

AN ABSTRACT OF THE THESIS OF

Edward A. Jensen for the degree of Doctor of Philosophy in
Curriculum and Instruction presented on October 11, 1990.

Title: A Study to Determine the Media Competencies Recommended
by Inservice Teachers From Specific Teaching Disciplines

Abstract approved: _____ **Redacted for Privacy** _____
Dr. Ed Strowbridge

This study was an investigation to determine the instructional media competencies that inservice teachers of secondary education teaching disciplines recommend for pre-service teachers in their discipline.

A literature review focused on four main questions:

1. What historical events mark the development of the field of instructional media?
2. What are some significant classroom media use studies?
3. What are some significant comparative media studies?
4. What are some significant instructional media course content studies?

Secondary education teachers of twelve different teaching disciplines were randomly selected from schools in three states, namely Hawaii, Oregon and Utah. Four hundred and sixteen (416) responded to a mail administered questionnaire. A series of one-way analysis of variance with Duncan Multiple Range Tests, t-Tests, cross tabulations and means tables were computed to determine any significant differences in the recommendations of fifty-six (56) instructional media competencies among teachers in secondary education teaching disciplines.

The findings of this study can be summarized with the following conclusions:

1. The teaching discipline influences recommendations by inservice teachers of secondary education for instructional media competencies to be included in a pre-service teacher education program.
2. The teaching discipline influences the perceived value of instructional media use in the classroom of inservice teachers of secondary education.
3. The perceived value of instructional media use in the classroom by secondary education teachers influences their recommendations of instructional media competencies to be included in a pre-service teacher education program.
4. Teachers of secondary education teaching disciplines recommend that instructional media competencies be taught as a part of the methods courses within their disciplines as well as being taught in separate instructional media courses.
5. There are two major factors affecting the non-use of instructional media by teachers of secondary education teaching disciplines are that they perceive:
 1. "Arranging to use media is too great a hassle."
 2. "Media materials in the school are outdated."
6. There are instructional media competencies that are common to all secondary education teaching disciplines as well as instructional media competencies that are unique to each of twelve secondary education teaching disciplines.

A Study to Determine The Media Competencies
Recommended by Inservice Teachers From
Specific Teaching Disciplines

by

Edward A. Jensen

A THESIS

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Doctor of Philosophy

Completed October 11, 1990

Commencement June 1991

APPROVED:

Redacted for Privacy

Professor of Curriculum and Instruction in charge of major

Redacted for Privacy

Head of department of Curriculum and Instruction

Redacted for Privacy

Dean of College of Education

Redacted for Privacy

Dean of Graduate School

Date Dissertation is presented: October 11, 1990

Typed by researcher for: Edward A. Jensen

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ACKNOWLEDGEMENTS

For their patience, encouragement, professional assistance and most importantly their warm friendship, the writer acknowledges the continued assistance and direction given by his Doctoral Committee; Dr. Ed Strowbridge, Dr. Alan Sugawara, Dr. Pat Wells, Dr. Jon Root and Dr. Tom Grigsby. In addition, unmeasurable gratitude is extended to his wife, Colleen, who postponed her twenty-fifth wedding anniversary for this project. His six children, Ed Jr., James, Kimberlee, Benjamin, Jeremiah and Aaron, without whose love and encouragement this project would not have been fulfilling. And his newly acquired daughter-in-law, Kathy, who would not postpone her wedding for this project.

Special thanks must also be given to the colleagues who were willing to fill in the void while my attention was focused elsewhere, and to the administration of Brigham Young University-Hawaii Campus for their support, encouragement and sharing of what ever resources were needed to complete this task.

A final note of thanks to all of the inservice secondary education teachers who took time from their hectic schedules to complete the questionnaire making it possible to compile the data for this project.

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A STUDY TO DETERMINE THE MEDIA COMPETENCIES RECOMMENDED BY INSERVICE TEACHERS FROM SPECIFIC TEACHING DISCIPLINES

CHAPTER 1

INTRODUCTION

"...studies show that even though teachers have a high level of media competence and equipment is available to them in their buildings, the majority of teachers do not make extensive use of educational media." (p. 60)

C. Edward Streeter

Perhaps one of the reasons teachers do not use media extensively is due to the lack of instruction relative to effective use as it relates to specific disciplines. Knowing about media or knowing that it exists is not the same as knowing how to apply it to enhance the instructional needs of a particular discipline. Experienced or inservice teachers at the secondary level have an understanding of what works well for them. The intent of this study was to draw upon that experience by having inservice teachers recommend instructional media competencies that are beneficial to them in their disciplines.

Streeter (1969) observed that in spite of the considerable financial support provided by the federal government for the purchase of audiovisual equipment and materials, and the increased training of school personnel to facilitate the use of these educational media there was relative little evidence of extensive use in the classroom.

A decade earlier, Fulton and White (1959) had observed:

“...despite the rather conclusive body of research produced over the last forty years that points to the values of this method of teaching, teachers today, by and large, do not take advantage of the audio-visual devices and materials that are generally available in this country.” (p. 158)

This statement seems to highlight the apparent dichotomy in the research results from the field of instructional media, audiovisual materials or educational technology. Proctor (1983), reviewed the available literature relating to media use and found a difference between pedagogical theory and classroom practice. “The prescriptive literature, based largely on the results of empirical studies, outlines the benefits attributable to the use of media; but the descriptive literature, based largely on the results of surveys and questionnaires, reveals one almost universal theme: MEDIA ARE SELDOM USED.” (p. 5) An analysis of several media research reviews such as Lumsdaine (1963), Saettler (1968), Levie and Dickie (1973), and Wilkinson (1980) supports the differences between research conducted to determine potential contribution to the teaching/learning process and those which identify or determine the current conditions of use within the classroom.

