved teacher attitudes toward such utilization. It may be assumed that improved attitudes imply a desire on the part of a user which not only leads to increased utilization, but also to more effective utilization of educational media. Since it is a tenet of those associated with audiovisual education that improved utilization methods and techniques must be employed by teachers if educational media are to have the desired impact on assisting teachers in reaching their educational objectives, the assumption that increased availability of educational media leads to improved utilization cannot be supported.⁵

⁴Ibid., p. 187.

⁵Ibid., p. 189.

Torkleson inferred this same feeling when he addressed a Regional Research Conference by saying that the evidence seems to indicate that the present knowledge of NEM is not being applied by teachers, professors nor school administrators in their instructional programs.⁶

The preceeding paragraphs have highlighted the research of the past decade. The indications are that where NEM is available the utilization trends are greater than where the availability of NEM is low. Also directly related to availability of NEM is the favorable attitude toward NEM utilization of educators. The studies in no way indicated a relationship between student achievement, teacher attitude, and availability of NEM.

The intent of this investigation is to attempt to determine the extent to which seven selected media factors (independent or predictor variable) are related to measured student achievement (dependent variable).

⁶G. M. Torkleson, "Implications of Research in Newer Educational Media for the Role of the Teacher and for Teacher Education", Regional Research Conference on Newer Educational Media. (Pennsylvania State University, 1961.)

The Purpose of the Study

The purpose of this study is to obtain descriptive data on six selected NEM variables which are commonly found in today's classroom environment, and attempt to determine the extent to which they may be related to student achievement. It is also intended that inferences concerning the possible effects of NEM on student achievement would be drawn from the data gathered, such that other schools having a similar learning environment might be able to anticipate similar impact of NEM on achievement.

To achieve these purposes, the study focused on the following questions:*

- A. Does teacher ability to recognize behavioral objectives have a relationship to student achievement?
- B. Does teacher attitude toward NEM have a relationship to student achievement?
- C. Does the amount of teacher training in NEM have a relationship to student achievement?
- D. Does the availability of NEM hardware have a relationship to student achievement?
- E. Does the availability of NEM software have a relationship to student achievement?
- F. Does the administrative support of NEM have a relationship to student achievement?

* Selected by the researcher from the many environmental stimuli present which were felt to have a relationship to student achievement.

G. Do all of the preceeding six NEM variables, taken as a whole, have a relationship to student achievement?

This study is designed to look critically at several selected NEM factors which have a common occurrence in the classroom of todays schools and to determine to what extent they may contribute toward increased student achievement as measured by the California Comprehensive Test of Basic Skills - Level 2.

Selected as participating schools in this survey were the schools of the Cooperative Educational Service Agency #11, headquartered in La Crosse, Wisconsin. (For the Balance of this study, the agency will be referred to as CESA #11). CESA #11 is one of nineteen such service agencies which was created by Wisconsin State law in 1965 to replace the former county superintendents.⁷ The CESA #11 is composed of twenty-five school districts within a ten-county area, approximately 4,000 teachers and 43,500 students.

In the spring of 1967, 15 schools were surveyed by this writer to determine the extent of NEM facilities and the amount of NEM preparation the teaching personnel had received. Based on the results of this survey, a Central Planning Committee was formed to determine what might be done to improve the learning environment of the students. The Planning Committee and CESA #11 sought and received a Planning Grant or

⁷Donald Jacobson, "The Effectiveness of Cooperative Educational Service Agencies in Wisconsin", A Doctoral Thesis. University of Wisconsin 1970.

Mini-Grant under Title III PL89-10 to provide the necessary environmental changes. The grant provided for workshops in NEM and for a detailed study of the teaching environment such that a three-year Operational Grant, entitled "Individualizing Learning Through Media-Rural", is now in its third year of operation. The grant has provided summer workshops in NEM for the faculties, additional NEM hardware and software, as well as para-professional and clerical assistance for each school team. A local Instructional Materials Center was created within each school to assist the project teachers and their students. Support for the local IMC and consultation for the teachers, as well as operation of the many summer and in-school NEM workshops was provided through the guidance of the staff of the Audiovisual Center at Wisconsin State University-La Crosse.

The four major objectives upon which the Operational Grant was founded were:

1. To enable rural teachers to more nearly meet the intellectual needs of the individual learner through development of an instructional program making the maximum use of instructional media in large group, small group, and individualized learning situations.
2. To develop teacher competency in the use of instructional media, preparing instructional objectives, and designing instructional sequences to accomplish the objectives.
3. To make instructional media readily available to rural area teachers and students.
4. To bring about adoption of promising innovative procedures in the schools.⁸

Research of the past decade indicates that much concern and interest was generated regarding the availability of NEM as it affected

⁸ CESA #11, La Crosse, Wisconsin, Operational Grant 1969-70.

teacher attitudes; also, how teacher training in NEM affected utilization. Present research has failed to indicate how the above and additional selected NEM variables affect student achievement.

In order to obtain data relevant to the selected environmental variables singled out for this study, a survey form was prepared. The several parts were so constructed as to measure teacher attitude toward NEM on a six-point Likert-type scale, ranging from agree strongly to disagree strongly; teacher ability to recognize behavioral objectives on a sixteen item instrument, responding yes or no; and the amount of teacher training in NEM as recorded on a personal inventory sheet. The amount of NEM hardware and software per school team was obtained through inventory completed by the para-professional. The amount of administrative support was determined through principal response to the same attitude inventory form used by the teachers and personal contact with each superintendent, followed up with a letter requesting the necessary 1969 budget allocations for their project schools in grades K-8. This budget information was also varified through the CESA #11 end of the year reports.

The measure of student achievement was obtained from the CESA #11 office records of the 1969 administration of the California Comprehensive Test of Basic Skills-Level 2. The portion of concern was the Composite Grade Equivilent Score and the Study Skills Score of each student in the project school in the 4th, 5th, and 6th grade whose teacher is a member of the project team.

In summary, the data was gathered about six distinctly different selected NEM variables from a population consisting of 1,800 students,

80 teachers, 15 principals, and 15 superintendents of the project schools in CESA #11.

Limitations of the Study

There are certain limitations imposed on field research by its ex post facto nature. Kerlinger points out that:

Ex post facto research may be defined as that research in which the independent variable or variables have already occurred and in which the researcher starts with the observation of a dependent variable or variables.⁹

This study deals with only the 4th, 5th, and 6th grade students, their teachers, principals, and superintendents within the project schools of CESA #11. The findings of this study may be generalized to other classrooms and schools only in as much as the learning environments are similar.

The statistical procedures used in the study are restricted to the Analysis of Variance (F Test) based on student achievement tests as reported on the California Comprehensive Test of Basic Skills - Level 2. The differences which may be found in student achievement scores via this analysis would be hypothesized to parallel the differences between schools on the individual and the composite NEM variables. Both correlation and analysis of variance statistical techniques will be applied to the mean data for all schools studied, and if any significant mean differences are detected in the analysis of variance, then appropriate post hoc analysis will be performed.

⁹Fred Kerlinger, Foundations of Behavioral Research (New York: Holt, Rinehart and Winston, Inc., 1964), p. 369.

Description of Terms

During the past twenty years, many new teaching aids have been developed. Some of them are sufficiently elaborate to change or to replace classroom communication and instructional patterns which, until their development, were limited to teacher and student. The following terms and definitions will assist in interpreting this study:

New Educational Media

Radio, television, motion pictures, slides, filmstrips, record players, tape recorders, teaching machines, programmed learning machines, and some computers will be considered New Educational Media. New Educational Media will be abbreviated as NEM.

Equipment

All projectors and other mechanical devices would be classified as equipment. They may also be referred to as "hardware".

Materials

All films and other visual displays are classified as materials. They may also be referred to as "software".

Overview

In the first chapter, an attempt has been made to present cognate information about the statement of the problem. A brief description of the sample population, method of data collection, and a brief statement of data handling were also included.

In the second chapter, pertinent related literature is reviewed which looks at the technology of NEM and research methods which govern field research.

In Chapter III, the methodology and procedures of the study are presented in detail, including a description of the population from which the sample population was taken, the development of the survey instruments, and all statistical procedures for analyzing the data gathered.

The analysis of data and statements of inference are provided in Chapter IV. Chapter V contains the summary of this study, any conclusions or inferencies reached, and recommendations for further research.

CHAPTER II

REVIEW OF THE LITERATURE

New Educational Media Status

The application of NEM, often referred to as technology, has only begun to affect education. It has become more evident since the Atomic Bomb and Sputnik that the survival and the rate of progress of our nation depends upon the widespread understanding and use of technology. Education, ranking as one of this nations largest businesses, and educational planners, must apply a cognizance of technology to the educational problems of underachievers irrespective of the students age, nationality or economic background.

Through the use of media, instructional units can be created in a permanent form that can be studied in detail utilizing appropriate research techniques. Learning from these instructional sequences can then be increased to a maximum by progressive improvement of the instructional message and proper selection of the channels of communication. The resulting instructional material is generally superior to most instruction and potentially superior to the best instruction. Education must put technology to work for the cause of education.¹

In 1962, the Department of Audiovisual Instruction of the NEA developed a position paper on the role of media in the public schools. In writing the paper, Morris² suggests that there are many societal forces at work which encourage the use of technology in instruction.

¹Loran Twyford, Jr., "Educational Communications Media," Encyclopedia of Educational Research, (The MacMillan Co., 1969) 4th Ed., pp. 367-80.

²Barry Morris, "The Function of Media in the Public Schools," Audiovisual Instruction, Vol. 8 (1963), pp. 9-14.

Two functions of media which were presented are, (1) media is to supplement the teacher by increasing his effectiveness in the classroom, and (2) media is utilized alone for instruction. The use of technology in these manners thus enriches present instruction as well as provides an instructional system which may operate effectively independent of the teacher. In whichever manner technology is used, the material presented must be directly related to the instructional goals of the learner involved.

The trend today is to provide education to all learners, from pre-school to adult. The advent of television has provided communication with the masses. In addition to television, new courses are now taught via programmed texts, records, audio-tape, film, teaching machines, filmstrips, and by computer assisted instruction. The teacher of today can receive support from a vast reserve of teaching and learning materials. The Educational Media Index, first created in 1964 by the Educational Media Council, requires 14 volumes and lists approximately 30,000 items. There are over 5,000 new films, filmstrips, tapes, recordings, models, and graphic materials which become newly available each year.³ This avalanche of instructional materials has been made readily available to all schools through the National Defense Education Act of 1958 and the Elementary and Secondary Education Act of 1965.

Research on certain aspects of technology, mainly educational film, television and programmed instruction, has been supported through

³Twyford, op. cit., p. 367.

funds supplied by the Ford Foundation, Title VII of the National Defense Education Act and the United States Department of Defense. While there have been voluminous research studies completed, the rate of adoption for instructional uses has been disappointingly slow.

The gap from research to accepted classroom techniques was partially bridged by Gagne', writing in "The Conditions of Learning," by his summary of media functions as shown in Table 2-1. The major varieties of media for instruction, as well as certain combinations of media were presented. The table indicates, for each medium, whether it could or could not perform the instructional duties requested of it. The examination of row one points out that both oral and printed verbal communications are limited in usefulness for presenting stimuli. This is true because they present only verbal material which often requires additional real objects or some form of pictorial representation for learning to rapidly take place. Row eight indicates that the media which is able to present information successfully provides limited feedback from the student.

Rasmussen⁴ also attempted to bridge the gap between research and the learner in 1960. His writings on "Instructional Media Stimulus Relationships to Learning" support ideas that for improved learning, a stimulus should be a combination of many sensory perceptions and not designed to effect only one sensory organ.

⁴Warren Rasmussen, "Instructional Process and Media Integration in the Creative Arts", Instructional Process and Media Innovation, edited by Robert Weisgerber, American Institute for Research, Palo Alto, California (Rand McNally Co., Chicago 1960), p. 157. (See Appendix A).

TABLE 2-1
INSTRUCTIONAL FUNCTIONS OF VARIOUS MEDIA⁵

Media							
Function	Objects; Demon- stration	Oral Commu- nication	Printed Media	Still Pic- tures	Moving Pic- tures	Sound Movies	Teach- ing Ma- chines
Presenting the stimulus	Yes	Limited	Limited	Yes	Yes	Yes	Yes
Directing attention and other activity	No	Yes	Yes	No	No	Yes	Yes
Providing a model of expected performance	Limited	Yes	Yes	Limited	Limited	Yes	Yes
Furnishing external prompts	Limited	Yes	Yes	Limited	Limited	Yes	Yes
Guiding thinking	No	Yes	Yes	No	No	Yes	Yes
Inducing transfer	Limited	Yes	Limited	Limited	Limited	Limited	Limited
Assessing attainments	No	Yes	Yes	No	No	Yes	Yes
Providing feedback	Limited	Yes	Yes	No	Limited	Yes	Yes

⁵ Robert Gagne', The Conditions of Learning, (Chicago: Holt, Rinehart and Winston, Inc., 1965), p. 284.

Researchers have generally concerned themselves with indicators of effectiveness of media, while occasionally delving into student and teacher acceptance of media as a possible method of understanding the lack of media research implementation in instructional programs. From this start, a new concern, operational research, was developed. It has been shown that while a form of media does have an effect on instruction it has not become a popular tool for instruction, due to the extreme cost involved to initiate a full scale program. An example of this phenomenon could be television, data banks, informational retrieval and computer assisted instruction. When operational research is undertaken, the researcher expresses concern with many areas of knowledge and the interrelationship each has with the other. Operations research concerns itself with the degree of change, or learning acquired, in realistic proportion to the administrative commitment required to carry out the program.

In 1969, a conference sponsored by the Department of Audiovisual Instruction, NEA, was held at Syracuse University to explore operational research.⁶ Coming out of that conference was not only concern with operational research, but also the design of learning or a systems analysis approach to solving learning problems.

Since that 1964 conference, the systems approach has been adopted by Michigan State University and other universities as the proper procedure

⁶Eugene Oxhanler, "Operational Research and System Analysis as Applied to Media", Report of a Conference - Syracuse University, (1964) p. 102.

for the correct design of learning units.

Twyford states, in 1956, that there are characteristics of media which have little or no effect on learning which were identified by Carpenter and himself. They are:

Music, optical effects, stereoscopic projection, attention-gaining devices, dramatic sequences, motion, and realistic settings often result in little improvement in learning.⁷

While preparing learning units through a systems approach, an awareness of the foregoing media characteristics must be considered so that only the form or forms of media whose attributes indicate the greatest likelihood of success should be included. When this is accomplished, the teacher will be permitted to become a resource person, counselor of learners, or a supervisor of instructional patterns. To fully capitalize on media advantages, educational efficiency must be considered. Twyford says "that instructional efficiency can be obtained if the time saved through the use of media is used to teach additional matter."⁸

One of the more important aspects of media application to instructional patterns is that of administrative commitment. Twyford talking about administrative commitment in his writings says:

The more successful media applications are usually characterized by a firm administrative policy supporting the use of media backed up by an adequate supporting program of personnel, equipment, and materials. One cannot expect a sizeable change in instructional methods without

⁷Twyford, op. cit., p. 372.

⁸Ibid., p. 372.

a comprehensive plan to bring about change. Often initial costs may greatly exceed current operational costs.⁹

This, then, presents administrative reasoning concerning the degree of financial support which a school may give any innovative and creative approach to the instruction of its' students.

The acceptance of technology as a method of assisting communications for instructional purposes is very important because the degree of acceptance determines, in large part, the extent to which the unique advantages of media will be used. Erickson states:

When instructors develop penetrating insights into the breadth and variety of teaching objective, when they understand better the difficulties in communication, and when they come to feel a real concern for student achievement in both large and small groups, they will recognize more clearly the need for help that audiovisual materials can give, help for the teacher that is rewarded in help for the student, help that is urgently needed if the learning process is to proceed efficiently.¹⁰

Morris says, "that the environment which contributes to the problems of education also contains the elements that can help to solve them."¹¹ Discussing the acceptance of technology, Norberg states:

The newer educational media are means which will be accepted or rejected as a means to ends. People who try new tools do so to accomplish new tasks or to perform old tasks in a new and possibly better way These are not just strong and ingenious tools; they are also means that will be used to accomplish some purpose beyond their own use, implement some program. They challenge educators to take another look at their goals, both explicit and implicit, to determine whether the goals are still sound, to decide whether the new media

⁹Ibid., p. 373.

¹⁰Carlton Erickson, Fundamentals of Teaching With Audiovisual Technology, (New York: The MacMillan Co., 1965), p. 28.