One application of the descriptive type research, however, is significant in relation to the Teacher Education Programs in the Schools and Colleges of Education. Starting as early as 1932, attempts have been made to identify what is being taught in the media courses offered in Teacher Education Programs. Stracke (1932), Starnes (1937-38), Taylor (1942), de Kieffer (1948, 1959, 1970, 1977), Meierhenry (1966), Rome (1973), McCutcheon (1984) and others have attempted to provide an understanding of

curriculum content of media courses. Some like Stracke (1932), Starnes (1937-38), de Kieffer (1948, 1959, 1970, 1977), and McCutcheon (1984) have reviewed the course content of media courses within the schools and colleges of education. While others, Taylor (1942), deBernardis and Brown (1946), Fulton and White (1959), Rome (1973), Lare (1974), Jones (1982), etc., have considered media skills or competencies in use or recommended by inservice education personnel including classroom teachers, administrators and college instructors for methods courses as well as instructional media faculty. These studies make suggestions, either implicit or implied, regarding instructional media course content based on feedback obtained from users.

An additional consideration of some descriptive studies has to do with the approach to teaching media skills or competencies. The Okoboji Conference (1959) had teacher education as its topic. After presenting a set of recommended objectives and competencies for teacher education programs, the report described four possible approaches to accomplishing them. The four suggested were: "The Completely Integrated Approach", with the competencies being a part of the entire program; "The Integrated Methods Materials Course Approach"; "The Formal Course Approach", where the development of these competencies would rest with the audiovisual staff; and "The Laboratory Project Approach", giving all students from various courses assignments to complete in the audiovisual lab.^(p. 5) These, or variations of these approaches have been suggested by others in the research that has followed. (Fulton and White, 1959; Fulton, 1960; and Carter and Schmidt, 1985).

Consideration of the prescriptive literature or comparative media studies presents the understanding, as Proctor (1983) states,

“...that research results have demonstrated that significantly greater learning often occurs when media are integrated into traditional programs, that the learning time for students may be reduced, and the instructional formats which utilize media are often preferred by students.” (p. 3)

Reconciling the descriptive and prescriptive research has long been a problem as evidenced by Fulton (1960): “Research evidence indicates that we know much more about what we should be doing with modern communicative media in education than we are actually doing.” (p. 496) Due to these apparent contradictions in research findings, drawing conclusions can sometimes be frustrating. Allen (1973) points out some factors that contribute to this frustration.

“...a look back over the past 50 years of research is both encouraging and discouraging. We can see no neatly organized body of research findings that can be used to guide our practice. For the most part, past research has been haphazard, poorly integrated, and lacking any theoretical structure. We see little evidence that what we have found out is being applied to instruction or that we are even asking the right questions.” (p. 49)

Allen (1973) seems to suggest a direction for future research when he says: “The major problem facing the researcher is the determination of the specific conditions under which different media should be employed, how the media should be designed, and with what kinds of learners.” (p.48)

Statement of the Problem

This study was an investigation to determine the instructional media competencies that inservice teachers of secondary education teaching disciplines recommend for pre-service teachers in their

discipline. The primary purpose of this study was to identify the instructional media competencies common to all teaching disciplines. These could be used to form the core content of an introductory instructional media course. In addition, the media competencies unique to each discipline were identified. These could be used for teaching discipline emphasis within the media course.

The majority of the existing studies on the use of instructional media in the classroom have dealt with one of two questions. First, in general, what and how much media is being used; and second how is media use related to training in, experience with, attitude about, availability, etc., of instructional media. Beyond focusing upon one or two specific disciplines, no studies provide analysis of media utilization based on teaching discipline.

Media course content studies focus primarily upon what is being taught, what experts in the field say should be taught, or a combination of suggestions from teachers, administrators and college level instructors. Again, there are no studies that consider specific media competencies related to teaching disciplines.

Background, Rationale and Justification of the Problem

As the use of the instructional film and other forms of equipment and materials became more prevalent and as teacher preparation institutions began including courses in "visual education," concerns surfaced over the knowledges and skills important to the classroom teacher. deBernardis and Brown (1946) conducted a study aimed at determining these skills which "...was based on the belief that a composite summary of opinions of experienced teachers, audio-visual supervisors, general supervisors,

and administrators would give this information.”(p. 550) The investigators collected data on four major categories: “(1) mechanics, (2) utilization, (3) production, and (4) facilities.”(p. 550) Generally stated, their findings indicated that teachers had a high interest in learning to operate the various types of equipment; a high level of interest in utilization of materials, but an average level of skill and knowledge; were more interested in having ready-made materials than spending time to construct their own, but were very interested in developing skills relative to simple production activities such as mounting and preparing maps, exhibits and diorama; were interested in knowing how to improve facilities for the use of audio-visual materials and safety practices in handling the equipment.(pp. 551-555) One of the side benefits that came out of this study was a formal list of some 42 skills and knowledges pertaining to instructional media.(p. 553) While this study was not conducted explicitly for the purpose of identifying content for a college course in instructional media, the findings could certainly be valued by those who have such responsibility.

The 1958 Lake Okoboji Leadership Conference, (Okoboji 1959), while not focused on determining what was being used by classroom teachers, did present a set of competencies that the participants believed were important for teachers to have. In addition, they spent considerable time dealing with instructional approaches for teaching these competencies.

Smith (1969), conducted a study “...to determine the extent the professors in the Pennsylvania State College system, who teach elementary social studies methods courses, encourage prospective teachers to utilize audiovisual materials in their teaching of

elementary school social studies.”(p. 8) He found that

1. “...students and instructors do not utilize media in the social studies methods course to the same degree that media are discussed.
2. As a group the beginning teachers who were students in social studies methods classes that provided many audiovisual experiences, utilize more audiovisual materials in their social studies teaching than do those teachers who had fewer audiovisual experiences in their methods classes.
3. 99.5 percent of the respondents believe that audiovisual materials should be a topic of discussion in the social studies methods course.
4. 45.5 percent believe that enough emphasis was placed on the topic of audiovisual materials in the social studies methods course while 54.5 percent report insufficient attention.”(pp. 74-77)

While Smith (1969) did not focus on specific media competencies, his study does have implication for the teaching of media skills and competencies in the methods courses.

Other studies have attempted to identify media competencies used by classroom teachers in general. Streeter (1969), using a list of 47 competencies, surveyed nearly 500 teachers to determine the teachers media competency and the teachers media use frequencies. From his study he draws the conclusion that

“...for the purposes of teacher education the media competencies can be divided into three categories: basic understandings and skills needed to operate equipment and produce simple audiovisual materials; media competencies unique to a particular subject matter; and the general media theory, utilization, and evaluation skills and understandings that seem to motivate a teacher to use educational media more extensively.”(p. 62)

Laird (1978) surveyed the Springfield, Oregon School system to determine the kinds of audiovisual equipment being used and the

approximate annual use of them. It was found that "...audiovisual materials and equipment play a major role in the education program... and that most teachers plan for the use of media in relation to their instructional goals and objectives." (p. 23) Laird's study was the only one that identified media format or type selection based on teaching discipline.

1. "Math teachers have found the use of the overhead projector to be most effective in demonstrating concepts.
2. Social studies teachers appreciate the use of films of far-away places to enliven the classroom.
3. English teachers use motion pictures to dramatize literature, and tape recorders for spelling tests." (p. 23)

Proctor (1983) conducted a study to determine the media utilization by student teachers in the Saskatchewan, Canada schools. His purpose was not to identify media competencies per se, but to consider which media were used, how they were used and what factors influenced their use. Generally stated he found that: "...for every ten lessons taught by student teachers, media were not used in six lessons and that low technology were used in three lessons while intermediate technology were used to teach one lesson." (p. 121)

These findings were substantiated by Carter and Wedman (1984).

Their study was concerned about the use of production equipment and the production of selected media. They concluded:

"Although there is a high degree of acceptability for using educational media in teaching, the actual use of certain items and techniques is low. There are two reasons for this situation. First, teachers are more likely to use those materials that are easiest and least expensive to produce. Second, the more advanced the technical requirements for equipment operation, the less likely it is that teachers will use that equipment." (p. 38)

Two additional studies can be considered relating to media skills utilization in general. Wilcock (1986), prior to development of self-instructional materials relating to the operation of audiovisual equipment, surveyed teachers to determine what equipment was being used regularly. He determined the equipment of importance was the: "16mm auto-load projector, cassette tape recorder, filmstrip projector, opaque projector, overhead projector, spirit duplicator and videocassette recorder." (p. 11) Seidman (1986) in his Survey of Schoolteacher's Utilization of Media came to some rather negative conclusions about teachers and media use.

"Only overhead transparencies, pictures from books and magazines, and games and simulations were used once a month or more by more than half of the schoolteachers in the survey. Overall, overhead transparencies were the most utilized materials, with pictures from books and magazines second, and games and simulations third.

The data also revealed that the media materials that senior, junior high, and middle school teachers employed most frequently (i.e., overhead transparencies, pictures from books and magazines, games and simulations, and models) generally were the same ones that elementary school teachers used most often (although these media were employed most frequently in elementary schools)." (p. 20)

In addition to the classroom media use studies there have been some media attitude studies completed. Bellamy, Whitaker and White (1978) in their attitude study state that:

"...most teachers apparently feel...that they are doing an adequate job of educating their students by depending exclusively on traditional materials (textbooks and teachers' supplements or handbooks). To date, they have had no particular incentive to locate and utilize non-print resources in the classroom. A related attitude is that 'teachers are just ordinary working people,' and lack either the inclination or the motivation to spend their own time reading educational journals or previewing filmstrips or video tapes." (p. 11)

Elliott, Ingersoll and Smith (1984) attempted to determine the trends and attitudes in the use of media. Using a "Focus Group research technique" this study was conducted with over 30 groups of teachers and administrators across the nation from schools of all sizes and cutting across all disciplines. Their interviews were analyzed and comments and suggestions recorded. In general, teachers and administrators are accepting of both "traditional" and "new" media technology; however, the more dramatic the new products, such as computers and computer related products, the greater amount of inservice training that is expected. (p. 21) The attitudes expressed by this study seemed to be more positive than the latter.

Several studies have been conducted to determine the relationship or impact of training on the use of media in the classroom. Jones (1982) investigated the relationship between media use, training, grade level and opinion of the value of media. She concluded:

1. The degree of a teacher's formal training in the use of media was not, in an overall sense, a significant factor in their use of these selected media.
2. The grade level taught by a teacher was not a significant factor in the use of selected media.
3. The opinions of the value of media used in the curriculum of student teachers and first year teachers was a significant factor in the use of selected media." (p. 118)

Sibalwa (1982) conducted a descriptive study to determine the effect that training in, experience with and availability of instructional media have on the use of media in the classroom. He concluded that the education (formal or informal) "...in instructional media is

important in developing skills and understanding. This education and their experience with media items will be the major factors determining the frequency with which they will use instructional media in their student teaching.” (p. 103) Carter and Schmidt (1985) attempted to relate media use to training based on a short course of instruction provided pre-service teachers prior to their student teaching. Instruction was given to a group of secondary pre-service teachers as well as a group in the elementary education program. At the completion of their student teaching experience each student received a questionnaire. “When the results were tabulated, it was apparent that few students actually used instructional materials in their teaching.” (p. 31) The comparison that produced the concern for the researchers was between the adequacy of training and the amount of use. While each student indicated that they were adequately prepared, because of the evidence indicating lack of use, the investigators concluded that the instruction was not sufficient. While the research seems appropriate it should be noted that drawing this conclusion may be a bit premature, especially when the overall complexity of the student teaching process is not considered.