¹¹Barry Morris, "The Function of Media," p. 11.

will help to implement them, possibly to change the course of the instructional program as well as the lives of the teachers and students who are involved.¹²

Since no clear evidence appears showing patterns of influence within the schools, some observers have drawn the conclusion that there are no institutional change agents in the public schools. Carlson says:

the change agent counterpart of the county extension agent has no office in our public school enterprise. And, as has been indicated, many attribute the slowness of change in educational practices to the absence of a change agent.¹³

Others feel that administrators control media acceptance in the public schools. Brickell observes that "two distinct groups of people might be expected to influence structural change in the local schools",¹⁴ the public which is outside the school system, and the professional staff itself.

New types of instructional programs are introduced by administrators. Rearrangements of structural elements of the institution depend almost exclusively upon administrative initiative. Teachers are not change agents for innovations of a major scope.¹⁵

It is suggested by Brickell that administrators act as gate keepers for the innovative process within their jurisdiction; "the administrator

¹²Kenneth Norberg, Media and Educational Innovation, Meierhenry (ed.), (University of Nebraska Press, Lincoln, Nebraska, 1964), pp.368-9.

¹³Richard Carlson, et al., Change Process in the Public Schools, (Eugene: The Center for Advanced Study of Educational Administration, University of Oregon, 1965), p. 4.

¹⁴Henry Brickell, "State Organizations for Educational Change: A Case Study and a Proposal", Innovation in Education, (ed.) Miles (New York: Bureau of Publication, Teachers College, Columbia University, 1966), p. 495.

¹⁵Ibid., p. 503.

may promote or prevent innovation. He cannot stand aside, or be ignored."¹⁶

An example of this is shown by Kelly¹⁷ who studied several points of influence on teachers' attitude toward the adoption of audiovisual materials. Having collected data from over 900 teachers in the Boston area, he found a significant relationship between teacher attitude toward audiovisual materials and whether or not they had had the encouragement of their various administrative personnel in the school system and the availability of materials, as a factor in determining teacher attitude toward the use of audiovisual materials.¹⁸ From this, we deduce there are several extenuating factors that not only affect the degree of change within a given school, but also affect the rate of innovation. Aquino¹⁹ points out that previous researchers have identified various factors which influence teacher utilization of educational media. These factors range from the amount of media in teacher training to fear of mechanization and the reduction of self-importance. This range of factors is further

¹⁶Ibid.

¹⁷Gaylen Kelly, "An Analysis of Teachers' Attitudes Toward the Use of Audiovisual Materials" (unpublished Ph. D. dissertation, Boston University, 1959).

¹⁸Gaylen Kelly, "A Study of Teachers' Attitudes Toward Audio-Visual Materials," Educational Screen and Audiovisual Guide, March, 1960. p. 119.

¹⁹Charles Aquino, "Teacher Attitudes Toward Audiovisual Instruction as They are Influenced by Selected Factors Within Teaching Environments," AV Communications Review, Vol. 18,2 (Summer 1970) p. 187.

pointed out by Aquino in his summation of the investigations of Eboch, Godfrey, and Battram. Aquino states:

Eboch (1966), in reporting on Project Discovery, noted that teachers will utilize audiovisual materials when they are available but did not comment on the effectiveness with which educational media were applied to the teaching-learning process. The growth of educational media inventories within schools and school districts was documented by Godfrey (1965) who noted that teacher requests were among the more influential channels for having school boards provide more audio-visual equipment and materials; while Battram (1963) found that teachers who perceived audio-visual materials to be readily available tended to learn more about the effective use of those tools.²⁰

A major implication of the literature is that educational media usage is in direct relationship to its availability. There is some evidence to support the postulate that teacher attitude toward media is linked to availability; however, "the assumption that increased availability of educational media leads to improved utilization cannot be supported."²¹

The availability of media was studied by Aquino, who attempted to determine differences between attitudes on the part of the teachers who perceived various degrees of availability and accessibility of educational media within their teaching environments.²² The resultant implication of his research points out a need for future investigation into teacher attitudes toward media as compared to teacher utilization of media in the learning environment when considering the availability of media.

²⁰Ibid., p. 188.

²¹Ibid., p. 189.

²²Ibid., pp. 189-194.

Operational research, of the type described on the preceeding pages, is being undertaken in two areas in Wisconsin. Project TREE (Teacher Research in Elementary Education)²³ was designed to investigate the affect of high media availability upon teachers and students at the Ames Laboratory School at Wisconsin State University - River Falls, Wisconsin; while the CESA #11, of the State of Wisconsin, is completing the third year of a Title III Grant for the "Individualizing of Learning Through Media-Rural."²⁴ A closer examination of each of these research areas provided the incentive and partial background for this investigation.

Project TREE: The Ames Laboratory School, River Falls, Wisconsin is a member of the Wisconsin State University System. The Lab School is charged with the education of students, K-9, as well as providing for the training of prospective teachers from the State University at River Falls. The role of the Lab School is described more adequately by Dr. Krueger, who served as Chairman of the TREE Executive Committee.

Ames Laboratory School instructors assist in the training of student teachers within their classrooms, as well as providing further input into the teacher-training process by teaching at least one elementary methods class each academic year. Student observers also enter the classrooms as a required portion of their psychology of learning sequence.

With this total teacher-student exposure to media utilization, it was felt that teacher attitudes and evaluations would be reflected

²³Robert Krueger, "Project TREE - A Four Year Study on the Impact of Media Availability on Teachers and Students", (River Falls: Wisconsin State University, 1969) (Mimeographed.)

²⁴Roland Solberg, "Individualizing Learning Through Media-Rural", (La Crosse: CESA #11., 1970) (Mimeographed.)

in the end product of the College of Education, the beginning teacher. The intimate teacher-student relationship would have to result in similar reactions.²⁵

The initial research project was conceived around grades K-3 at the Ames School. The original program was based on a three-year study of instructional media and the affect on learning which would be created through ultimate classroom use of media. The development of this project was a joint venture of Encyclopaedia Britannica Films Department of Education and Dr. Eugene Kleinpell, President of Wisconsin State University - River Falls. The initial year of operation was 1964-65.

In 1965-66, Project TREE was expanded to include the 4th grade. Later Project TREE was to include grades K-9. With this expansion, Project TREE became the only K-9 Media Availability Study on a university campus in the United States.²⁶

Data was gathered from the faculty and students involved in the project through a Summary and Evaluation Form, which was completed periodically throughout the project. The Teacher Summary and Evaluation Form asked responses to the following questions:

1. In what ways has Project TREE affected your teaching approaches and procedures?
2. In what way has Project TREE affected your pupils' interests and attitudes?
3. In what ways has Project TREE affected your pupils' learning?
4. In what ways has Project TREE been valuable to you as a teacher?

²⁵Robert Krueger and Alton Jensen, "High Media Availability in The Teacher Education Process," (River Falls: Wisconsin State University, 1970) (Mimeographed.)

²⁶Krueger, op. cit., p. 41.

5. In what ways has Project TREE created difficulties for you as a teacher?
6. What would you recommend to increase the effectiveness of Project TREE?²⁷

The student teachers working within the project were not solicited, although responses were obtained from grades 3 through 8 by using modified questions similar to those above.

The Teacher Media Attitude Inventory, which was completed in September and May of each school year, consisted of a Likert-response-type check list. The choices ranged from Essential to Not Applicable. While the above independent variables provided data of a subjective nature, the data of a dependent nature (student achievement) was also gathered through the administration of standardized achievement tests and intelligence tests. The Revised Stanford-Binet Intelligence Scale, the Metropolitan Readiness Test, the Lorge-Thorndike Intelligence Test, the Harrison-Stroud Reading Readiness Profiles and the Stroud-Hieronimus Primary Reading Profile were used in K-2. Grades 3-9 used the Lorge-Thorndike Intelligence Test as well as the Iowa Tests of Basic Skills.²⁸ The evaluation was completed on each of the four years of the project. The information gathered on the independent and dependent variables provided data through which the following two hypotheses could be examined.

Hypothesis 1: There is no significant difference in achievement of children in high and low media availability programs.

²⁷Krueger and Jenson, op. cit., pp. 1-2.

²⁸Krueger, op. cit., p. 19.

Hypothesis 2: There is no significant difference in achievement of children in study skills, language skills, and arithmetic in high and low media availability programs.²⁹

The Teacher Media Attitude Inventory assessed Project TREE on the print and non-print media involved in the project. In summary, teachers' ratings of traditional materials used in the teaching of reading, appeared lower than the ratings of teaching with media as introduced in Project TREE.³⁰

Standardized test data, which indicated the effectiveness of Project TREE, provided the dependent variable used in the study to determine the effectiveness of high media availability on student achievement. An analysis of covariance and t-tests were used to determine any significant gains in student achievement due to Project TREE. The conclusions reached from the investigation are explained by Dr. Krueger as:

The achievement test data obtained from the Metropolitan Readiness Tests, Stroud-Hieronymous Primary Reading Profiles, and the Iowa Tests of Basic Skills support the effectiveness of the Ames School program during the four years 1964-65 — 1967-68. It was clear that the children profitted well during the years of Project TREE. It was difficult however, to demonstrate a clear statistical advantage for Project TREE children, but in each instance in which a significant difference was obtained, that difference favored Project TREE. The non-TREE children may very well have been favorably influenced by the experimental or Hawthorne effect. It was not possible to insulate the control group from the pervasive influence of a massive media program. Teachers of non-TREE groups were able to avail themselves of media in excess of normal availability levels and general discussion of teaching strategy could easily have influenced control group teachers to higher levels of performance. It appears unlikely that the measuring instruments used in the study permitted

²⁹Ibid., p. 9.

³⁰Ibid., p. 16.

a real answer to the question of the value of a high media availability program. Therefore, the evaluation design for the future study of Project TREE will be revised.³¹

Individualizing of Learning Through Media-Rural: The CESA #11 Agency of the State of Wisconsin was awarded a Planning Grant, in 1967 under Title III P.L.89-10, for the purpose of determining the status of media, media utilization, and media facilities within its rural school population. The CESA #11 Agency is composed of 25 school districts, within a 10 county area, approximately 4,000 teachers and 43,500 students. The Planning Grant provided a six-week summer workshop in media for teacher teams from 15 of the 25 school districts. Also provided was in-service training within the participating schools.

This researcher was commissioned by CESA #11 to survey and analyze the results of the survey.³² Using the results of the initial investigation into media application, a Central Planning Committee was formed. The Committee sought and secured a 3-year Operational Grant. The Title III Operational Grant was awarded in 1968, resubmitted in 1969, and is presently in its last year of operation. There were four principle objectives under which the Operational Grant was funded and is now operating. They are as follows:

1. To enable rural area teachers to more nearly meet the intellectual needs of the individual learner through development of an instructional program making the maximum use of instructional media in large groups, small groups, and

³¹Ibid., p. 24 and p. 26.

³²Richard Peterson, "Operational Grant Title III, P.L.89-10" (La Crosse: CESA #11), pp. 12-13. (Mimeographed.)

individualized learning situations.

2. To develop teacher competency in the use of instructional media, preparing instructional objectives, and designing instructional sequences to accomplish the objectives.
3. To make instructional media readily available to rural area teachers and students.
4. To bring about adoption of promising innovative procedures in the schools.³³

The participating schools committed classroom space, equipment, and allocated funds to support an experimental team within each school. This team was composed of one 4th, one 5th, and one 6th grade classroom, students and teachers in each of the buildings. Also provided was the service of one full-time para-professional and one clerical assistant.

To assure media software availability, a semi-weekly truck route was established between the Agency IMC in La Crosse, the Audiovisual Center at Wisconsin State University at La Crosse, and each of the schools. A local IMC, within each school, and under the guidance of the para-professional, was created to coordinate the production, supply, and utilization of media software and equipment.

The CESA #11 Agency evaluated the first year of the program through the use of several instruments which were designed with the assistance of the Research and Development Center of the University of Wisconsin. The second year, some of the same measures were used, while some additional instruments were created by the Agency.

The evaluation report was completed in March of 1970, covering

³³Ibid., p. 14.

the second year of operation. That report was intended to do the following:

1. Establish an assessment of the project thus far in terms of how well the project objectives are being met and how well program activities are being carried out.
2. Establish a pattern for continuing evaluation of the project.
3. Suggest areas within the project which should be examined to a greater degree than has been accomplished by this report.
4. Provide information which can be utilized by project planners in considering changes in the operational format and in submitting the application for continuing support.³⁴

The complete evaluation report indicated the following:

1. During this past year the local IMC's were expanded to meet the demands created by the addition of fourth, fifth, or sixth grades in eight schools of the original thirteen plus the addition of one new school. Four schools did not increase their program to include additional grades, two of which did not have any additional grades to expand into, and one school was dropped from the project. Two additional schools added an individualized program in accordance with project specifications in grades four, five and six without financial support from the project itself. Sufficient interest was created on the junior high school level in five schools to cause them to initiate a partial individualized program in that area.³⁵
2. Teachers new to the program demonstrated a strong ability to recognize behavioral objectives correctly. This was attributed to the summer workshop.³⁶
3. An agency level IMC was established and a truck route delivered 16mm films, filmstrips, records, tapes, and transparencies to schools bi-weekly. Production services from the central IMC to WSU-La Crosse in the areas of graphics and photography were utilized very much by participating teachers. . . . The Evaluation Report showed a tremendous increase in the use of media

³⁴Solberg, op. cit., p. 15.

³⁵Ibid., p. 6.

³⁶Ibid.

by project teachers, especially in the areas of English and mathematics with science and reading increasing this year as compared to the first year of the project.³⁷

4. The availability of software and hardware increased greatly, with the largest gains in materials for tape recorders, filmstrip projectors, viewers, listening stations and head sets, as well as overhead projectors. This supported the tendency of the teacher teams to provide greater individualized instruction for their students.³⁸
5. A four-week summer workshop was conducted in 1968 and 1969, which was designed to develop the following:
 - (a) the use of instructional media,
 - (b) the writing of instructional objectives,
 - (c) the designing of learning experiences,
 - (d) the evaluation and selection of instructional media, and
 - (e) working effectively with para-professionals.³⁹

The workshop participants also developed behavioral objectives for the grade levels involved in the project, selected media to be used, and designed the learning experiences in which students will participate for the academic year 1970-71.

6. During the past year delivery and pick up services were maintained from the central IMC. The utilization of 16mm films and filmstrips from the central IMC increased, but there was a slight drop in utilization of production service. Production services centered primarily around photographic and dry mounting needs. . . .⁴⁰

A program of consultant visitations and the dissemination of information was initiated, to inform not only CESA #11 area educators of the projects demonstrated contributions to student learning, but to statewide and national educators.

³⁷Ibid., p. 7.

³⁸Ibid.

³⁹Ibid., p. 8.

⁴⁰Ibid., p. 9.

It is the aim of CESA #11 to motivate and encourage adoption of the "innovative practice demonstrated through team teaching, independent study using media, the use of para-professionals, and maximum utilization of the resources provided through the instructional materials center."⁴¹

Discussion of Previous Research

Chapter II has sought to provide the research framework within which this study should be examined. The Review of Literature presented basically two divergent points of view on media research. There are those who favor a clinical-type research on the contributive value of media. These researchers are able to demonstrate that, as a tool of communication, media is as able a tool for teaching content as material taught in non-media environments.

The opposite view is supported by Kittross, who in reviewing MacLean says:

I have said that we seem to be wasting much fine research talent on trivial matters. We frequently use high prestige methods where they are not appropriate to our level of knowledge or theory. We control unimportant factors and leave important ones uncontrolled and undefined We become so encumbered by elaborate manipulations and by unwieldy organization of research that we find little time to ask where we are going and why.⁴²

This emphasis on educational research was emphasized by Saettler, who said:

It has tended to focus on separate disciplines already established

⁴¹Ibid., p. 11.

⁴²Allen Koenig and Ruane Hill (ed.), The Farther Vision - ETV Today, (Madison: University of Wisconsin Press, 1967), p. 216.

in the curriculum and to ignore or give scant attention to the developmental processes of learners or to their social or cultural backgrounds.⁴³

The update of subject matters by teachers has been tied to school reorganizational plans. Thus administrators have played a very important role as a change agent. Too often, the assumption has been made that new content, new organizational theories, new media and new facilities are all that is required for improved learning to take place.

The principle point of dispute between the two extremes of researchers in that on one hand, the research has been done in a sterile environment and is not easily applicable to actual classroom procedure, while on the other hand, the researchers have arrived at the conclusion of NSD. Kittross elaborates on meaningful research and the NSD findings by suggesting there are three ways of looking at them:

When considering the question of "meaningful research," there are at least three ways of looking at these NSD findings. First, we should try to isolate the factors in the learning situation that might cause these results. Williams, for example, suggests that the attitudes, ability, and personality of the classroom teacher may be the most important missing variable. Schramm has speculated as to whether the Hawthorne effect (increased effort from the students due to being in the limelight as part of an experiment) or a novelty effect may have been important factors for NSD findings in a closely allied field. Also, there is little agreement as to what constitutes "conventional classroom teaching," and there are so many uncontrolled variables in the classroom situation that it is of little value to compare the two modes of teaching.⁴⁴

The TREE Project and the CESA #11 Project described in the preceding pages has been an attempt at applying research to actual classroom

⁴³Paul Saettler, A History of Instructional Technology (New York: McGraw - Hill Book Co., 1968), p. 358.