Rationale and Justification of the study

Aside from the single exception, (Laird 1978), none of the studies cited have dealt with the use or application of media in relation to specific teaching disciplines. There is some literature, however, that provides some suggestions relative to media use for specific disciplines. Blythe and Sweet (1983) discuss the use of media in the teaching of English. Hansen (1983) presents ideas concerning the use of media for Math instruction. Sigda (1983)

reviews possibilities of media in the teaching of Science. Finally, Dyrenfurth and Miller (1984) consider media use for Vocational/Technical Education. None of the literature surveyed provides any insight into media competencies relative to specific teaching disciplines.

Purpose of the Study

This study was an investigation to determine the instructional media competencies that inservice teachers of secondary education teaching disciplines recommend for pre-service teachers in their discipline. The primary purpose of this study was to identify the instructional media competencies common to all teaching disciplines. These could be used to form the core content of an introductory instructional media course. In addition, the media competencies unique to each discipline were identified. These could be used for teaching discipline emphasis within the media course. In addition, consideration was given to the perceived value of instructional media use in the classroom, length of tenure as a teacher and the teaching location, namely Hawaii, Oregon and Utah. Recommendations were also studied relative to the instructional approach, i.e., formal course approach, integrated methods course approach or combination approach in relation to teaching discipline.

The objectives of this study were to:

1. compile a set of media competencies that are common to all disciplines which could be used to form the core of an introductory instructional media course.
2. compile separate lists of media competencies that are peculiar to each teaching discipline or sets of disciplines which could be recommended for inclusion in designated methods courses or that could be used to individualize the methods courses.

3. identify the value of media in the classroom by teaching discipline.
4. identify the instructional approach significant to each teaching discipline.

Pilot Study and Design

During the 1983-84 school year, while a faculty member of the Secondary Education Department of the College of Education, Brigham Young University, Provo, Utah, the writer conducted a small study relative to the topic of this research. The purpose of the study was (1) to develop a set of media competencies taught in selected introductory media courses from teacher education institutions throughout the western states of the United States of America; (2) to determine the importance of each competency as judged by public school inservice teachers and college methods course instructors by teaching discipline; and (3) to compare the list of competencies derived from the public school teachers against those from the methods course instructors. First, a questionnaire was developed to use as a guide for a telephone survey of twenty institutions offering introductory media courses as identified through their university catalogs. These institutions were randomly selected from all those available in California, Oregon, Washington, Idaho, Utah, Colorado, Wyoming and Arizona. For those states with only one school the choice was automatic. Telephone contact was made and the questionnaire completed for all of the institutions. During the phone interview, request was made to have any syllabus or course information sent to the writer. Approximately half (50 percent)

responded by sending course information. This information, along with the writers current course syllabus was used to develop a list of media competencies being taught by the representative institutions.

The instrument was reviewed by several colleagues and after suggested revisions a sample of public school teachers was identified for a trial run. Through interviews, after the teachers finished the questionnaire, additional revisions were completed.

A list of all the university faculty associated with the Secondary Education Program was compiled by subject area. This consisted of both methods course instructors in the College of Education as well as subject matter instructors from other colleges within the university. The questionnaire was administered to this group. A total of twenty-nine responded. Along with the questionnaire a request was made for suggested public school teachers with at least three years service that the university instructors would consider outstanding in their particular teaching discipline.

The list from the methods course instructors was compiled and the same instrument mailed to them. A total of ninety-seven questionnaires were mailed with ten being returned as "undeliverable". Of the eighty-seven remaining 63 were returned for a return rate of 72 percent. While the return rate was considered excellent, the actual numbers in each cell for analysis was below the minimum needed to get a statistically accurate report by discipline. By collapsing the teaching discipline cells, it was possible to obtain data using public school and university respondents as categories. There was no significant difference between the categories of public school and university. By combining the two categories it was possible to make some determination relative to media competencies

considered significant for inclusion in an introductory media course. Out of the twenty-five media competencies used in this study sixteen were identified as significant.

Additional questions were included relative to when the course should be offered. The respondents could make two selections out of the three possibilities. Overall 74 percent recommended before student teaching, 25 percent during student teaching and 16 percent after student teaching. Regarding state certification requirements, 65 percent of the total suggested the state should require a media course for secondary education certification with 32 percent saying no. The missing percentage was no response.

The original intent was to provide data that would guide the development of the pre-service instructional media courses for the Secondary Education Department of the College of Education at Brigham Young University. While this pilot study didn't provide the anticipated information, it was beneficial. A questionnaire was developed as well as a compilation of media skills that were currently being taught in teacher education institutions in the west. The pilot study laid the ground work for a larger, more comprehensive study.

Design of the Study

This study was an investigation to determine the instructional media competencies that inservice teachers of secondary education teaching disciplines recommend for pre-service teachers in their discipline. The primary purpose of this study was to identify the instructional media competencies common to all teaching disciplines. These could be used to form the core content of an

introductory instructional media course. In addition, the media competencies unique to each discipline were identified. These could be used for teaching discipline emphasis within the media course. In addition, consideration was given to the perceived value of instructional media use in the classroom, length of tenure as a teacher and the teaching location namely Hawaii, Oregon and Utah . Recommendations were also studied relative to the instructional approach, i.e., formal course approach, integrated methods course approach or combination approach in relation to teaching discipline.

Questions to be Answered

This study attempted to answer the following questions:

1. Is there a significant relationship between teaching discipline and instructional media competencies recommended for inclusion in a pre-service teacher education program?
2. Are there recommended instructional media competencies that are common to all teaching disciplines?
3. Are there recommended instructional media competencies that are unique to specific teaching disciplines or groups of disciplines?
4. Is there a significant relationship between length of teaching and recommended instructional media competencies by teaching discipline?
5. Is there a significant relationship between the perceived value of instructional media and recommended instructional media competencies by teaching discipline?
6. Is there a significant relationship between a recommended instructional approach and teaching disciplines?