⁴⁴Koenig and Hill, op. cit., p. 218.

conditions. While the evaluation of each project showed that a favorable attitude toward media had been created, the TREE Project reflected NSD when measured by a dependent variable (student achievement). It was because of a desire to seek the application of educational research on media that this investigation was developed.

The investigation, as presented in the remaining portion of this study, was instigated under certain environmental conditions and with the knowledge that in as much as the results would indicate a relationship between certain media variables and student achievement, inferences could be drawn concerning the value of media to learning only within the population sampled, however, the findings of the investigation may be found applicable to other learning situations which reflect similar populations and learning environments. The methodology and procedures of this investigation are presented in detail in Chapter III.

CHAPTER III

DESIGN AND PROCEDURES

Apercu

This dissertation records an exploratory field study, which can be defined as an ex post facto investigation of the relationships between NEM independent variables and student achievement (dependent) variables, which are present in today's educational environment. Specifically, descriptive information related to seven NEM variables was gathered from each of 15 schools. The analysis of this data provided a rank ordering of the schools on the NEM variables. The same schools provided student data through the results of student achievement in two areas, (1) general subject matter achievement, and (2) study skills scores as measured by the Comprehensive Test of Basic Skills - Level 2 produced by the California Test Bureau. Analysis of variance procedures were used to indicate systematic student achievement differences among the several schools, which were known to differ in terms of their respective NEM characteristics.

The Population

The CESA #11 Agency is composed of 25 school districts encompassing a ten-county area, in the state of Wisconsin. There are approximately 4,000 teachers, 25,000 elementary (K-6) and 18,500 secondary (7-12) students. The school districts range from a city of 50,000 population with many city and urban schools to rural districts with single or consolidated buildings.

The 25 school districts were provided the opportunity to

participate in a three-year Title III project, entitled "Individualizing Learning Through Media-Rural." There were 15 schools that indicated an interest and joined in the project. Each of these schools committed a minimum of one 4th, one 5th, and one 6th grade class, its' teacher and room to the project.

The population, from which the data was gathered, was basically rural schools and all members of the Title III project. The proposed independent or "predictor" variables upon which information was to be gathered were:

- A. Teacher ability to recognize behavioral objectives.
- B. Teacher attitude toward NEM.
- C. The amount of teacher training in NEM utilization.
- D. The availability of NEM software.
- E. The availability of NEM hardware.
- F. Administrative attitude toward NEM.
- G. Administrative financial support for NEM.

The several instruments were constructed to gather NEM data from 15 superintendents, 15 elementary principals, and 78 elementary teachers.

The criterion measure, or dependent variable, was assessed from teacher-administered standardized student achievement tests. The California Testing Bureaus' Comprehensive Test of Basic Skills - Level 2, was administered to all 4th, 5th, and 6th grade students in the project schools in the spring of 1970. These 1,800 student achievement scores were available through the CESA #11 office.

Instrumentation

Instruments were prepared and distributed to four closely related populations consisting of superintendents, elementary principals, teachers, and para-professionals within the 15 project schools of CESA #11.

The school superintendents were contacted through a personal telephone conversation. These were followed with a survey instrument which requested information relative to budget expenditures within the project schools for 1969. The net operating costs for each school and the amount spent for NEM software and NEM hardware in 1969 was obtained. The school enrollment figures were obtained from the CESA #11 office with which the cost per student for NEM was computed.

The elementary school principals were surveyed with a series of two instruments. Part One requested personal data and Part Two was an NEM Attitude Inventory Instrument consisting of 47 items to which the respondent replied using a Likert-type scale ranging from "1 - agree strongly" to "6 - disagree strongly." Twenty-two of the 47 items were reversed scored to avoid the ambiguities caused by the negative phrasing of some statements. Therefore, a strong disagreement with a negative item was scored as a high positive attitude response. Those items marked with "R" in Appendix I indicate the reversed scored items.

The form of this instrument had its inception with Ramsey, who devised an instrument which discriminated between respondents possessing positive attitudes toward NEM and those respondents having a negative attitude.¹ Having initially selected 375 statements which indicated

¹Ramsey, A Research Project for the Development of a Measure to Assess Attitudes

positive or negative attitudes toward NEM, Ramsey reduced the final selected list to 39 statements through testing and revision.

Ramsey's instrument was later modified by Guba and Synder in their 1964 research on MPATI telecasting.² The instrument was further modified by Katser in 1969, when the Attitudes of Building Coordinators were studied.³ Katser's 23-item form was further modified for this investigation. A 47-item form was determined through pre-testing and revision using peer groups of audiovisual persons.

The teachers received a survey packet consisting of three separate instruments. Instrument One requested personal data; Instrument Two was the same 47-item NEM Attitude Inventory Form described for the principals. Instrument Three was a 16-item instrument which was designed to determine the respondents ability to recognize behavioral objectives as described by Mager. There were six of the 16 items that were written in behavioral terms, while the remaining 10 items were not in behavioral form. A total of the correct responses ranging from 16, for correctly identifying all items, to 0 for being unable to make any correct identification, was tallied for each respondent.

The para-professionals received two instruments which were designed to inventory both the amounts of NEM software and NEM hardware available

²Arthur D. Katser, "Activities and Attitudes of Instructional Media Building Coordinators: A Follow-up to Two M.S.U. Summer Institutes." (unpublished doctoral thesis, Michigan State University, East Lansing, 1969), p. 56, citing Guba and Synder, 1964, ITV and the Classroom Teacher, p. 59.

³Ibid., p. 54.

to each teaching team. A tally of the responses provided the total amounts required in this investigation.

Data Collection

The initial thrust of the research was to determine to what extent NEM variables, present in today's classroom environment, affect student achievement. Having worked with the CESA #11 Agency and the Title III Project from its inception, a letter dated August 12, 1970, requesting permission to survey the project schools was sent to Mr. Robert B. Tremain, Coordinator of CESA #11. (See Appendix B.) Mr. Tremain replied on August 17, 1970, that the request to use the project schools for this investigation was granted. (See Appendix C.) Mr. Tremain also offered the services of the CESA #11 office staff and the area coordinators should such assistance be required in order to complete this investigation.

A listing of the personnel of the project schools, who were a part of the project, as well as their principals and superintendents, was provided by the CESA #11 office. This document provided the names of 15 superintendents, 15 principals, and 80 teachers.

Each school was assigned a number that was recorded to be used later to identify them in the analysis of the data, such that all responses would remain confidential. (See Appendix D.)

The several packets, administrator and teacher, of survey instruments were readied and addressed to each project school team leader for distribution. On September 9, 1970, a meeting was held with the southern half of the project schools, at which time the packets of survey forms

were distributed to the team leader. The completion and return of the instruments was discussed. The team leader returned to the project school, distributed the packets to fellow team members and to the principal. Each packet contained a cover letter with instructions on completing the several instruments, as well as the method by which they were to be returned to the researcher. (See Appendix F.) A similar meeting was held on September 10, 1970, at which time the packets were distributed and explained to the team leaders of the northern half of the project schools.

The respondents, who had not returned the completed instruments at the requested time, were contacted again through the CESA #11 service route driver. All of the 80 teacher respondents completed and returned the survey instruments to this researcher by October 15, 1970. There was a 100% return for the teachers and para-professionals.

The 15 principals received their survey instruments from the team leader of their school. A cover letter provided the instructions necessary to complete the data form and the NEM Attitude Survey Form (see Appendix Q) which was enclosed. Those principals who did not complete and return the instruments were contacted by a personal letter requesting their cooperation in expediting the returns. By November 15, 1970, all of the principals had responded. There was 100% return of the principal's instruments, although this was not done within the requested time table.

The 15 superintendents were contacted by telephone during the month of November, 1970. It was found that the report of the school

budgeting was not constant within all 15 school districts; therefore, a personal telephone conversation was appropriate because of the two budget questions which the follow-up survey instrument would ask. The superintendents were very helpful and prompt in returning their responses to the survey instruments. On December 1, 1970, 100% of the superintendents had replied.

The statistical responses on the criterion measure, student achievement, were obtained through reviewing the files on student achievement testing in the CESA #11 office. All but one of the project schools utilized the California Test of Basic Skills - Level 2, in the spring of 1970, to determine the achievement levels of their 4th, 5th, and 6th grade students in the project classrooms. One school did not evaluate with the same measure, therefore, it was necessary to remove that school from consideration in the general analysis. However, comparisons may still be made which may be of interest.

Analysis of the Data

The survey instruments, as received by the respondents, requested information in seven areas:

1. Teacher Ability to Recognize Behavioral Objectives (See Appendix H) was determined by identification of responses to 16 statements, six of which were correctly stated in behavioral terms. Each school was identified by number, so that a record of each response could be compiled. The compiled responses determined the mean response for that school. (See Table 4-1, p. 47.)

2. Teacher and administrative attitude toward NEM innovation was

determined through an instrument having 47 items to which replies were recorded on a Likert-type scale ranging from "1 agree-strongly" to "6 disagree-strongly." (See Table 4-1, p. 47 .) Twenty two of the 47 items were reversed scored so that a strong response to a negative item was recorded as a highly positive reply. The use of code numbers for the respondent allowed for the separation of replies into administrative and teacher. The mean score of each group is recorded in Table 4-1, p. 47 and Table 4-6, p. 57 .

3. The amount of teacher training in NEM was obtained from the data sheet which was attached to each packet of instruments. The replies indicated the number of courses or institutes in NEM each respondent had attended. The mean number of courses for each school was recorded. (See Table 4-1, p. 47.)

4. The availability of NEM software to each project school team was determined by para-professional response to the NEM Software Survey Form. The chart contained 15 items of NEM software commonly found in todays learning environments. A numerical type inventory response was made to each item, such that the numbers of each item could be tallied. (See Appendix L.) The responses were identified by number so that the total amount of each response could be determined for each school.

It was necessary to determine an arbitrary weighting system for the software items, such that the responses could be combined into a single number which would represent the software responses for a given school. This was done by ranking the 15 items in ascending order of importance to a learning situation as determined by the investigator.

(See Table 4-2, p. 50.) The weighting ranged from the language laboratory assigned a value of one, to 16mm films having an assigned value of forty.

A weighted software score was determined for each school on each item by dividing the number of items, of each type, by the total number of items for all schools and multiplying that number by the weight assigned to that item. (See Table 4-3, p. 51.) From this, a weighted software number was determined which represented each school on each item. The weighted numbers were totaled to provide a Weighted Composite Software Score for each school. (See Table 4-3, p. 51.)

5. The availability of NEM hardware was determined in a manner similar to that of NEM software. The para-professional for each project school replied in inventory fashion to the NEM Hardware Survey Form. There were 22 items of hardware for which each respondent indicated the number available in their project school. (See Appendix N.) The coded responses were identifiable by school.

The items, all being of different types and having different educational values, made it necessary to establish a weighting procedure such that a single number would identify each school in NEM hardware. This was accomplished by ranking the 22 items of NEM hardware in ascending order, from the public address sound system, weighted one, to the 16mm projector with an assigned weight of forty.

A weighted hardware score was determined for each school by dividing the number of each item at a given school by the total number of that item for all schools, (see Table 4-4, p. 53) and multiplying that number by the weight assigned that item. From this weighted hardware number, a weighted

composite hardware number was determined for each school. (See Table 4-5, p. 54.)

6. The amount of administrative support for NEM was ascertained first on the NEM Attitude Survey, which was previously described.

7. A personal telephone conversation with each superintendent was combined with a follow-up Budget Survey Instrument. The personal contact with each Superintendent was deemed appropriate as budget reporting procedures, in terms of what the instrument asked, were not readily available to provide consistent data.

Each school was identified by a number which indicated the net amount of dollars required to operate the project school in 1969-70. Also, recorded for each school, was the amount of money expended by that school district, within the project school, on NEM software and hardware for a similar period. (See Appendix S.) The number of students enrolled in each school was determined through State Yearly Reports available in the CESA #11 office. In order to compute the amount of money spent in 1969-70 by each project school per student, the total amount of money spent for NEM was divided by the number of students enrolled for that period. (See Table 4-7, p. 58.)

The raw scores, which represent the project schools response to the NEM variables, were tabulated. It should be noted that school #14 was omitted from further analysis as they had not used the California Comprehensive Test of Basic Skills - Level Two, as a means to determine their student achievement, and school #18 because it was the first year of their participation in the project, therefore, their data responses

would not be comparable to the other schools. The remaining thirteen project schools were analyzed on their responses to the NEM variables.

The seven independent variables were ranked in ascending order and assigned a weight relative to the importance each has as a contributor to the learning environment, with teacher training weighted one, and teacher attitude assigned twenty, as arbitrarily determined by the investigator. (See Table 4-9, p. 61.) A Standard Score or z-score was generated for each school on each independent variable. All of the z-scores were inspected. It was noted that higher numerical scores on all NEM measurement scales, except those for administrator and teacher attitude, indicated a high and positive response to, or value of, NEM. The z-scores for administrative and teacher attitude were therefore reversed in sign, because the lower the score the higher the value of NEM, while the higher score indicated a low value of NEM. Thus, in order that the z-scores on all independent variables would be comparable in meaning, the z-scores were reversed from negative to positive and positive to negative. (See Table 4-1, p.47 and Table 4-6, p. 57.)

The Standard Score for each NEM variable for each school was multiplied by the weight assigned and the resulting Weighted Standard Scores were summed to determine the NEM Composite Standard Score. (See Table 4-10, p. 62.) Noting that some of the resulting NEM Composite Standard Scores were negative, an arbitrary constant of 40 was added to each school's NEM Composite Standard Score so that all such Standard Scores were in the positive range. From this data, a simple rank order compiled with the school ranking in the number one position being the most favorable to

NEM on all of the seven variables examined and school #13 being the least favorable toward the NEM variables investigated.

The dependent variable data, student achievement, was compiled from Administrative State Reports on file in the CESA #11 office. The data available for this study were the results of the California Comprehensive Test of Basic Skills - Level 2, which had been administered in March of 1970 to each 4th, 5th, and 6th grade student in the project. The data collected on each of the 1,800 students indicated their performance on that test in achievement and on study skills. The measures used in this investigation are the Composite Grade Equivalent Score and the Study Skills Score for each student.

It was noted that school #24 had not administered their tests during the testing period pertaining in all other schools. Therefore, to correct for additional learning and hence increment in measured achievement which may have taken place between the times of testing, .2 was subtracted from each student score gathered during late testing. An example of this would be a 4th grade student's grade equivalent score of 5.6 would, for the purpose of this study, be recorded as 5.4.

Each school was identified by a code number, so that identification was possible in both of the areas in question. It was possible to analyze these scores by grade as well as by school when compared to the school's NEM scores.

Summary

Descriptive information indicating the degree of support given to seven selected NEM independent variables was gathered from 15 school districts within the CESA #11 district of the State of Wisconsin. The sample population consisted of 15 superintendents, 15 elementary principals, and 78 elementary teachers from primarily a rural environment.

Their several responses were tallied, and converted to z-scores for comparison. The z-scores for each school, on each of the independent variables, were weighted and summed to create one composite number which would represent each school's level of support for NEM.

Data on student achievement, the dependent variable, was gathered on 1,800 4th, 5th, and 6th grade students from the records on file in the CESA #11 office. The students data indicated their achievement as measured by the California Comprehensive Test of Basic Skills - Level 2 in the area of Composite Grade Equivalent Score and Composite Study Skills Score. An IBM 1130 computer was used to provide the statistical analysis required.

The statistical treatment used was an analysis of variance (F test) based on two student achievement variables measured by the California Test (dependent variables.) Differences among schools on such student achievement data were examined for their correspondence to differences among schools on NEM Composite Standard Scores.

CHAPTER IV

ANALYSIS OF RESULTS

Descriptive Data

Independent Variables: This chapter contains statements and tables which present the data gathered by this investigation. In the first section, descriptive data relating to the NEM Independent Variables and the Dependent Variables are presented. The second section presents an analysis of that data, and section three summarized the analysis of that data.

The Independent Variables which were measured were:

- A. Teacher ability to recognize behavioral objectives.
- B. Teacher attitude toward NEM.
- C. The amount of teacher training in NEM utilization.
- D. The availability of NEM software.
- E. The availability of NEM hardware.
- F. Administrative attitude toward NEM.
- G. Administrative financial support for NEM.
- H. A composite score, combining all seven of the above.