7. Is there a recommended instructional approach that is common to all teaching disciplines?

8. Is there a recommended instructional approach that is unique to a specific teaching discipline or group of disciplines?

Data Gathering and Analysis

A questionnaire administered by mail was utilized for data gathering. Junior and senior high schools were identified throughout the states* of Oregon, Utah and Hawaii. Schools were randomly selected to receive the questionnaire. Questionnaires were sent to teachers of each of the teaching disciplines listed below.

- Art
- Business
- Computer Science
- Foreign Language
- Health
- Home Economics
- Industrial Arts
- Language Arts (Includes English, Literature, etc.)
- Mathematics
- Music
- Physical Education
- Science
- Social Science (Includes History, Sociology, Psychology, etc.)

Upon return of the questionnaires, they were computer analyzed using SPSSX (Statistical Package for Social Sciences) release 3.0.

*In a study conducted by the AECT (Association of Educational Communication and Technology), 1982, Oregon was identified as one of only four states in the United States that "...required any evidence of having met media standards." (p. 32) Hawaii is identified as "...requiring individual institutions to design and implement media training." (p. 33) Utah had provided no response. The National

Association of State Directors of Teacher Education and Certification (1988) list Oregon as the only state requiring evidence of media competency.

The three states selected for sampling were identified for two reasons. First because of familiarity and accessibility to the writer and second because each represents a slightly different set of standards for state approval of the teacher education institutions. Oregon lists only "State Standards" required, Hawaii lists "State Standards, Regional Accrediting Association Standards, and NASDTEC Standards", while Utah lists all three of the above plus "NCATE Standards". This is not anticipated to be a major factor, but does suggest a cross section of possibilities relative to certification requirements for the teachers surveyed.

Assumptions of the Study

Because of the daily instructional activities of the inservice teacher she/he have experiences that cannot be duplicated or speculated with accuracy outside of that environment. They develop preference for and confidence in selected techniques and materials that "work" for them in the teaching/learning process. These perceptions and insights are valuable to identification of skills and competencies that pre-service teacher education students need to be developing that will prepare them to be successful teachers.

The findings of a study using an adequate sample of in-service secondary education teachers selected by discipline can be generalized to pre-service teacher education institutions within the study area offering an introductory media course in their program.

Delimitations and Limitations of the Study

This study was delimited by the following parameters for ease of management and effectiveness:

1. The subjects were selected from a limited geographical area thus limiting the generalizability of the findings.
2. The study was concerned with recommendations of instructional media competencies, not the use of media in the classroom.

The following are limitations of this study:

1. The instructional media competencies were limited to available literature and the writer's personal experience.
2. The study was limited by the truthfulness and accuracy of the respondents.

Definition of Terms

Audiovisual Materials or Audiovisual Aids. These terms are used interchangeably and refer to the non-print materials utilized in teaching.

Instructional Media, Instructional Materials, and Educational Materials. These terms as used in this study are interchangeable and encompass both print and non-print materials used for instruction. They do not include the equipment needed for utilization of the materials.

Media. This term refers to the complete range of print and non-print materials that can be utilized in the teaching/learning process.

Media Equipment. This term refers only to the hardware or equipment necessary for the utilization of instructional materials in the teaching/learning process.

Media Competencies. This term as used in this study refers to the various skills and knowledges needed by a teacher to effectively select, operate, produce, utilize and/or evaluate instructional media.

Pre-Service. This term refers to the period of time spent in developing the various skills and understandings needed to become a professional teacher. This usually represents the time spent in a college or university with a teacher education program.

Inservice. This term refers to the professional teacher who is in the field as a classroom teacher either in a private or public system. This usually suggests having been granted some type of teaching credential from the state of current employment.

Introductory Instructional Media Course. This term refers to a formal course offered in a teacher education program in a college or university with the primary purpose of developing some or all skills and knowledges related to the selection, operation, production, utilization and evaluation of instructional media.

Methods Course. This term as used in this study refers to the course or courses designated by a teacher education program in a college or university that focus on teaching methods relating to a specific discipline.

CHAPTER 2

REVIEW OF LITERATURE

Comprehensive electronic searches using SILVER PLATTER AND DIALOG to search the ERIC data base and Dissertation Abstracts produced a large listing of studies and articles dealing with audiovisual instruction, instructional materials, educational media and media utilization. In addition, Moldstad (1974), Ely in Osborne and Trott (1985) and Caffarella and Sachs (1988) were reviewed to identify studies, articles and readings significant to the utilization and application of media.

A careful review of all abstracts, etc., was conducted to determine literature specifically focused at media competencies utilized by classroom teachers and media competencies relative to introductory instructional media course content. By narrowing the focus to studies that dealt with media utilization or course content as it relates to secondary education disciplines, only a few research studies and articles were found.

While significant literature was not found that deals specifically with the topic of this study, there were sufficient studies to answer the following questions that relate to the topic:

1. What significant historical events have led to the development of the field of instructional media?
2. What significant classroom media use studies have contributed to a better understanding of effective application of media in the teaching/learning process?
3. What significant contributions have the comparative media studies made to the understanding of the effects

and benefits of instructional media in teaching and learning?

4. What significant instructional media course content studies have contributed to the improvement of instruction in pre-service teacher education programs?

The review of literature will center on these four areas of research.