Table 4-1 presents the combined data gathered on NEM variables A, B, and C. Variable A, teacher recognition of behavioral objectives, was measured by a 16-item instrument (see Appendix H) which required a yes or no response to indicate whether or not a statement was written in behavioral terms according to Mager. There were 83 teachers surveyed with 100% return. The responses by individual teachers are shown, by school, in Appendix H. Table 4-1 indicated the mean school response on

TABLE 4-1

TEACHER RESPONSE TO NEM INSTRUMENTS

School	Behavioral Objectives	Attitude NEM		Teacher Training (courses)
	(Raw Score)	(Converted Score)**		
	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$
10	14.00	102.80	57.20	4.33
11	12.00	107.00	53.00	3.00
12	14.17	119.08	40.92	4.00
13	14.60	98.80	61.20	3.40
14*	14.00	94.17		1.89
15	8.67	109.00	51.00	2.67
16	14.67	124.50	35.50	1.33
17	13.50	103.38	56.62	2.25
18*	12.33	131.83		2.00
19	15.00	111.38	48.62	2.50
20	15.00	86.10	73.90	3.60
21	14.58	88.08	71.92	2.67
22	14.00	82.00	78.00	2.50
23	13.00	104.33	45.67	3.33
24	14.13	107.56	52.44	3.75
$\bar{X}$	13.64	103.39	55.85	3.03
S	1.71	12.35	12.35	.82
N	13.00	13.00	13.00	13.00

* Omitted from analysis

** Converted to indicate high value to mean high support of NEM

Formula used $\bar{X} = 160 - \text{Mean Raw Score}$

Variable A. Although data was gathered from 15 schools, it was necessary to omit schools 14 and 18 from consideration, because of incomparable data on certain dependent variables. The highest possible mean response was 16. The actual range was from 15.00 to a low of 8.67. The mean of all schools, or grand mean, was 13.64 with a standard deviation of 1.71 and an N of 13.

Variable B, teacher attitude toward NEM, was measured by a 48 item Likert-type instrument (see Appendix I) which required a response ranging from "agree strongly" to "disagree strongly." There were 20 items which were reversed scored so that a response of "disagree strongly" with a negative statement would be scored as an "agree strongly", so that all total responses were finalized in the positive. Any statement to which there was no response made was scored as a 3.5 or middle response. There were 83 teachers surveyed with 100% return. Appendix J shows the individual teacher responses, while Table 4-1, columns 2 and 3 indicate the mean school response. It should be noted that the mean school response was reported in raw score form with a low numeric response indicating a high attitude toward NEM and a high numeric response indicating a low attitude toward NEM. Therefore, it was necessary to convert the mean raw score for each school to a converted score, which would then indicate a high numeric response as having a high attitude toward NEM and a low numeric response as having a low attitude toward NEM. Table 4-1 indicates the converted scores which were obtained by using the formula $\bar{X} = 160 - \text{mean raw score}$. The converted school mean responses ranged from 78.00, high attitude toward NEM, to 35.5, low

attitude toward NEM. The grand mean of all schools was 55.85 with a standard deviation of 12.35 and an N of 13.

Variable C, teacher training, was indicated by the respondent on a personal information sheet. (See Appendix G.) There were 83 instruments circulated with 100% return. The individual teacher response, by schools, is found in Appendix J. Table 4-1, column 4, indicates the mean number of training courses per teacher by school. These range from 4.33 courses to 1.33. The grand mean of all schools was 3.03 courses with a standard deviation of .82 and an N of 13.

Variable D, availability of software, was determined through para-professional response to a 15-item inventory-type listing of software. (See Appendix L.) The para-professionals tallied all software available to each teaching team within each school surveyed. Each item was assigned a relative weight index value (Table 4-2) by the researcher, in terms of value toward instruction, with the item considered least important to instruction assigned a 1. The balance of items were assigned values on a relative scale to 1 and ranging to a value of 40 for 16mm films.

The total number of items were calculated across all schools. In order to determine a number which would identify each school on software, the number of each item per school was divided by the total number of items and then multiplied by the weight assigned. The weighted total for all items per school is found in Table 4-3. These weighted totals, on each item, were totaled to create a weighted composite software score across all items for each school.

TABLE 4-2
NEM SOFTWARE WEIGHTING INDEX

Item	*Weighted Value
16mm films	40
8mm, super 8mm loop films	30
35mm filmstrips	20
2x2 slides	15
audio recordings	10
audio-tape recordings	10
overhead transparencies	10
realia	8
maps	6
globes	6
models	6
study prints	4
overhead masters	4
$3\frac{1}{4}$ x 4 slides	1
language labs	1
Total - 15 items	
* Relative to value of 1 for least valued.	

TABLE 4-3

NEM WEIGHTED SOFTWARE SCORES

Software	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	*	.01	.07	.09	.04	.03	.04	.08	.09	.00	.09	.07	.14	.08	.08
16mm film	**	.46	2.18	3.53	1.68	1.16	1.51	3.20	3.68	.00	3.62	2.90	5.50	3.30	3.33
loop films		.00	.11	.01	.00	.00	.00	.14	.15	.00	.00	.19	.40	.00	.00
		.00	3.30	.30	.00	.00	.00	4.20	4.50	.00	.00	5.70	12.00	.00	.00
film strips		.03	.13	.02	.05	.13	.03	.07	.02	.00	.05	.03	.05	.04	.13
		.66	2.57	.47	.93	2.57	.53	1.42	.48	.00	1.07	.68	1.03	.71	4.32
audio tape		.05	.09	.06	.10	.10	.03	.08	.06	.00	.05	.06	.05	.11	.03
		.52	.93	.60	.95	1.03	.34	.77	.56	.00	.45	.62	.45	1.60	.27
records		.00	.02	.00	.01	.18	.01	.02	.02	.00	.04	.01	.10	.03	.05
		.00	.19	.00	.09	6.84	.10	.23	.17	.00	.44	.09	1.02	.34	.00
language labs		.00	.00	.00	.00	.00	.64	.00	.00	.00	.04	.08	.00	.00	.24
		.00	.00	.00	.00	.00	.64	.00	.00	.00	.04	.08	.00	.00	.24
		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.79	.21	.00	.00
3 1/4 x 4		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.79	.21	.00	.00
		.10	.00	.08	.00	.07	.00	.35	.08	.00	.06	.00	.04	.04	.10
2 x 2		1.48	.00	1.23	.00	1.11	.00	5.23	1.18	.00	.84	.00	.59	.62	1.23
overhead		.00	.06	.00	.17	.04	.00	.11	.17	.00	.20	.02	.03	.01	.09
masters		.00	.24	.00	.66	.16	.00	.44	.66	.00	.79	.06	.13	.05	.35
overhead		.05	.21	.04	.08	.13	.03	.00	.16	.00	.11	.03	.04	.01	.02
transp.		.46	2.11	.44	.82	1.29	.28	.00	1.63	.00	1.10	.29	.44	.07	.17
		.00	.17	.00	.00	.08	.00	.05	.06	.00	.04	.10	.35	.00	.15
study prints		.00	.67	.00	.00	.34	.00	.20	.22	.00	.17	.89	1.40	.00	.62
		.06	.10	.00	.10	.06	.04	.08	.19	.00	.08	.01	.07	.03	.00
maps		.36	.60	.00	.60	.36	.24	.48	1.17	.00	.48	.08	.44	.20	.00
		.06	.04	.00	.17	.17	.08	.02	.13	.00	.08	.00	.08	.06	.10
globes		.38	.25	.00	1.00	1.00	.50	.12	.75	.00	.50	.00	.50	.38	.00
		.10	.03	.00	.00	.04	.00	.64	.11	.00	.05	.03	.00	.01	.00
models		.57	.15	.00	.00	.27	.00	3.82	.65	.00	.31	.19	.00	.04	.00
		.00	.00	.00	.00	.31	.00	.00	.00	.00	.00	.00	.19	.50	.00
realia		.00	.00	.00	.00	2.50	.00	.00	.00	.00	.00	.00	1.50	4.00	.00
Weighted		4.89	13.82	6.57	6.73	18.63	4.14	20.11	15.65	.00	9.81	11.87	25.21	11.31	9.64
															12.53

Composite Software Score

*Compiled raw score decimal fraction

**Weighted raw score

***Schools not included in analysis

Variable E, availability of hardware, was determined through para-professionals responses to a 22-item inventory-type listing of hardware. (See Appendix N) The para-professionals tallied all hardware available to each teaching team within each school surveyed. Each item was assigned a relative weight index value, (Table 4-4) by the researcher, in terms of value toward instruction with the item considered least important to instruction assigned a 1. The balance of items were assigned values on a relative scale to 1 and ranging to a value of 40 for 16mm projectors.

The total number of items was calculated across all schools. In order to determine a number which would identify each school on hardware, the number of each item per school was divided by the total number of items and then multiplied by the weight assigned. The weighted total for all items per school is found in Table 4-5. These weighted totals, on each item, were totaled to create a weighted composite hardware score across all items for each school.

Variable F, administrative attitude toward NEM, was measured by the same instrument with which teacher attitude was measured. The instrument consisted of 48 Likert-type items (see Appendix T) each requiring a response ranging from "agree strongly" to "disagree strongly." There were 20 items which were reversed scored so that response of "disagree strongly" with a negative statement would be scored as an "agree strongly" such that all total responses were finalized in the positive. Any statement to which there was no response made was scored as a 3.5 or middle response. There were 17 administrators surveyed with 100% return. It

TABLE 4-4
NEM HARDWARE WEIGHTING INDEX

Item	*Weighted Value
16mm projector	40
loop projectors	30
tape recorders	30
overhead projectors	30
8mm projectors	25
filmstrip projectors	25
record players	25
projection screens	15
controlled readers	10
head sets	9
opaque projectors	8
filmstrip previewers	6
projection carts	5
study carrels	5
cameras	4
cyclo-teachers	3
radio	3
TV receivers	3
language labs	2
ETV	2
CCTV	2
sound systems	1

Total - 22 items

*Relative to value of 1 for least valued.

TABLE 4-5

NEM WEIGHTED HARDWARE SCORES

Hardware	Schools															
	10	11	12	13	14***	15	16	17	18***	19	20	21	22	23	24	
* .03 .06 .06 .08 .06 .03 .03 .06 .11 .19 .03 .03 .06 .03 .06 .14																
16mm proj. ** 1.11 2.22 2.22 3.33 2.22 1.11 1.11 2.22 4.44 7.78 1.11 2.22 1.11 2.22 1.11 2.22 5.56																
loop proj. .00 .07 .07 .14 .00 .07 .07 .00 .07 .07 .07 .07 .29 .07 .00 .00																
film strip .00 2.14 2.14 4.29 .00 2.14 2.14 .00 2.14 2.14 2.14 8.57 2.14 .00 .00																
projector .05 .18 .03 .06 .05 .03 .03 .05 .05 .06 .11 .03 .08 .05 .12 .09																
film strip 1.14 4.55 .76 1.51 1.14 .76 .76 1.14 1.51 2.65 .76 1.89 1.14 3.03 2.27																
previewers .10 .02 .06 .06 .12 .04 .10 .06 .06 .01 .08 .14 .03 .09 .10 .00																
overhead .57 .14 .33 .38 .71 .24 .57 .38 .05 .48 .86 .19 .52 .57 .00																
projector .05 .05 .10 .08 .10 .05 .03 .03 .03 .06 .06 .02 .17 .03 .03 .14																
opaque 1.43 1.43 2.86 2.89 2.86 1.43 .95 .95 .95 1.90 1.90 .48 5.24 .95 4.29																
projector .00 .07 .07 .07 .00 .07 .07 .07 .00 .07 .07 .07 .14 .00 .07 .21																
tape recorder .00 .57 .57 .57 .00 .57 .57 .57 .00 .57 .57 .57 1.14 .00 .57 1.71																
record player .04 .06 .05 .04 .17 .03 .03 .03 .05 .09 .06 .05 .18 .05 .02 .08																
radio 1.21 1.94 1.45 1.21 5.08 .97 .97 1.45 2.66 1.94 1.45 5.32 1.45 .48 2.42																
projection .06 .06 .04 .06 .19 .04 .06 .06 .04 .07 .09 .04 .09 .04 .07 .07																
projection carts 1.39 1.39 .93 1.39 4.63 .93 1.39 .93 1.85 2.31 .93 2.31 .93 1.85 1.85																
projection screens .00 .00 .00 .03 .15 .03 .03 .00 .03 .09 .12 .00 .32 .06 .09 .09																
controlled .00 .00 .00 .09 .44 .09 .00 .09 .09 .26 .35 .00 .97 .18 .26 .26																
reader .02 .05 .11 .02 .18 .07 .02 .02 .00 .02 .05 .05 .25 .05 .02 .09																
sound (P.A.) .09 .27 .54 .09 .89 .38 .09 .09 .00 .09 .27 .27 1.25 .27 .09 .45																
system .03 .03 .07 .07 .25 .05 .00 .05 .05 .05 .06 .06 .05 .03 .07 .14																
camera .52 .52 1.03 1.03 3.79 .69 .00 .69 .69 .86 .86 .69 .52 1.03 2.07																
language .20 .20 .00 .00 .00 .10 .20 .00 .00 .00 .10 .00 .00 .00 .00 .20																
labs 2.00 2.00 .00 .00 .00 1.00 2.00 .00 .00 1.00 .00 .00 .00 .00 2.00																
						</										

TABLE 4-5 (continued)

NEM WEIGHTED HARDWARE SCORES

Hardware	Schools															
	10	11	12	13	14***	15	16	17	18***	19	20	21	22	23	24	
study	* .00	.11	.00	.00	.22	.04	.00	.06	.11	.06	.00	.15	.17	.00	.09	
carrels	** .00	.55	.00	.00	1.11	.19	.00	.28	.55	.28	.00	.74	.83	.00	.46	
CCTV	.00	.00	.00	.00	.00	.50	.00	.00	.00	.50	.00	.00	.00	.00	.00	
	.00	.00	.00	.00	.00	1.00	.00	.00	.00	1.00	.00	.00	.00	.00	.00	
ETV	.00	.00	.00	.00	.00	.50	.00	.00	.00	.00	.00	.00	.00	.00	.50	
	.00	.00	.00	.00	.00	1.00	.00	.00	.00	.00	.00	.00	.00	.00	1.00	
television	.00	.00	.00	.00	.00	.33	.00	.00	.00	.33	.00	.00	.00	.00	.33	
receivers	.00	.00	.00	.00	.00	.99	.00	.00	.00	.99	.00	.00	.00	.00	.99	
head sets	.09	.08	.01	.13	.06	.06	.05	.01	.08	.03	.08	.09	.12	.01	.12	
	.81	.69	.09	1.15	.52	.52	.43	.06	.72	.23	.69	.81	1.07	.12	1.10	
cyclo-teacher	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.00	.00	.00	.00	.00	.00	
	.00	.00	.00	.00	.00	.00	.00	.00	.00	3.00	.00	.00	.00	.00	.00	
Weighted	9.27	19.85	13.03	19.37	23.50	15.72	10.98	8.19	17.54	29.19	10.12	31.34	11.22	11.57	26.54	
Composite Hardware Score																
*Compiled raw score decimal fraction																
**Weighted raw score																
***Schools not included in analysis																

***Schools not included in analysis

was noted that two schools had replies from more than one administrator. For these two schools, the raw scores were tallied and a mean score determined which was used to indicate the administrative attitude for that school system. Two schools, 14 and 18, were also omitted from analysis of administrative data, because some data returned (dependent variables) was found to be incomparable. Table 4-6, column 3, shows the mean response per school for administrators. The raw form of the score indicates a low value, or score, as having a high attitude toward NEM, while a large value, or score, as having a low attitude toward NEM. Column 4 shows the converted scores used, which were attained through the formula $\bar{X} = 160 - \text{mean raw score}$. These converted scores allowed a high numerical response to indicate high attitude toward NEM, while a low numerical response indicated a low attitude toward NEM. The converted score mean response ranged from 78.00, high attitude toward NEM, to 9.50, low attitude toward NEM. The mean for all schools was 57.12 with a standard deviation of 23.49 and an N of 13.

Variable G, administrative financial support for NEM, was determined through personal telephone contact with all school superintendents followed by a financial survey instrument through the mail. (See Appendix S.) Table 4-7 indicates the amount spent in 1969-70 per school ranged from a high of \$26.03 per pupil to a low of \$3.41 per pupil. It was noted that school #19 actually had a higher per pupil expenditure than reported here, due to involvement in other funded activities, as an example, a "Talking Typewriter" computerized terminal.

Variable H, combining the preceeding independent variables A, B, :

TABLE 4-6
ADMINISTRATIVE SUPPORT
-ATTITUDE-

School #	Admin. #	Attitude		Rank
		Raw Score	Converted Score ***	
10	1	86.0	74.0	5
11	5	144.0	16.0	12
12	9	123.0	37.0	11
13	16	82.0	78.0	2
14 *	23	91.0		
15	33	114.0	46.0	10
16	37	85.0	75.0	3
17	41	91.0	69.0	6
18 *	46	159.0		
19	50	80.0	80.0	1
20	55	85.0	75.0	4
21	61	119.0		
	62	88.5	56.0	9
22	75	93.0	67.0	7
23	80	150.5	9.5	13
24	87	115.0		
	88	85.0	60.0	8
Total - 17 Administrators			15	
* Omitted from analysis			$\bar{X} = 57.12$	
** Average response			$S = 23.49$	$N = 13$
*** Converted to indicate high value to mean high support of NEM				
Formula used $\bar{X} = 160 - \text{mean raw score}$.				

TABLE 4-7
ADMINISTRATIVE SUPPORT
-FINANCIAL ALLOWANCES-

School #	Net Budget 1969	Amount spent on NEM 1969	Enrollment 1969**	NEM per Student
10	\$ 349,280	\$3,500	269	\$13.01
11	268,240	2,420	519	4.66
12	313,926	6,015	474	12.69
13	263,250	2,800	435	6.44
14*	210,000	7,500	482	15.56
15	496,640	4,800	593	8.09
16	386,692	3,500	220	15.91
17	510,384	2,500	679	3.68
18*	163,372	2,520	215	11.72
19	171,715	6,377	245	26.03
20	451,675	6,900	422	16.35
21	1,151,766	7,700	942	8.17
22	450,528	3,362	574	5.86
23	608,780	1,972	578	3.41
24	406,875	3,905	426	9.17

* Not included in the analysis of data

** Obtained from CESA #11 State Reports for 1969-70.

$\bar{X}$ = \$10.27 per student

S = \$6.44

N = 13

C, D, E, F and G as one independent variable, was accomplished by totaling each mean school response on each independent variable. Table 4-8 shows the mean response per school on each independent variable converted to Standard Scores (z scores) to allow for the differences in sample size. It was necessary to create a weight index for the independent variables, (see Table 4-9) so that a Composite Standard Score which would represent each school could be calculated. (See Table 4-10.)

Table 4-10 presents the raw Composite Standard Score and an adjusted Composite Standard Score. The adjusted Standard Score was determined for each school by the following formula.

$$\begin{aligned} \text{Adjusted NEM Comp. S.S.} = & 40 + [3(\text{Var.}_1\text{S.S.}) + 20(\text{Var.}_2\text{S.S.}) \\ & + 1.5(\text{Var.}_3\text{S.S.}) + 1(\text{Var.}_4\text{S.S.}) + 10(\text{Var.}_5\text{S.S.}) + 10(\text{Var.}_6\text{S.S.}) \\ & + 12(\text{Var.}_7\text{S.S.})] \end{aligned}$$

The arbitrary value of 40 was added to all Composite Standard Scores so that all of the values would be positive and therefore more easily ranked.

The Composite Standard Score, for each school included in this investigation, represents the numerical value which identifies each schools responses to the survey instruments concerning NEM. The Grand Mean Composite Scores were used to determine the relationships that NEM (independent variables) had with student achievement (dependent variables I and II).

TABLE 4-8
 MEAN STANDARD SCORES (z)
 INDEPENDENT VARIABLES

School #	Behavioral Objectives	Attitude Teacher	Attitude Admin.	Teacher Train.	Soft Ware	Hard Ware	Finance
10	+0.21	+0.05	+0.72	+1.59	-1.13	-0.93	+0.43
11	-0.96	-0.29	-1.75	-0.04	+0.35	+0.46	-0.87
12	+0.31	-1.27	-0.86	+1.18	-0.85	-0.43	+0.38
13	+0.56	+0.37	+0.89	+0.45	-0.83	+0.40	-0.59
15	-2.91	-0.45	-0.47	-0.44	-1.26	-0.08	-0.34
16	+0.60	-1.71	+0.76	-2.07	+1.39	-0.70	+0.88
17	-0.08	+0.00	+0.51	-0.95	+0.65	-1.07	-1.02
19	+0.80	-0.65	+0.97	-0.65	-0.32	+1.69	+2.45
20	+0.80	+1.40	+0.76	+0.70	-0.03	-0.82	+0.94
21	+0.55	+1.24	-0.05	-0.44	+2.24	+1.97	-0.33
22	+0.21	+1.73	+0.42	-0.65	-0.07	-0.67	-0.68
23	-0.37	-0.08	-2.03	+1.37	-0.34	-0.63	-1.07
24	+0.29	-0.34	+0.12	+0.88	+0.14	+0.81	-0.17

TABLE 4-9
WEIGHTING INDEX - INDEPENDENT VARIABLE

Variable		Value Assigned
A	Recognizing Behavioral Objectives	3.0
B	Teacher Attitude	20.0
C	Administrative Attitude	1.5
D	Teacher Training	1.0
E	Software	10.0
F	Hardware	10.0
G	Financial Support	12.0

Note: Values assigned subjectively by investigator relative to value of contribution toward student learning.

TABLE 4-10
ADJUSTED NEM COMPOSITE STANDARD SCORES

School #	Composite Standard Scores		Rank Order
	SS	SS+40*	
10	-11.14	28.86	7
11	-13.69	26.31	8
12	-32.82	7.18	12
13	-0.52	39.48	6
15	-36.36	3.64	13
16	-15.87	24.13	9
17	-16.87	23.13	10
19	+33.31	73.31	3
20	+35.62	75.62	2
21	+64.08	104.08	1
22	+19.65	59.65	4
23	-27.93	12.07	11
24	+2.59	42.59	5

$$\bar{X} = 40.00$$

$$S = 30.15$$

$$N = 13$$

*Add 40 to give all positive values

Note: Adjusted Comp.S.S. = $3(\text{Var.}_1 \text{S.S.}) + 20(\text{Var.}_2 \text{S.S.}) + 1.5(\text{Var.}_3 \text{S.S.})$
 $+ 1(\text{Var.}_4 \text{S.S.}) + 10(\text{Var.}_5 \text{S.S.}) + 10(\text{Var.}_6 \text{S.S.}) + 12(\text{Var.}_7 \text{S.S.})$

Dependent Variables: The dependent variables used in this study are two forms of student achievement as determined by the California Comprehensive Test of Basic Skills - Level 2, which was administered in the spring of 1970. The fact that all tests were administered by the classroom teacher was accounted for in the environmental conditions under which most achievement testing takes place. The actual student achievement raw scores are not included in the Appendix of this study, as the large sampling of 1,808 students would fill many additional pages; however, all of the raw scores used were obtained from the files of the CESA #11 office. Student achievement was measured in two manners: (a) composite student achievement score, and (b) student study skills score. These are designated Variable I and Variable II, respectively.

Table 4-11 indicates student grade equivalent scores, in raw terms, for each grade across all schools. The fourth grade mean "grade-equivalent" score on composite student achievement was 5.10, with a standard deviation of 1.31 and a sample size of 620 students. The fourth grade "study skills" mean score was 5.67, with a standard deviation of 1.90 and a sample of 620 students. The fifth grade mean "grade equivalent" score on composite student achievement was 6.13, with a standard deviation of 1.61 and a sample of 653 students. The fifth grade "study skills" mean score was 6.85, with a standard deviation of 2.19 and a sample of 653 students. The sixth grade mean "grade equivalent" score on composite student achievement was 7.20 with a standard deviation of 1.78 and a sample of 538 students. The sixth grade mean "study skills" score was 8.00, with a standard deviation of 2.28 and a sample of 538 students.

TABLE 4-11
COMPILED STUDENT GRADE EQUIVALENT SCORES*

Grade	Dependent Variables	Mean	SD	Sample Size
4th	Composite Stud. Achieve.	5.10	1.31	620
	Study Skills	5.67	1.90	620
5th	Composite Stud. Achieve.	6.13	1.61	653
	Study Skills	6.85	2.19	653
6th	Composite Stud. Achieve.	7.20	1.78	538
	Study Skills	8.00	2.28	538

*California Comprehensive Test of Basic Skills - Level 2, Spring 1970,
expressed as 'grade-equivalent' scores.

The sample size for each reporting school varied within each grade level. It was therefore necessary to interpret the student raw scores on Variable I and Variable II in terms of a converted score, a Standard Score. (See Table 4-12.) The T-score was calculated on the mean and standard deviation of each grade across all schools. Table 4-12 indicates the mean T-score for each school, standard deviation, and sample size on each dependent variable.

A correlation between the school means for Variable I and Variable II was calculated. The results indicated a correlation or $r_{12} = +0.74$, where 1 = mean student achievement T-score; 2 = mean student study skills T-score; and $N = 13$. The correlation value $+0.74$ indicated a high degree of overlap between the two dependent variables of student achievement and student study skills. Thus, a student who scored high in grade equivalent also tended to score high in measured study skills and vice versa.

TABLE 4-12
ADJUSTED ACHIEVEMENT SCORES (T-SCORES)
ON DEPENDENT VARIABLES

School #	Variable I*			Variable II**		
	Mean	SD	Sample Size	Mean	SD	Sample Size
10	52.48	9.38	95	53.06	8.88	95
11	48.01	11.79	78	45.83	9.17	78
12	51.03	9.30	160	51.37	8.91	160
13	52.79	10.96	146	52.20	9.31	146
15	49.70	10.91	51	49.42	10.40	51
16	49.94	9.19	83	48.41	9.62	83
17	47.18	10.65	107	47.85	10.74	107
19	50.79	9.84	113	50.07	8.81	113
20	48.58	10.18	163	49.77	9.77	163
21	48.63	10.43	354	48.21	9.67	354
22	47.39	11.01	83	49.88	11.68	83
23	52.60	10.92	183	50.48	9.81	183
24	50.55	10.88	192	52.35	11.05	192
13 schools			1808 students	1808 students		

*Variable I is Grade Equivalent Score on all students in sample.

**Variable II is Study Skill Score on all students in sample.

Analysis of Data

The research hypothesis of this investigation was that there was a relationship between the environmental conditions under which learning takes place and measured student achievement. Data was gathered which described selected NEM independent variables. Table 4-13 shows the intercorrelations of all the Independent Variables. The mean intercorrelation of all variables was +0.10. This indicated that there was little correlation between the NEM variables. At the .05 level of probability an $r \geq \pm 0.55$ is required for significance with 13 pairs of measures. The low mean intercorrelation did, then, indicate that distinctly different NEM variables were measured.

When considering the selected NEM variables investigated, in comparison to the dependent variable (student achievement) the conclusion derived was that under the conditions of this investigation the selected variables, as a group, had no more effect on student achievement than conventional environmental conditions.

Analysis of each independent variable in relation to student achievement indicated a slightly different conclusion. Table 4-14 presents Individual NEM Variables and Dependent Variable I, student achievement, correlations. Table 4-15 presents the Individual NEM Variables and Dependent Variable II, student study skills, correlations.

Column 1 in Table 4-14, indicates the ranking of all schools on NEM Variable A, "recognizing behavioral objectives," and corresponding student achievement T scores (Dependent Variable I). School #19 ranked 1 and school #15 ranked 13. The Grand Mean Response was 13.64 and the

TABLE 4-13
INTERCORRELATIONS OF ALL INDEPENDENT VARIABLES

Variable #							
	1	2	3	4	5	6	7
1	+1.00	+0.18	+0.51	+0.07	+0.36	+0.12	+0.42
2		+1.00	+0.30	+0.13	+0.16	+0.09	-0.22
3			+1.00	-0.19	+0.07	+0.02	+0.35
4				+1.00	-0.57	-0.08	-0.06
5					+1.00	+0.33	-0.06
6						+1.00	+0.25
7							+1.00

Mean Intercorrelation = +0.10

Note: Key to Independent Variables

1. Behavioral Objectives
2. Teacher Attitude
3. Administrative Attitude
4. Teacher Training
5. Software
6. Hardware
7. Finances

correlation of +0.12 was not significant. Table 4-15 shows the ranking and correlation between Independent Variable A and Dependent Variable II, student study skills. The Grand Mean Response was 13.64. The correlation of +0.27 was not significant.

The correlation between Independent Variable B and Dependent Variable I is shown in Table 4-14, column #2. The Grand Mean Response was 55.85. The correlation of -0.44 was not significant. Table 4-15, column #2, shows the relationship of Variable B with Dependent Variable II. The Grand Mean Response was 55.85. The correlation of -0.03 was not significant.

The correlation between Independent Variable C and Dependent Variable I is shown in Table 4-14, column #3. The Grand Mean Response was 57.12. The correlation of -0.04 was not significant. Table 4-15, column #3, shows the relationship of Variable C with Dependent Variable II. The Grand Mean Response was 57.12. The correlation of +0.31 was not significant.

The correlation between Independent Variable D and Dependent Variable I is shown in Table 4-14, column #4. The Grand Mean Response was 3.03. The correlation of +0.50 approaches statistical significance, but is not sufficiently high to indicate a correlation which may have occurred other than by chance. Table 4-15, column #4, shows the relationship of Variable D with Dependent Variable II. The Grand Mean Response was 3.03. The correlation of +0.66 was of sufficient value to indicate a significant correlation ($p < .05$) between the availability of software and Student Study Skills. Appraising only Independent Variable D and Dependent Variable II,

TABLE 4-14

INDIVIDUAL NEM VARIABLES AND STUDENT ACHIEVEMENT T

Sch. Rank	$\bar{X}$ 1	Ach. T	Sch. Rank	$\bar{X}$ 2*	Ach. T	Sch. Rank	$\bar{X}$ 3*	Ach. T	Sch. Rank	$\bar{X}$ 4	Ach. T
19	15.00	50.79	22	78.00	47.39	19	80.00	50.79	10	4.33	52.48
20	15.00	48.58	20	73.90	48.56	13	78.00	52.79	12	4.00	51.03
16	14.67	49.94	21	71.92	48.63	16	75.00	49.94	24	3.75	50.55
13	14.60	52.79	13	61.20	52.79	20	75.00	48.58	20	3.60	48.58
21	14.58	48.63	10	57.20	52.48	10	74.00	52.48	13	3.40	52.79
12	14.17	51.03	17	56.62	47.18	17	69.00	47.18	23	3.33	52.60
24	14.13	50.55	23	45.67	48.01	22	67.00	47.39	11	3.00	48.01
10	14.00	52.48	11	53.00	50.55	24	60.00	50.55	15	2.67	49.70
22	14.00	47.39	24	52.44	49.70	21	56.00	48.63	21	2.67	48.63
17	13.50	47.18	15	51.00	50.79	15	46.00	49.70	19	2.50	50.79
23	13.00	52.60	19	48.62	52.60	12	37.00	51.03	22	2.50	47.39
11	12.00	48.01	12	40.92	51.03	11	16.00	48.01	17	2.25	47.18
15	8.67	49.70	16	35.50	49.94	23	9.50	52.60	16	1.33	49.94
$\bar{X}$	13.64		$\bar{X}$	55.85		$\bar{X}$	57.12		$\bar{X}$	3.03	
S	1.71		S	12.72		S	23.49		S	0.82	
N	13.00		N	13.00		N	13.00		N	13.00	
r=	+0.12		r=	-0.44		r=	-0.04		r=	+0.50	

r= Correlation based on Individual NEM Scores and mean Study Skill Score across all schools.

*Converted to indicate high value to mean high support of NEM.

TABLE 4-15

INDIVIDUAL NEM VARIABLES AND STUDENT STUDY SKILLS T

Sch. Rank	$\bar{X}$ 1	S.S. T	Sch. Rank	$\bar{X}$ 2*	S.S. T	Sch. Rank	$\bar{X}$ 3*	S.S. T	Sch. Rank	$\bar{X}$ 4	S.S. T
19	15.00	50.07	22	78.00	49.88	19	80.00	50.07	10	4.33	53.06
20	15.00	49.77	20	73.90	49.77	13	78.00	52.20	12	4.00	51.37
16	14.67	48.41	21	71.92	48.21	16	75.00	48.41	24	3.75	52.35
13	14.60	52.20	13	61.20	52.20	20	75.00	49.77	20	3.60	49.77
21	14.58	48.21	10	57.20	53.06	10	74.00	53.06	13	3.40	52.20
12	14.17	51.37	17	56.62	47.85	17	69.00	47.85	23	3.33	50.48
24	14.13	52.35	23	45.67	50.48	22	67.00	49.88	11	3.00	45.83
10	14.00	53.06	11	53.00	45.83	24	60.00	52.35	15	2.67	49.42
22	14.00	49.88	24	52.44	52.35	21	56.00	48.21	21	2.67	48.21
17	13.50	47.85	15	51.00	49.42	15	46.00	49.42	19	2.50	50.07
23	13.00	50.48	19	48.62	50.07	12	37.00	52.37	22	2.50	49.88
11	12.00	45.83	12	40.92	51.37	11	16.00	45.83	17	2.25	47.85
15	8.67	49.42	16	35.50	48.41	23	9.50	50.48	16	1.33	48.41
$\bar{X}$	13.64		$\bar{X}$	55.85		$\bar{X}$	57.12		$\bar{X}$	3.03	
S	1.71		S	12.72		S	23.49		S	0.82	
N	13.00		N	13.00		N	13.00		N	13.00	
r=	+0.27		r=	-0.03		r=	+0.31		r=	+0.66	

r= Correlation based on Individual NEM Scores and mean Study Skill Score across all schools.