Historical Background of Instructional Media

Beyond dates and places an historical review can be a complex process. One of the first decisions that must be made is what approach or perspective will be most meaningful to the reader. It is no different when considering the development of the field of instructional media. One of the factors that makes this a challenge lies with the fact that as a discipline, instructional media has undergone considerable change in becoming what it is today. One evidence of this can be seen by reviewing the titles used to describe the field or groups within the field. Saettler (1968) states:

“Since the early 1900’s, such terms as visual aids, teaching aids, audiovisual aids, visual instruction, audiovisual instruction, audiovisual materials, audiovisual communication, audiovisual technology, and many more have been used to designate a group of machines and materials.” (p. 3)

Reference in early studies (Stracke, 1932; Starnes, 1937-38) is made to “visual education” activities. A little later, (Taylor, 1942; deBernardis and Brown, 1946), the terms visual aids and audiovisual aids are used to describe the materials under discussion. The term “media” begins to replace “audiovisual” as a better descriptor because it suggests a greater spectrum of resources. Instructional media, educational media, educational technology and instructional

science all have been used at one time or another to describe what most would say is the same thing with perhaps a minor adjustment to perspective.

Perhaps a better terminology example is that of facility titles used to describe the “library.” Through the 60’s, 70’s and 80’s there has been an attempt to clarify the role and service of the school “library.” The term “library” has a tradition that carries with it a fairly good mental picture of what it is. As greater emphasis has been placed on the inclusion of non-print resources in the instructional process the term “media center” was used in an attempt to describe the nature of the expanded collection. The term “media specialist” rather than “librarian” indicated the person responsible for the facility. From “media center” the term “instructional media center or instructional materials center” began to be used, again to better define the function of the facility. To move the emphasis from “instruction” to “learning” the title “learning resource center” evolved. Apparently because of continued philosophical differences between the “traditional” librarians and the “traditional” audiovisual specialists a reconciliatory title of “library/media center” was also tried. The significance of recognizing this struggle with terminology is simply to understand the struggle that the field of instructional media seems to have been going through and to a certain extent, still is. Analysis of these terms would suggest that many within the profession have been trying to better define the field or profession as a whole. If the terms mentioned above are to represent a continuum, it could be suggested that they move from a perception of “storage and maintenance” to a promotion and enhancement of the learning process.

Another area of historical interest is the development of a definition for the field. Ely (1973), reviews several of the significant attempts at providing a definition for professionals. In 1963, the Commission on Definition and Terminology of DAVI (Department of Audiovisual Instruction) published a definition under the term “educational technology.”

“(Educational technology) is that field of educational theory and practice primarily concerned with the design and use of messages which control the learning process.” (p. 52)

Ely (1973), reports that the Presidential Commission on Instructional Technology produced two definitions for education technology with the second being widely accepted.

“(Educational technology) is a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication, and employing a combination of human and non-human resources to bring about more effective instruction.” (p. 52)

Silber (1970), provides a definition that he uses to answer the question as to what field we (instructional technologists) are in.

“Instructional Technology is the Development (Research, Design, Production, Evaluation, Support-Supply, Utilization) of Instructional System Components (Messages, Men, Materials, Devices, Techniques, Settings) and the Management of that development (Organization, Personnel) in a systematic manner with the goal of solving Instructional problems.” (p. 21)

Knirk and Gustafson (1986), report that the Association for Educational Communications and Technology published its official definition of education technology in 1977 which is all inclusive:

“Educational technology is a complex, integrated process involving people, procedures, ideas, devices, and organization for analyzing problems, and devising, implementing, evaluating and managing solutions to those problems, involved in all aspects of human learning. In educational technology, the solutions to problems take the form of all the ‘Learning Resources’ that are designed and/or selected as Messages, People, Materials, Devices, Techniques, and Settings. The processes for analyzing problems and devising, implementing and evaluating solutions are identified by the ‘Educational Development Functions’ of Research-Theory, Design, Production, Evaluation, Selection, Logistics, and Utilization. The processes of directing or coordinating one or more of these functions are identified by the ‘Educational Management Functions’ of Organization Management and Personnel Management.” (p. 17)

Another source of understanding the development of the field of instructional media is to track the professional organization. Cochran (1973), traces the highlights of the establishment of a professional organization for the field of instructional media. The organization had its beginnings on July 6, 1923 as DVI (Department of Visual Instruction of the National Education Association). At its beginning the comment was made that “...in the minds of many thousands, visual education will now cease to be a fad.” (p. 42)

Cochran (1973), continues to trace the changes in the field regarding the development of new equipment and techniques in various media formats. Some significant research projects are highlighted as well as organizational structure changes. DVI was impacted by World War II. Because of the training needs of the military and the research and development that was accomplished a new commitment was felt regarding the benefits that appropriately designed and implemented audiovisual media could provide in the schools.

Following the war in 1947, DVI changed its name to DAVI (Department of Audiovisual Instruction) and was permanently located in Washington, D.C. at the headquarters of the National Education Association.

DAVI remained from 1947 until 1970 when it went through another name change which remains until the present. The Association for Educational Communications and Technology, as Cochran (1973), puts it "...seems to have been a look at the future." (p. 43)

One of the long benefits that came from this organization was the establishment of Audiovisual Communication Review in 1953 which provided an excellent outlet for reporting research findings in the instructional media area. The ACR was followed in 1956 by the publication of Instructional Materials which soon changed its name to Audiovisual Instruction magazine. This publication has gone through several name changes over the years and is currently published as Tech Trends.

What does this evolution of definition and organization represent? Is it a manifestation of growth, change or evolution of the philosophical and theoretical bases of the field or discipline? One of the factors that can make this a difficult question to answer is the fact that the field of instructional media, instructional technology, educational technology or instructional science is an eclectic discipline. Drawing from the physical and behavioral sciences, contributions to the development of the constructs and components of this discipline can be traced to Physics, Chemistry, Mechanical, Electrical and Electronic Engineering, Architecture, Psychology, Sociology, Education, Mathematics, Organizational Behavior and

various Human Resource areas. Saettler (1968) in his introductory chapter reviews the influence of the physical and behavioral sciences on the development of the discipline of instructional media.