*Converted to indicate high value to mean high support of NEM.

TABLE 4-15 (Continued)

INDIVIDUAL NEM VARIABLES AND STUDENT STUDY SKILLS T

Sch. Rank	$\bar{X}$ 5	S.S. T	Sch. Rank	$\bar{X}$ 6	S.S. T	Sch. Rank	$\bar{X}$ 7	S.S. T
21	25.21	48.21	21	31.34	48.21	19	26.03	50.07
16	20.11	48.41	19	29.19	50.07	20	16.35	49.77
17	15.15	47.85	24	22.54	52.35	16	15.91	48.41
11	13.82	45.83	11	19.85	45.83	10	13.01	53.06
24	12.53	52.35	13	19.37	52.20	12	12.69	51.37
20	11.85	49.77	15	15.72	49.42	24	9.17	52.35
22	11.31	49.88	12	13.01	51.37	21	8.17	48.21
19	9.81	50.07	23	11.57	50.48	15	8.09	49.42
23	9.64	50.48	22	11.22	49.88	13	6.44	52.20
13	6.73	52.20	16	10.98	48.41	22	5.86	49.88
12	6.57	51.37	20	10.12	49.77	11	4.66	45.83
10	4.89	53.06	10	9.27	53.06	17	3.68	47.85
15	4.14	49.42	17	8.19	47.85	23	3.41	50.48
$\bar{X}$	11.71		$\bar{X}$	16.34		$\bar{X}$	10.27	
S	6.03		S	7.61		S	6.44	
N	13.00		N	13.00		N	13.00	
r=	-0.60		r=	-0.10		r=	+0.20	

r=Correlation based on Individual NEM Scores and mean Study Skill Score across all schools.

the conclusion was drawn that within the restrictions of this investigation, the presence of NEM software does have a positive effect on student achievement. (Study Skill Score.)

The correlation between Independent Variable E and Dependent Variable I is shown in Table 4-14, continued, column #1. The Grand Mean Response was 11.71. The correlation of -0.52 was not significant. Table 4-15, continued, column #1 shows the relationship of Variable E and Dependent Variable II. The Grand Mean was 11.71. The correlation of -0.60 was of significant value to report as a negative correlation between the availability of NEM hardware and Student Study Skills. Appraising only Independent Variable E, the conclusion was drawn that within the restrictions of this investigation, the presence of NEM hardware had a negative effect on student achievement. (Student Study Skills Score.)

The correlation between Independent Variable F and Dependent Variable I is shown in Table 4-14, continued, column #2. The Grand Mean Response was 16.34. The correlation of $+0.04$ was not significant. Table 4-15 continued, column #2, shows the relationship of Variable F and Dependent Variable II. The Grand Mean was 16.34. The correlation of -0.10 was not significant.

The correlation between Independent Variable G and Dependent Variable I is shown in Table 4-14, continued, column #3. The Grand Mean Response was 10.27. The correlation of $+0.19$ was not significant. Table 4-15, continued, column #3, shows the relationship of Variable G and Dependent Variable II. The Grand Mean was 10.27. The correlation of

+0.20 was not significant.

Table 4-16 shows the correlation coefficient of the NEM Composite Standard Scores with Dependent Variable I and Variable II. The correlation coefficient of -0.30 for NEM and Variable I indicates that no significant correlation was found, at the .05 level of probability, when NEM variables were present at the levels measured in the student learning environment. Also shown in Table 4-16, is the correlation coefficient of -0.10 for NEM and Variable II. This indicates that no significant correlation was found, at the .05 level of probability, when NEM Variables and Student Study Skills were compared.

This fact is supported in Table 4-17. Visual inspection indicates that if school #21, which ranked 1 in NEM, had also ranked 1 in Dependent Variable I and Dependent Variable II instead of ranking 10 and 11 respectively, there would have been an indication that the hypothesis of this investigation was supported. School #15 which was 13th in ranking on NEM ranked 8th on Dependent Variable I and 9th on Dependent Variable II. Visual inspection showed no pattern of ranking between the Independent and Dependent Variables. The apparent random ranking shown in Table 4-17, supported by the correlational analyses reported previously, indicated that no additional examination of data as suggested in Chapter III should be undertaken.

Summary of Data

A summary of the decisions reached on the NEM hypotheses is shown in Table 4-18. Of the 16 hypotheses tested, there were two hypotheses which indicated a significant correlational value between NEM and the

TABLE 4-16

CORRELATION OF NEM COMPOSITE STANDARD SCORES
WITH DEPENDENT VARIABLES

$r_{12} = -0.30$ Where 1 = NEM Composite Standard Score; and
N = 13 2 = Mean Student Achievement T
NSD from $r = 0$ at $P < .05$

$r_{12} = -0.10$ Where 1 = NEM Composite Standard Score; and
N = 13 2 = Mean Student Study Skill T
NSD from $r = 0$ at $P < .05$

TABLE 4-17

RANKING ON NEM COMPARED TO DEPENDENT VARIABLES

School #	Independent Var. NEM*	Rank	Dependent Var. I**	Rank	Dependent Var. II	Rank
21	104.08	1	48.63	9	48.21	11
20	75.62	2	48.58	10	49.77	8
19	73.31	3	50.79	5	50.07	6
22	59.65	4	47.39	12	49.88	7
24	42.59	5	50.55	6	52.35	2
13	39.48	6	52.79	1	52.20	3
10	28.86	7	52.48	3	53.06	1
11	26.31	8	48.01	11	45.83	13
16	24.13	9	49.94	7	48.41	10
17	23.13	10	47.18	13	47.85	12
23	12.07	11	52.60	2	50.48	5
12	7.18	12	51.03	4	51.36	4
15	3.64	13	49.70	8	49.42	9

* z-scores

** t-scores

Dependent Variables at the .05 level of probability, while the remaining 14 hypotheses showed no significant correlations. The two which did show a relationship were hypothesis D, teacher training ($r = +0.66$) and hypothesis F, the availability of hardware ($r = -0.60$), with both showing a relationship to measured student study skills only, and one of these in a direction opposite to that hypothesized. Further, it is recognized that when many hypotheses are tested statistically at a given level of probability (in this case .05), the chances of finding at least one significant value are inflated to a probability level much higher than the level for just one such inference. Specifically, 16 different inferences regarding correlation coefficients were carried out in this study. Hays¹ indicates the probability of finding at least one significant difference by chance alone for the entire set of comparisons is given by the expression $1-(1-\alpha)^K$, where $\alpha = .05$ here, and $K = 16$ comparisons. Thus, the probability level for the entire study is at least 0.56 and not just .05.

A discussion of the implications and the conclusions drawn concerning the several facets of this study is presented in Chapter V.

¹W. L. Hays, Statistics, (New York: Holt, Rinehart and Winston, 1963), p. 488 and p. 516.

TABLE 4-18

SUMMARY - HYPOTHESES TESTED

Hypotheses Tested			Correlation (r)	Decision on Hypothesis (r = 0)
Independent Variable*	Dependent I**	Variable II**		
A	I		+0.12	NSD
A		II	+0.27	NSD
B	I		-0.44	NSD
B		II	-0.03	NSD
C	I		-0.04	NSD
C		II	+0.31	NSD
D	I		+0.50	NSD
D		II	+0.66	Significant at the .05 level
E	I		-0.52	NSD
E		II	-0.60	Significant at the .05 level
F	I		+0.04	NSD
F		II	-0.10	NSD
G	I		+0.19	NSD
G		II	+0.20	NSD
H	I		-0.30	NSD
H		II	-0.10	NSD

*NEM Hypotheses

- A. Behavioral Objectives
- B. Teacher Attitude
- C. Administrative Attitude
- D. Teacher Training
- E. Software
- F. Hardware
- G. Finances
- H. Combined A - G

**Dependent Variable I

Composite Student Achievement

**Dependent Variable II

Composite Student Study Skills

CHAPTER V

DISCUSSION AND CONCLUSIONS

Summary of Procedures

This study has sought to determine the relationship between selected environmental variables and their effect on student learning, as measured by standardized student achievement tests. Descriptive information indicating the degree of support given to seven selected NEM independent variables was gathered from 15 school districts within the CESA #11 district of the State of Wisconsin. The sample population consisted of 15 superintendents, 15 elementary principals, and 78 elementary teachers from primarily a rural environment.

Their several responses were tallied, and converted to z-scores for comparison. The z-scores for each school, on each of the independent variables, were weighted and summed to create one composite number which would represent each school's level of support for NEM.

Data on student achievement, the dependent variable, was gathered on 1,808 4th, 5th, and 6th grade students from the records on file in the CESA #11 office. The students data indicated their achievement as measured by the California Comprehensive Test of Basic Skills - Level 2, in the area of Composite Grade Equivalent Score and Composite Study Skills Score. A single measure of student achievement was used to determine the dependent variables.

Summary of Findings

There were seven NEM Hypotheses investigated in this report.

They were:

- A. Does teacher ability to recognize behavioral objectives have an effect on student achievement?
- B. Does teacher attitude toward NEM have an effect on student achievement?
- C. Does the administrative attitude support of NEM have an effect on student achievement?
- D. Does the amount of teacher training in NEM have an effect on student achievement?
- E. Does the availability of NEM software have an effect on student achievement?
- F. Does the availability of NEM hardware have an effect on student achievement?
- G. Does administrative financial support of NEM have an effect on student achievement?
- H. Do all of the preceeding seven NEM variables, taken as a whole, have an effect on student achievement?

Each of the seven hypotheses was tested twice, once compared to Dependent Variable I, and secondly compared to Dependent Variable II. Of the 16 hypotheses tested, there were two hypotheses which indicated a significant correlational value between NEM and the Dependent Variables at the .05 level of probability, while the remaining 14 hypotheses showed no significant correlations. The two which did show a relationship

were hypothesis #4, "Teacher Training" and hypothesis #5, "the Availability of Hardware," with both showing a relationship to measured student study skills only, and one of these in a direction opposite to that hypothesized. Hays states that when many hypotheses are tested statistically at a given level of probability, the chances of finding at least one significant value is inflated to a probability level much higher than the level for just one such inference. Specifically, 16 different inferences regarding correlation coefficients were carried out in this study. Thus, the error probability level for the entire study was determined to be at least 0.56 and not just .05.

Conclusion and Discussion

It was the hypothesis of the investigator that NEM materials, when used appropriately in a normal classroom environment, are important and measurable ingredients which contribute to student achievement. The investigation recognized the myriad of possible environmental factors present in normal classrooms; therefore, data was gathered on seven selected NEM variables and two student achievement variables which provided the statistics leading to the following conclusions:

1. The overall conclusion of this investigation supports previous conclusions of operational research on NEM, that of no significant difference (NSD), being found to exist where all of the NEM variables were present. However, there were several interesting relationships shown when each separate Independent Variable was analyzed in relation to each of the Dependent Variables.

2. It was found that "Teacher Training" was significantly related

(+0.66) to "Student Study Skills" at the .05 level of probability, whereas "Teacher Attitude" was not significant. Certainly, then, the number of NEM courses may be important. Therefore, inservice courses, workshops, and undergraduate courses in NEM might be of prime concern for all teachers. It should be noted, however, that a near chance relationship of "Teacher Training" and "Student Achievement" existed.

3. The review of literature indicated that the administrator was perhaps the greatest change agent in a school system. Yet, in this research, administrators responses, "Attitude" and "Financial Support" were not significantly related to student achievement. Contrary to popular belief, this tends to relegate his contribution to that of providing facilities, equipment and personnel.

4. There was an indication that the amount of software was not important to student achievement, because of a negative correlation of -0.52. The r value was not significant in itself, but this negative value does suggest a question as to the value of software in itself. This would indicate that the great quantities of software which remain unused in many classrooms has no effect on learning. If the software was put into service, perhaps another measure would indicate a very direct relationship to student achievement.

5. Further, it was found that the amount of software available was significantly related to "Student Study Skills", (-0.60.) The negative r value suggests that the amount of software available may be detrimental to study skills, but the mechanism whereby this is accomplished remains to be discovered.

Implications for Further Research

Field research in the use of NEM has been very slow in its ability to demonstrate significant results when related to student learning. However, there are many factors which can be measured that do have an effect on student learning. Some of these factors, in addition to NEM variables, are class size, location of building, room conditions (e.g. heating, lighting, ventilation), teacher age, curriculum planning, administrative decision making, educational financing and budgeting practices. Research on environmental conditions has previously been evaluated, by Twyford and others, but not in relation to measured student achievement.

Previous research has been completed by Gagne' on the relationship of instruction with specific pieces of NEM equipment as compared to instruction without NEM. The results of this kind of research, if performed under actual classroom conditions, would tend to indicate how effective NEM is when used for instructional purposes.

Studies on how effectively the message is transmitted via various NEM tools has provided data on message design, as well as information on the NEM vehicle chosen. That type of study would provide helpful data for educators if undertaken in actual field conditions. The degree to which pure research is able to be adopted to actual classroom environments is of prime concern to practicing teachers and administrators.

Should this type of investigation be duplicated, there are several suggested changes that could be implemented to more accurately measure NEM. The measure of "Teacher Attitude on NEM" should be reevaluated

as to the content validity of the present form, so that the items will measure more accurately teacher attitude. The weight assigned each NEM variable could be recalculated to more clearly present the picture of NEM. Additional measures could be generated which would indicate the utility of NEM in an operational classroom. Some suggested items to investigate might be: frequency of teacher NEM use, student utilization of NEM hardware, parental attitude toward NEM, and frequency of student software use.

Investigation of the NEM variable used in this study could be strengthened using a pre-test, post-test dependent variable of student achievement. This would allow for a more accurate comparison of each independent variable.

The lack of statistical correlation between the selected NEM variables used in this investigation and the dependent variables of student achievement may be due, in part, to the following:

1. The uncontrollable effects of teacher administered achievement tests,
2. the unrefined measures of NEM,
3. the lack of standardization in reporting financial support,
4. the lack of standardization in measuring NEM attitudes,
5. the weight index values of independent variables should be reconsidered.
6. The teacher and administrative sample used reflected possible bias, as the respondents were all participants in the CESA #11 project. A more accurate measure would have provided a

control group of teachers and administrators as well as the selection of a method other than the analysis of variance with which to evaluate the data.

This investigation, showing an NSD correlation of the Independent and Dependent Variables, did seek to identify the contributions of NEM variables which are a part of today's classroom environment. While the conclusions reached by this study do not present what is considered by many educators normal classroom environment, the findings do suggest there is much to be done in field research on education and NEM in particular. The present tools of research appear inadequate for isolating and measuring the many and varied contributions of NEM to classroom learning.

In order to carry out research of the type presented above, several assumptions must be allowed the investigator. At any rate, parameters must be established which will try to identify those environmental factors which are contributors to the learning process and those factors which have little influence on student learning.

There are persons who are aware and concerned with the problems of application of research to learning situations. Saettler, in summing up the future of education in relation to NEM or technology says, " . . . if we are to bring these goals (of application) [explanation mine] to reality, it will require the blending of philosophical insights with psychological and technological insights."¹

¹Saettler, A History of Instructional Technology, p. 368.

Saettler concurs with Secretary Russell, of the Educational Policies Commission, on his viewpoint, as expressed with the following:

There is a bridge, from philosophy to psychology and a bridge from both to technology, and someone, somewhere, somehow, is going to discover the footwork that will enable him to cross these bridges.²

The intent of this investigation was to build the bridge which separated research from classroom implementation. This bridge has been recognized by the U. S. Office of Education by their awarding a grant to the American Institute of Research of Palo Alto, California, to conduct a 5-year study in an effort to determine the effect which intensive, innovative schools have on students as indicated by intellectual achievement and other measures of student behavior.³ One of the schools selected to participate in this project is one which is included in this study, and was a participant in the CESA #11 project for the three years of its duration. The points, which the American Institute of Research hope to validate through their investigation, seem to parallel this study, except they will be more inclusive of environmental variables and on a national sample population.

The reader is reminded to remain cognizant of the limitations of this investigation when interpreting the results.

²Ibid., p. 369, citing James E. Russell, Change and Challenge in American Education. 1965. pp. 40-48.

³News item in the La Crosse Tribune, October 25, 1970.