“The physical science concept of instructional technology usually means the application of physical science and engineering technology, such as motion picture projectors, tape recorders, television, teaching machines, for group presentation of instructional materials. Characteristically, this concept views the various media as aids to instruction and tends to be preoccupied with the effects of devices and procedures, rather than with the differences of individual learners or with the selection of instructional content.” (p. 2)

Saettler (1968) suggests that the social science influence upon instructional media began in the latter half of the nineteenth century.

“It began with the British development of social anthropology by E. B. Tylor (1832-1917) and J. B. Frazier (1854-1941); the first experimental psychological laboratory of Wilhelm Max Wundt (1832-1926) in Leipzig, Germany, in 1879; the antecedent of the modern intelligence test by Alfred Binet (1857-1911) in France; the beginning of child study by G. Stanley Hall (1846 -1917); and the first large-scale sociological investigations stemming from early twentieth century reform movements in the United States.” (p. 4)

He proceeds with a review of the impact of World War I and World War II on the development of psychology and the utilization of intelligence testing and statistical measurement. After World War II there was an increased growth in application of the social sciences until the United States became the world leader. He continues:

“Today there is an emerging *Zeitgeist* that an applied behavioral science approach to the problems of learning and instruction is fundamental to instructional technology. Thus the basic view of the behavioral science concept of instructional technology is that educational practice should be more dependent on the

methods of science as developed by behavioral scientists in the broad areas of psychology, anthropology, sociology, and in the more specialized areas of learning, group processes, language and linguistics, communications, administration, cybernetics, perception, and psychometrics. Moreover, this concept includes the application of engineering research and development (including human factors engineering) and branches of economics and logistics related to the effective utilization of instructional personnel, buildings (learning spaces), and such new computerized machine systems as data processing and information retrieval.” (p. 5)

Saettler’s (1968) work is a very comprehensive historical analysis of instructional technology. He goes into great depth to identify the earliest beginnings of thought and procedure that helps us understand the philosophical background of instructional media or technology. He points out that much of the current philosophy is similar to that taught and spoke about anciently. Fulton (1960) supports this perception. He states: “Much in the writings of Comenius, Pestalozzi, Rousseau, and Froebel would, if read today, sound similar to the most authoritative textbooks in audio-visual education.” (p. 492)

In 1977, the Association for Educational Communications and Technology’s Task Force on Definition and Terminology published The Definition of Educational Technology. Much of what Saettler did, contributes to the historical perspective chapter, however, they attempt to look at history in a more applicable way. Wallington (1974 p. 15) is quoted as making this observation:

“Educational technology is essentially a young field of study. Saettler (1968) traced the philosophical underpinnings of educational technology to the Sophists of the Golden Age of Greece. While such a

link may be historically valid and give credence to educational technology as an ancient and venerable field of endeavor, it is not operationally relevant.” (p. 28)

To make the historical review more “operationally relevant” the Task Force begins looking at the changes and developments of instructional technology from the time that Jim Finn, one of the recognized early leaders in the field of instructional media or technology, suggests that it all began. He is quoted as saying: “Instructional technology ...could be thought to have begun in the early 1920’s.” (Finn, 1967) (p. 28) Starting from there, the Task Force describes the progression of instructional media or technology from its simplest beginnings down to the present.

The first formal movement related to instructional media was visual instruction. According to AECT (1977): “The visual instruction movement was based on the concept of using visual materials to make more concrete the abstract ideas being taught.” (p. 28) Most of the research carried out during this movement focused on surveys of equipment, materials and teacher training. Influence of the physical science perception can be seen in the “materials and equipment” orientation of the movement of visual instruction. (p. 28-29)

Moving from visual instruction to audiovisual instruction was accomplished as a result of the development of sound recording technology. Sound recordings and sound motion pictures now become a part of the collection of materials. The adding of sound did very little to change the conceptual base of instructional technology. Both the visual instruction and audiovisual instruction movement emphasized the abstract-concrete continuum notion with the

materials at the more concrete end. The idea of integration of the materials in the curriculum rather than using them in isolation was also important. Both movements were weak in that they were more concerned with the materials rather than with the processes of development and they viewed the materials as aids to teachers' instruction. A shift in research toward effectiveness of audiovisual materials was experienced.

The end of World War II saw an increased interest and development in communication theory. Dale (1953, p. 3) is quoted in AECT (1977) as setting the perception of the shift from audiovisual instruction to communications. He states:

“...We are concerned with communication; we are interested in the answer to the question, ‘What does it mean to communicate?’ As I think about the effectiveness of audiovisual materials, I find that reading and thinking about communications are one of my most fruitful methods of evaluation. In short, I ask myself: ‘What broad theories of communication can I operate under which will be most helpful to me...’ (p. 30)

According to AECT (1977): “The communications orientation to educational technology altered the theoretical framework of the field. Instead of concentrating on ‘things’ of the field, it concentrated on the entire process of communicating information from a source (either a teacher or some materials) to a receiver (the learner).” (p. 30)

While communications theory was enjoying a great deal of attention a parallel development was occurring. Early systems concepts focused on the development of instruction as a total product that arranged and integrated all the components of mass, individual and conventional instruction together to produce a complete instructional system.

Three major new concepts develop as a result of the systems concept of instruction. First, the basic unit is not individual materials, but rather the complete instructional system. Second, individual materials are components of a system not aids to the teacher's instruction. And third, instructional systems had to be designed for a cause. (p. 34)

The development of communications theory and the systems concepts can be seen as a major shift from the physical science perception of instructional media toward the behavioral science orientation. The process of instruction now begins to become the primary focus of the field rather than materials and equipment. The audiovisual communications movement is the result of the synthesizing of communications and early systems concepts.