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APPENDICES

APPENDIX A

INSTRUCTIONAL MEDIA STIMULUS RELATIONSHIPS TO LEARNING OBJECTIVES - TABLE I

Instructional Media Type	Learning Objectives				Learning Principles Concepts and Rules	Learning Procedures	Performing Skilled Perceptual Motor Acts	Developing Desirable Attitudes, Opinions & Motivations
	Learning Objectives	Learning Factual Information	Learning Visual Identifications	Learning Principles Concepts and Rules				
Still Pictures		Medium	<u>HIGH</u>	Medium	Medium	low	low	low
Motion Pictures		Medium	<u>HIGH</u>	<u>HIGH</u>	<u>HIGH</u>	Medium	Medium	Medium
Television		Medium	Medium	<u>HIGH</u>	Medium	low	low	Medium
3-D Objects		low	<u>HIGH</u>	low	low	low	low	low
Audio Recordings		Medium	low	low	Medium	low	low	Medium
Programed Instruction		Medium	Medium	Medium	<u>HIGH</u>	low	low	Medium
Demonstration		low	Medium	low	<u>HIGH</u>	Medium	Medium	Medium
Printed Textbooks		Medium	low	Medium	Medium	low	low	Medium
Oral Presentation		Medium	low	Medium	Medium	low	low	Medium

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Wisconsin State University - La Crosse

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La Crosse, Wisconsin 54601

August 12, 1970

Mr. Robert B. Tremain, Coordinator
Cooperative Educational Service Agency
Court House
La Crosse, Wisconsin

Dear Mr. Tremain:

As a member of the Audiovisual Center staff I have had the pleasure of working with your agency, for the past several years, as a consultant in the Title III, ESEA project, Individualizing Learning Through Media-Rural. We had discussed informally the possibility of my working with your agency on a predictive survey involving new educational media and its relationship to student achievement scores.

Last year, 1969-70, I was a doctoral student at Michigan State University. I have now returned to Wisconsin State University-LaCrosse to complete my dissertation and continue as a member of the Audiovisual Staff. I request your permission to work with your agency in pursuit of information for the dissertation. Of course, all such information would be confidential and the results and implications for CESA #11 would be available to you.

I should like to meet with you or your representative as soon as convenient to formalize the procedures to be followed while administering the survey instruments.

Thank you for your consideration and assistance.

Sincerely,

A handwritten signature in cursive script that reads "Clair L. Rood".

Clair L. Rood, Assistant Professor
Audiovisual Center

CLR:lf

**STATE
COOPERATIVE EDUCATIONAL SERVICE AGENCY
No. 11**

County Court House
LA CROSSE, WISCONSIN 54601
TELEPHONE 784-0518
R. B. TREMAIN, COORDINATOR

RESPONSE LETTER FROM CESA #11

August 27, 1970

Mr. Clair Rood
La Crosse State University
La Crosse, Wisconsin 54601

Dear Mr. Rood:

In reply to your recent letter asking permission to use the project schools of CESA #11 for subjects for a Predictive Survey relative to the newer educational needs.

We are most happy to have you make this survey and will assist you in any possible way that is necessary.

Yours very truly,



R.B. Tremain, Coordinator

RBT/eb

POPULATION IDENTIFICATION - TABLE II

School	Assigned #	Number of			Stu. in Proj.	Total Stu.
		Superin.	Princ.	Teachers		
Alma-Center	10	1	1	3	95	269
Bangor	11	1	1	3	78	519
Blair	12	1	1	6	160	474
Cashton	13	1	1	5	146	435
Cathedral	14*	1	1	9	—	482
Cochrane-	15	1	1	3	51	593
Fountain City						
De Soto	16	1	1	3	83	220
Holmen	17	1	1	4	107	679
Independence	18*	1	1	3	—	215
La Farge	19	1	1	4	113	245
Melrose-	20	1	1	5	163	422
Mindoro						
Tomah	21	1	2	12	354	942
West Salem	22	1	1	4	83	574
Westby	23	1	1	6	183	578
Whitehall	24	1	2	8	192	426
Total:					1808 Students	
15 schools	15 Superin.	17 Princ.	78 Teachers			
*Not included in analysis.						

INTRODUCTORY LETTER TO TEACHERS

To: Faculty Members of CESA #11 Schools

From: Clair L. Rood, Doctoral Student, Michigan State University
and Assistant Professor, Audiovisual Center, Wisconsin
State University-La Crosse

Re: Participation in New Educational Media Survey of CESA #11
schools, grades 4, 5 and 6.

At the present time I am in the process of instituting survey instruments to attempt to predict achievement scores of students in relation to the availability and utilization of the new educational media available to today's teachers. I would like to enlist your aid, as a concerned t e a c h e r i n CESA #11 schools.

As you will note I have attached several survey forms. Would you please complete these forms within the next week and return them to me via Mr. Ralph Whiting or mail them in the enclosed envelope to me at the Audiovisual Center, Wisconsin State University, La Crosse. Your responses will be confidential and utilized by me only for the completion of this survey. At the culmination of this investigation the resulting implications will be made available to you.

Thank you very much for your assistance in completing this survey.

DIRECTIONS FOR COMPLETING THE SURVEY FORMS

Teachers:

Please complete ALONE all areas which pertain to you with the following exceptions .

1. N.E.M. Software Survey
2. N.E.M. Hardware Survey

The above 2 forms may be completed by your team para-professional and reflect your physical arrangements as well as the materials and equipment available within your local I.M.C.

When you have completed your portion of the survey please have your paraprofessional complete the above mentioned forms, gather all completed forms from your team, place them in their envelopes and return them to me via Mr. Whiting and the service route.

Please return the completed survey by September 22.

Thank you.

TEACHER PERSONAL DATA SHEET

Your name _____ Sex _____

Name of your school _____

Position:

(circle one) teacher principal superintendent

Highest degree earned _____

Total years teaching experience _____

Years in administration _____

Years in present system _____

The number of media courses taken _____

OR

The number of media institutes attended _____

Are you a participant in CESA #11 "Individualized Learning Through Media-Rural" project"

Yes _____ No. of years _____

No _____

Your answers to these survey instruments will be kept strictly confidential. Only you and members of the study team will see your responses. Thank you for your cooperation.

RECOGNIZING BEHAVIORAL OBJECTIVES SURVEY

Place an (X) before any of the instructional objectives which are properly stated in behavioral terms, according to Mager. There are six (6) correct answers.

- YES 1. Give ten finite sets, the student is able to name the number of each set with 100 per cent accuracy.
- NO 2. Given twenty subtraction problems, the student will work them with 90% accuracy.
- NO 3. Given a matching test, the pupil will correctly match both columns. (100 %)
- YES 4. Given 10 (10) rectangles, the student will be able to compute the area of each with 80% accuracy.
- NO 5. The student will prefer sewing to cooking.
- NO 6. Given chapter 10, the student will grasp the significance of the Treaty of Versailles with 80% accuracy.
- NO 7. Given ten true and false statements, the student will answer by true or false. (90%)
- YES 8. Given orally a list of one-syllable words containing short vowel sounds, the student is able to write the vowel letter and mark the vowel letter long or short according to the sound heard in the word. (80%)
- NO 9. Given a demonstration, you will pay attention as the teacher demonstrates the use of the lathe.
- YES 10. Given paragraphs to which a conclusion or prediction must be supplied, you will be able to select the most logical conclusion or prediction from each paragraph. (90%)
- YES 11. Given a list of words, some of which are proper nouns, the student will be able to capitalize those words that are proper nouns. (80%)
- NO 12. The student will be able to develop a sense of the cultural unity of man with 90% accuracy.
- NO 13. The student must pass a test of vocabulary with 100% accuracy.

- NO 14. Given a history of World War I, the student will know the important battles.
- NO 15. Given 10 algebra problems, the student will appreciate the key importance of algebraic approaches.
- YES 16. Given two whole numerals that name whole numbers not greater than nine thousand, nine hundred ninety-nine, the student is able to compute and list the products of 20 such pairs with 80% accuracy.

YOU HAVE NOW COMPLETED THE SURVEY INSTRUMENTS.
I WISH TO THANK YOU FOR YOUR TIME AND CONSIDERATION
CONCERNING NEW EDUCATIONAL MEDIA.

WOULD YOU PLEASE PLACE THE COMPLETED INSTRUMENTS
IN THE ENCLOSED BROWN ENVELOPE AND RETURN THEM TO
ME AT THE FOLLOWING ADDRESS. THANK YOU.

Mr. Clair L. Rood
Audiovisual Center
Wisconsin State University
La Crosse, Wisconsin 54601

NEWER EDUCATIONAL MEDIA ATTITUDE INVENTORY

During the past twenty years or so, many new teaching aids have been developed. Some of these are sufficiently elaborate to change, or even to replace temporarily, the classroom communication processes which were formerly pretty much limited to children and teachers. Radio, television, motion pictures, slides and filmstrips, and phonograph and tape recorders, certain types of teaching machines and programmed learning methods - - all are examples of what might be termed the "Newer Educational Media". (NEM)

In American education today, there is some controversy concerning this NEM. The following statements represent various points of view on this question.

Please indicate the extent of your agreement or disagreement with each statement. Please don't make efforts to be consistent or to select the "right answer" -- there are none. Simply enter the proper number in the space before each sentence according to the following code.

DEFINITIONS

EQUIPMENT refers to projectors and other mechanical devices.

MATERIALS refers to films and other audio-visual displays.

NEW EDUCATIONAL MEDIA will be abbreviated in this questionnaire as NEM.

The following statements represent varying points of view about which there is some controversy in American education today. Respond rapidly according to the degree of agreement with the statements listed below. Mark your answers in the blank space on the right according to the code shown below:

1. Agree strongly
2. Agree moderately
3. Agree slightly
4. Disagree slightly
5. Disagree moderately
6. Disagree strongly

Please indicate the extent of your agreement or disagreement with each statement.

1. Agree strongly
2. Agree moderately
3. Agree slightly
4. Disagree slightly
5. Disagree moderately
6. Disagree strongly

- _____ 1. The widespread use of the NEM will revolutionize the process of instruction as we know it now.
- _____ 2. The possible uses of the NEM are limited only by the imagination of the person directing the usage.
- _____ 3. The wide resources of the NEM stimulate the creative student.
- R 4. There are no educational frontiers in the NEM--just new gadgets.
- R 5. Most children see the NEM mainly as entertainment, rather than as education.
- R 6. Most teachers lose the gratification of personal accomplishment when the child is taught by machine.
- _____ 7. Use of the NEM constitutes a major advance in providing for individual differences in the learning needs of students.
- _____ 8. Much wider usage of the NEM is needed.
- R 9. The vicariousness of learning by NEM aids is not conducive to the most effective learning.
- _____ 10. If surplus funds exist which could be spent only for supplementary books or for more NEM equipment, the latter should be chosen.
- _____ 11. Children can learn the basic value of a good education only when taught by conventional methods -- not by the NEM.

Note: "Open" responses scored 3.5

Please indicate the extent of your agreement or disagreement with each statement.

1. Agree strongly
2. Agree moderately
3. Agree slightly
4. Disagree slightly
5. Disagree moderately
6. Disagree strongly

- R 12. The problems of getting materials and equipment when you need it, darkening rooms, setting up the equipment, and otherwise disrupting classes tend to counteract the value of most NEM.
- R 13. The "authoritative" presentations of most of the NEM tend to produce an uncritical acceptance on the part of most children.
- R 14. The passive quality of learning by NEM is not conducive to the most effective learning.
- R 15. The proper student attitudes for effective learning are not developed as well by the NEM as by conventional methods of teaching.
16. Only through the NEM can vicarious learning experiences be provided in the classroom.
- R 17. The expense of most of the NEM is out of all proportion to their educational value.
- R 18. The NEM give little opportunity to provide for individual differences of children.
- R 19. NEM materials are so specific as to have little adaptability to different teaching requirements or situations.
- R 20. With increased usage of the NEM, the teaching role may be downgraded to clerical work, proctoring, grading, and other simple administrative tasks.
21. The development of NEM centers in every school unit should be encouraged and facilitated.

Please indicate the extent of your agreement or disagreement with each statement.

1. Agree strongly
2. Agree moderately
3. Agree slightly
4. Disagree slightly
5. Disagree moderately
6. Disagree strongly

- R 22. The NEM do not suitably provide for the special needs of either slow learners or brighter children.
23. Provision for the purchase of NEM should be included in every school's instructional budget.
- R 24. The educational value of broadcast (commercial) television is practically nil.
- R 25. The educational value of Closed Circuit Television is practically nil.
26. The use of such aids as the bioscope, electric microscope, and science films can revolutionize the teaching of science.
27. New teachers would be more inclined to use NEM if there were wider usage of these aids in teacher-training programs.
- R 28. Most media persons do not use the mass communications media enough in developing a favorable public attitude toward NEM.
29. The percentage of teachers using newer educational media has increased greatly in recent years.
30. The personal relationship between teacher and student is essential in most learning situations.
31. NEM machines instructing ability cannot be evaluated solely on the basis of standardized scholastic achievement of students using them.
- R 32. NEM materials have little adaptability to different teaching requirements or situations.

Please indicate the extent of your agreement or disagreement with each statement.

1. Agree strongly
2. Agree moderately
3. Agree slightly
4. Disagree slightly
5. Disagree moderately
6. Disagree strongly

- _____ 33. The newer educational media improves the teacher's ability to communicate with students.
- _____ 34. Wider use of newer educational media will ultimately mean that instructional costs can be reduced.
- _____ 35. The widespread use of teaching machines will revolutionize the process of instruction as we know it now.
- _____ 36. All teachers should have a central training NEM room where the equipment is permanently installed and available for use there.
- _____ 37. All teachers in training should take a course in the use of NEM aids.
- R 38. Learning through new educational media is a passive experience.
- _____ 39. Wider acceptance of currently known NEM aids is needed.
- _____ 40. Proper use of NEM materials can go a long way toward providing for individual differences in the learning needs of children.
- _____ 41. Most professional educators have viewed newer educational media in the specific context of machines and operations rather than in the more general point of view of a medium for communication.
- _____ 42. The development of new NEM aids is a waste of time and resources.
- _____ 43. Recent technological trends in education demand a changing teacher role.

Please indicate the extent of your agreement or disagreement with each statement.

1. Agree strongly
2. Agree moderately
3. Agree slightly
4. Disagree slightly
5. Disagree moderately
6. Disagree strongly

 R 44. NEM materials and educational media usage should be the province of NEM specialists.

 R 45. The creative student is apt to be stifled by the extensive use of NEM instructional media.

 46. A basic problem of NEM education is to change the attitude of many teachers who look upon NEM aids simply as frills tacked on to their regular teaching.

 48. One of the most satisfactory ways to provide adequate educational opportunities for the increasing mass of students is through wider usage of NEM aids.

"R" Represents those items reverse scored.

COMPILED TEACHER RESPONSE TO NEM VARIABLES - TABLE III

School #	Teacher #	Behavioral Objectives	Attitude Survey	Number of NEM Courses
10	02	14	078.0	05
10	03	16	117.5	05
10	04	12	113.0	03
11	06	11	104.0	03
11	07	14	123.0	02
11	08	11	094.0	04
12	10	11	099.5	07
12	11	16	156.0	02
12	12	14	126.0	02
12	13	14	101.0	02
12	14	16	096.0	08
12	15	14	136.0	03
13	17	14	088.0	03
13	18	16	091.0	06
13	19	16	095.0	03
13	20	13	108.0	01
13	21	14	112.0	04
14	24	14	103.0	01
14	25	14	090.0	01
14	26	16	081.0	03
14	27	16	103.0	03
14	28	14	078.5	01
14	29	14	089.5	02
14	30	14	096.0	01
14	31	14	105.0	01
14	32	10	101.5	04
15	34	12	112.0	01
15	35	14	100.0	03
15	36	00	115.0	04
16	38	14	128.5	01
16	39	14	133.0	02
16	40	16	112.0	01
17	42	15	124.0	03
17	43	15	115.5	01
17	44	12	095.0	03
17	45	12	079.0	02

COMPILED TEACHER RESPONSE TO NEM VARIABLES - TABLE III (continued)

School #	Teacher #	Behavioral Objectives	Attitude Survey	Number of NEM Courses
18	47	13	081.5	02
18	48	12	150.0	03
18	49	12	164.0	01
19	51	16	086.5	03
19	52	16	093.0	01
19	53	14	115.5	05
19	54	14	150.5	01
20	56	12	099.5	01
20	57	16	086.0	05
20	58	16	091.0	05
20	59	16	081.0	04
20	60	15	073.0	03
21	63	15	097.0	02
21	64	16	079.0	02
21	65	16	082.0	02
21	66	14	106.5	03
21	67	12	089.5	03
21	68	14	080.0	03
21	69	16	086.0	02
21	70	16	077.0	02
21	71	14	093.0	05
21	72	14	076.0	02
21	73	14	085.0	04
21	74	14	106.0	01
22	76	14	073.0	04
22	77	14	079.0	02
22	78	14	088.0	02
22	79	14	088.0	02
23	81	14	107.0	04
23	82	14	072.0	01
23	83	12	134.0	03
23	84	12	127.5	02
23	85	14	080.0	03
23	86	12	105.5	07
24	89	14	130.0	08
24	90	14	095.0	03
24	91	16	129.5	04
24	92	13	192.0	03
24	93	14	102.0	07
24	94	12	096.0	02
24	95	14	105.0	01
24	96	16	111.0	02
15 schools	78 teachers			

**Wisconsin State University - La Crosse**

La Crosse, Wisconsin 54601

INTRODUCTORY LETTER TO PARA-PROFESSIONALS

Dear Paraprofessional:

In order to complete the survey of Newer Educational Media of which your project school is a part, it is necessary to ask for additional specific information. Using the enclosed forms please complete the survey using numbers to indicate quantities.

The Software form asks for numbers of 16mm films you have rented or purchased the last year of the project. The balance of the questions refer to materials purchased either with district funds or through the CESA #11 project, which are now in your I.M.C. and used by all of the project teachers.

The Hardware form asks for numbers of equipment purchased either with district funds or CESA #11 funds and presently housed in the I.M.C. or classrooms of the project teachers.

The central sound system may be a part of the classrooms, if so, mark it as a one (1).

Thank you very much for your assistance. Will you please return this form through the CESA #11 driver? Thank you again.

Sincerely,

Clair Rood,
Wisconsin State University-
LaCrosse

CR:lf
Enc.

APPENDIX L

NEW EDUCATIONAL MEDIA SOFTWARE SURVEY

Materials Provided	School # _____	
	Rented From Film Libraries	Purchased
16mm films - number used last yr		
8mm films		
Loop of single concept films		
Filmstrips Classroom use		
Tape Recordings Classroom use		
Disk Recordings Classroom use		
Language Lab Tapes and Disk Recordings		
Slides 3-1/4" x 4" or lantern slides		
2" x 2" slides		
Overhead transparency masters		
Overhead transparencies		
Study prints		
Maps		
Globes		
Dioramas		
Models		
Realia (live specimens)		

NEM SOFTWARE RESPONSE - TABLE IV

Software	School Team #																			
	10	11	12	23	110	76	99	210	241	0	237	190	360	216	216	218	218	23	24	Total Items
16mm films	30	184	23	110	76	99	210	241	0	237	190	360	216	216	218	218	218			2618
loop films	0	11	1	0	0	0	14	15	0	0	0	19	40	0	0	0	0			100
film strips	142	549	100	200	550	113	303	102	0	229	145	220	151	925	550	550	550			4279
tape	92	164	107	169	182	61	136	100	0	80	109	80	284	48	159	159	159			1771
recordings	0	26	0	12	936	14	32	23	0	60	12	140	47	0	67	67	67			1369
records	0	0	0	0	0	0	32	0	0	2	4	0	0	0	12	12	12			50
language labs	0	0	0	0	0	0	0	0	0	0	0	92	24	0	0	0	0			116
3 1/4 slides	0	0	0	0	0	0	0	0	0	0	0	34	0	25	50	60	60			608
2x2 slides	60	0	50	0	45	0	212	48	0	180	14	30	12	80	100	100	100			907
overhead	0	53	0	150	37	0	100	150	0	295	0	80	12	30	162	162	162			1814
masters	84	384	80	150	234	50	0	295	0	200	53	80	12	30	162	162	162			1814
overhead transparencies	0	24	0	0	12	0	7	8	0	6	14	50	0	0	22	22	22			143
study prints	0	15	0	15	9	6	12	29	0	12	2	11	5	0	24	24	24			149
maps	9	15	0	15	9	6	12	29	0	12	2	11	5	0	24	24	24			149
globes	3	2	0	8	8	4	1	6	0	4	0	4	3	0	5	5	5			48
models	15	4	0	0	7	0	100	17	0	8	5	0	1	0	0	0	0			157
realia	0	0	0	0	5	0	0	0	0	0	0	3	8	0	0	0	0			16

APPENDIX N

NEW EDUCATIONAL MEDIA HARDWARE SURVEY

School # _____

Please use numbers to indicate what your team has.

16mm sound projectors	_____
8mm projectors	_____
sound	_____
silent	_____
8mm loop film or single concept projectors	_____
Filmstrip projectors of slide & filmstrip combination	_____
Sound filmstrip projectors	_____
Filmstrip previewers or viewers	_____
Overhead projectors	_____
Opaque projectors	_____
Tape recorders	_____
Record players	_____
Radios AM-FM	_____
Projection carts	_____
Projection screens	_____
Micro projectors	_____
Controlled readers	_____
Tachistoscopes	_____
Central sound system	_____
Cameras	_____
Language Labs	_____
Memory banks	_____
Dial access	_____
Individual study carrels	_____
Closed circuit TV	_____
Educational TV	_____
TV receivers	_____
Headsets	_____

APPENDIX O

NEM HARDWARE RESPONSE - TABLE V

Hardware	School Team #																		Total Items
	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
16mm sound projector	1	2	2	3	2	1	1	2	4	7	1	2	1	2	5				36
8mm loop projector	0	1	1	2	0	1	1	0	1	1	1	4	1	0	0				14
filmstrip proj.	3	12	2	4	3	2	2	3	4	7	2	5	3	8	6				66
filmstrip prev.	12	3	7	8	15	5	12	8	1	10	18	4	11	12	0				126
overhead proj.	3	3	6	5	6	3	2	2	4	4	1	11	2	2	9				63
opaque proj.	0	1	1	1	0	1	1	0	1	1	1	2	0	1	3				14
tape recorder	5	8	6	5	21	4	4	6	11	8	6	22	6	2	10				124
record player	3	3	2	3	10	2	3	2	4	5	2	5	2	4	4				54
radios	0	0	0	1	5	1	0	1	3	4	0	11	2	3	3				34
proj. carts	1	3	6	1	10	4	1	0	1	3	3	14	3	1	5				56
proj. screens	3	3	6	6	22	4	0	4	4	5	5	4	3	6	12				87
controlled reader	2	2	0	0	0	1	2	0	0	1	0	0	0	0	2				10
sound system	0	1	1	1	1	1	0	0	1	1	0	0	1	0	1				9
cameras	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0				3
language labs	0	0	0	0	0	12	0	0	0	0	0	0	0	3	0				15
study carrels	0	12	0	0	24	4	0	6	12	6	0	16	18	0	10				108
CCTV	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0				2
ETV	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1				2
head sets	28	24	3	40	18	18	15	2	25	8	24	28	37	4	38				312
cyclo teacher	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0				13

INTRODUCTORY LETTER TO ADMINISTRATORS

To: Administrators of CESA #11 Schools

From: Clair L. Rood, Doctoral Student, Michigan State University
and Assistant Professor, Audiovisual Center, Wisconsin
State University-La Crosse

Re: Participation in New Educational Media Survey of CESA #11
schools, grades 4, 5 and 6

At the present time I am in the process of instituting survey instruments to attempt to coorelate achievement scores of students in relation to the availability and utilization of the new educational media available to today's teachers. I would like to enlist your aid, as a concerned administrator of CESA #11 schools.

As you will note I have attached several survey forms. Would you please complete these forms within the next week and return them to me via Mr. Ralph Whiting or mail them in the enclosed envelope to me at the Audiovisual Center, Wisconsin State University, La Crosse. Your responses will be confidential and utilized by me only for the completion of this survey. At the culmination of this investigation the resulting implications will be made available to you.

Thank you very much for your assistance in completing this survey.

DIRECTIONS FOR COMPLETING ADMINISTRATOR SURVEY INSTRUMENT

DIRECTIONS FOR COMPLETING THE SURVEY FORMS

Administrators:

Please complete all of the survey forms with the idea you are replying for your building and not in respect to the CESA #11 project. Where your responsibility may be such that you are also a project teacher please complete the forms from both viewpoints. Where these viewpoints are the same simply say refer to the appropriate portion of the other form. Please return both forms via the project paraprofessional, Mr. Whiting, and the service route.

Please return the completed forms by September 22.

Thank you.

Note:

Should there be additional questions you may call me at Wisconsin State University, La Crosse 608 - 895-1800, ext. 303, or contact me through Mr. Whiting and the service route.

ADMINISTRATOR PERSONAL DATA SHEET

Your name _____ Sex _____

Name of your school _____

Position:

(circle one) teacher principal superintendent

Highest degree earned _____

Total years teaching experience _____

Years in administration _____

Years in present system _____

The number of media courses taken _____

OR

The number of media institutes attended _____

Are you a participant in CESA #11 "Individualized Learning Through Media-Rural" project"

Yes _____ No. of years _____

No _____

Your answers to these survey instruments will be kept strictly confidential. Only you and members of the study team will see your responses. Thank you for your cooperation.



Wisconsin State University - La Crosse
La Crosse, Wisconsin 54601

ADMINISTRATIVE FINANCIAL SUPPORT INSTRUMENT

This letter is a follow-up of our recent conversation concerning the study I am conducting of New Educational Media within the Project Schools of CESA #11. Would you please complete the following two questions which concern only the Project School or schools in your district?

1. What was the total amount of budget required to operate the Project School 1969-70?

2. What was the total amount of funds spent by the Project School - rent and purchase - (1969-70) for Newer Education Media Software and Hardware?

Note: This is meant to reflect non-print software and the hardware required to utilize the software as well as any film rentals. This figure to include monies raised by local taxation as well as any received through support programs.

This information will remain confidential and be used for survey purposes only.

Please return this letter or a copy of it to me in the enclosed envelope as soon as possible. Thank you very much for your assistance.

Sincerely,

Clair Rood

CR:lf

Enc.

Note: #1 may be estimated by per student cost x number of students.

NEWER EDUCATIONAL MEDIA ATTITUDE INVENTORY

During the past twenty years or so, many new teaching aids have been developed. Some of these are sufficiently elaborate to change, or even to replace temporarily, the classroom communication processes which were formerly pretty much limited to children and teachers. Radio, television, motion pictures, slides and filmstrips, and phonograph and tape recorders, certain types of teaching machines and programmed learning methods - - all are examples of what might be termed the "Newer Educational Media". (NEM)

In American education today, there is some controversy concerning this NEM. The following statements represent various points of view on this question.

Please indicate the extent of your agreement or disagreement with each statement. Please don't make efforts to be consistent or to select the "right answer" -- there are none. Simply enter the proper number in the space before each sentence according to the following code.

DEFINITIONS

EQUIPMENT refers to projectors and other mechanical devices.

MATERIALS refers to films and other audio-visual displays.

NEW EDUCATIONAL MEDIA will be abbreviated in this questionnaire as NEM.

The following statements represent varrying points of view about which there is some controversy in American education today. Respond rapidly according to the degree of agreement with the statements listed below. Mark your answers in the blank space on the right according to the code shown below:

1. Agree strongly
2. Agree moderately
3. Agree slightly
4. Disagree slightly
5. Disagree moderately
6. Disagree strongly

Please indicate the extent of your agreement or disagreement with each statement.

1. Agree strongly
2. Agree moderately
3. Agree slightly
4. Disagree slightly
5. Disagree moderately
6. Disagree strongly

- _____ 1. The widespread use of the NEM will revolutionize the process of instruction as we know it now.
- _____ 2. The possible uses of the NEM are limited only by the imagination of the person directing the usage.
- _____ 3. The wide resources of the NEM stimulate the creative student.
- R 4. There are no educational frontiers in the NEM--just new gadgets.
- R 5. Most children see the NEM mainly as entertainment, rather than as education.
- R 6. Most teachers lose the gratification of personal accomplishment when the child is taught by machine.
- _____ 7. Use of the NEM constitutes a major advance in providing for individual differences in the learning needs of students.
- _____ 8. Much wider usage of the NEM is needed.
- R 9. The vicariousness of learning by NEM aids is not conducive to the most effective learning.
- _____ 10. If surplus funds exist which could be spent only for supplementary books or for more NEM equipment, the latter should be chosen.
- _____ 11. Children can learn the basic value of a good education only when taught by conventional methods -- not by the NEM.

Note: "Open" responses scored 3.5

Please indicate the extent of your agreement or disagreement with each statement.

1. Agree strongly
2. Agree moderately
3. Agree slightly
4. Disagree slightly
5. Disagree moderately
6. Disagree strongly

- R 12. The problems of getting materials and equipment when you need it, darkening rooms, setting up the equipment, and otherwise disrupting classes tend to counteract the value of most NEM.
- R 13. The "authoritative" presentations of most of the NEM tend to produce an uncritical acceptance on the part of most children.
- R 14. The passive quality of learning by NEM is not conducive to the most effective learning.
- R 15. The proper student attitudes for effective learning are not developed as well by the NEM as by conventional methods of teaching.
16. Only through the NEM can vicarious learning experiences be provided in the classroom.
- R 17. The expense of most of the NEM is out of all proportion to their educational value.
- R 18. The NEM give little opportunity to provide for individual differences of children.
- R 19. NEM materials are so specific as to have little adaptability to different teaching requirements or situations.
- R 20. With increased usage of the NEM, the teaching role may be downgraded to clerical work, proctoring, grading, and other simple administrative tasks.
21. The development of NEM centers in every school unit should be encouraged and facilitated.

Please indicate the extent of your agreement or disagreement with each statement.

1. Agree strongly
2. Agree moderately
3. Agree slightly
4. Disagree slightly
5. Disagree moderately
6. Disagree strongly

 R 22. The NEM do not suitably provide for the special needs of either slow learners or brighter children.

 23. Provision for the purchase of NEM should be included in every school's instructional budget.

 R 24. The educational value of broadcast (commercial) television is practically nil.

 R 25. The educational value of Closed Circuit Television is practically nil.

 26. The use of such aids as the bioscope, electric microscope, and science films can revolutionize the teaching of science.

 27. New teachers would be more inclined to use NEM if there were wider usage of these aids in teacher-training programs.

 R 28. Most media persons do not use the mass communications media enough in developing a favorable public attitude toward NEM.

 29. The percentage of teachers using newer educational media has increased greatly in recent years.

 30. The personal relationship between teacher and student is essential in most learning situations.

 31. NEM machines instructing ability cannot be evaluated solely on the basis of standardized scholastic achievement of students using them.

 R 32. NEM materials have little adaptability to different teaching requirements or situations.

Please indicate the extent of your agreement or disagreement with each statement.

1. Agree strongly
2. Agree moderately
3. Agree slightly
4. Disagree slightly
5. Disagree moderately
6. Disagree strongly

- _____ 33. The newer educational media improves the teacher's ability to communicate with students.
- _____ 34. Wider use of newer educational media will ultimately mean that instructional costs can be reduced.
- _____ 35. The widespread use of teaching machines will revolutionize the process of instruction as we know it now.
- _____ 36. All teachers should have a central training NEM room where the equipment is permanently installed and available for use there.
- _____ 37. All teachers in training should take a course in the use of NEM aids.
- R 38. Learning through new educational media is a passive experience.
- _____ 39. Wider acceptance of currently known NEM aids is needed.
- _____ 40. Proper use of NEM materials can go a long way toward providing for individual differences in the learning needs of children.
- _____ 41. Most professional educators have viewed newer educational media in the specific context of machines and operations rather than in the more general point of view of a medium for communication.
- _____ 42. The development of new NEM aids is a waste of time and resources.
- _____ 43. Recent technological trends in education demand a changing teacher role.

Please indicate the extent of your agreement or disagreement with each statement.

1. Agree strongly
2. Agree moderately
3. Agree slightly
4. Disagree slightly
5. Disagree moderately
6. Disagree strongly

 R 44. NEM materials and educational media usage should be the province of NEM specialists.

 R 45. The creative student is apt to be stifled by the extensive use of NEM instructional media.

 46. A basic problem of NEM education is to change the attitude of many teachers who look upon NEM aids simply as frills tacked on to their regular teaching.

 48. One of the most satisfactory ways to provide adequate educational opportunities for the increasing mass of students is through wider usage of NEM aids.

YOU HAVE NOW COMPLETED THIS SURVEY INSTRUMENT. I WISH TO THANK YOU FOR YOUR
TIME AND CONSIDERATION CONCERNING NEW EDUCATIONAL MEDIA. WOULD YOU PLEASE
PLACE THE COMPLETED INSTRUMENT IN THE ENCLOSED ENVELOPE AND RETURN IT TO ME

AT THE FOLLOWING ADDRESS.

MR. CLAIR L. ROOD
AUDIOVISUAL CENTER
WISCONSIN STATE UNIVERSITY
LA CROSSE, WISCONSIN 54601

"R" Represents those items reverse scored.

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