The shift from audiovisual aids to complete instructional systems is evidenced by the 1963 DAVI definition of educational technology as discussed earlier. Ely (1973) presented it as:

“(Educational technology) is that field of educational theory and practice primarily concerned with the design and use of messages which control the learning process.” (p. 52)

Many developments are seen during the audiovisual communications movement. The development and application of models to define and describe relationships of systems components becomes significant. Because of the shift from physical to behavioral science orientation we see an emphasis on behavior and reinforcement rather on stimuli as it pertains to the learning process. The importance of materials changes from presentation to reinforcement. Teaching machines and subsequently the concepts of programmed instruction are introduced. Behavioral objectives and

criterion-referenced evaluation are developed and emphasized as critical components of the instructional system.

The next shift is from audiovisual communications to the systems approach and instructional development. The application of models to assist in the systematic development became very important. There were a variety of models presented, but none that were universally adopted. AECT (1977) describes the bases of instructional development as:

“The theoretical framework of instructional development serves to synthesize and formalize many of the earlier concepts: process, systems approach, functions. It is also helpful in expanding and indicating some relationships among: behavioral objectives, criterion-referenced tests, use of appropriate human and nonhuman resources, appropriate use of individualized and self-instruction, development of complete instructional systems, emphasis on the learner, evaluation and revision of the instructional system and products based on tryouts with learners, and systematic management—all key elements in applying technology to instruction.” (p. 46)

At the time of the writing of AECT (1977) the final phase in the development of the field of instructional technology was the move from audiovisual communications and systems approaches to instructional technology. At first, there may not seem to be any difference between the two phases, however, there is a significant difference when the process of instruction as a whole is considered. Hoban (1965, p. 124) is quoted by the Task Force to describe instructional technology.

“...instructional technology, in its modern usage, involves the *management* of ideas, procedures, money, machines, and people in the instructional process. As such it involves:

- (1) a physical device(s) which mediates information transmission;
- (2) a system of instruction of which this device(s)

is one of several components; and

(3) a range of mediating options involving progression in (a) requirements for physical alteration of the 'classroom'; (b) remoteness in time and space between the tutor-planner and the student; (c) sophistication of design of programmed information exchange between the 'tutor' and the student; (d) complexity and cost of hardware; (e) level of technical skills required for equipment construction, installation, 'de-bugging,' operation and maintenance; (f) independence from classroom teacher control or continuous monitoring in the operation of the device-centered teaching; (g) additional manpower required by way of paraprofessional personnel for the use of instructional technology, and (h) role changes and new skills required of 'classroom' teachers in (1) management of technology, and (2) other and/or new non-structured, non-mediated teaching activities essential to personality development, humanistic growth, and cultivation of values, all of which lie outside the present and foreseeable potential of instructional technology as herein considered." (p. 49)

The work of the Task Force as presented in AECT (1977) does indicate a progression in the development of the field of instructional technology and media. Moving from a perception of simply visual aids to supplement the teachers instruction to the utilization of physical and behavioral science procedures and techniques to assist in the development and management of a complete instructional system requires multiple changes and shifts of theoretical paradigms. The historical development represented by the changes in definitions and terminologies is significant because they represent the corresponding changes in theoretical framework and philosophy. It should be noted, however, that while the definitions and terminologies of instructional technology may seem to have reached wide agreement and acceptance it does not mean that there is no further change. There is evidence of continued shift or progression

in refinement of the field or profession of instructional technology.

Osguthorpe and Zhou (1989) introduce a new term, instructional science which could mark the next phase of development. Osguthorpe, as Associate Dean in the College of Education, Brigham Young University and Professor of Instructional Science discusses with a Ph.D. candidate, Lian Zhou, the development of the field of instructional science. Considerable effort is taken to trace the behavioral scientists who have contributed to the theoretical and philosophical bases for instructional science. While most of this development is similar to what is presented by Saettler (1968) and AECT (1977) there are some differences that mark a possible change. Osguthorpe and Zhou (1989) state:

“...I like the term *instructional science* better than some of the other terms. It’s more inclusive. It leaves room for us to draw on what is now being called *cognitive science* (which draws upon the fields of developmental psychology and learning and cognition), as well as the research being done with new technology (computer-assisted or managed instruction, interactive videodisc, teleconferencing or distance instruction, etc.). In addition, those in the field are equally interested in new developments in the field of educational evaluation and research.” (p. 9)

They further explain:

“Instructional scientists have become increasingly interested in looking at the educational process in its full and complex entirety, rather than focusing only on the pieces that are easily defined and researched.” (p. 11-12)

Osguthorpe and Zhou (1989) help to reinforce the importance of the behavioral science contribution to the development of instructional science. They seem to suggest that the future is going to provide greater refinement in the application of what is known

about the process of learning through the behavioral sciences and the development of new understanding of how to enhance learning by applying new equipment and facilities developed by the physical sciences. What seems to be evolving is not an either/or condition, but rather a merging of the physical and behavioral sciences for the benefit of the learner.

While this brief description of the historical highlights of the development of the field of instructional technology and media helps produce a better understanding of the role of media and technology in education it is important to note that the practical value of such a review is in determining the contributions made to the process of education as a whole. In general, those contributions come in the form of the research that has been conducted and shared with the educational community. There are several categories of media research. Proctor (1983) identifies two major categories of media research. The first is prescriptive research which uses empirical study to outline the benefits of media use. Another descriptor for this research is comparative media studies. (Lumsdain, 1963; Levie and Dickie, 1973; Wilkinson, 1980; Clark and Salomon, 1985, etc.) The second is descriptive or media use research which attempts, through surveys, questionnaires and observation, to describe how media is used in the classroom. A third area of research interest as identified by McCutcheon (1984) is course content. The intent of these studies is to determine content of instructional media courses in teacher education programs. In some ways the course content studies could be considered descriptive research, however, their application is significantly different.

Descriptive Media Use Literature

In an attempt to determine the influence from professors of social studies methods courses upon the use of audiovisual materials by beginning teachers in Pennsylvania, Smith (1969) found the amount of actual use did not match the amount of discussion in the methods courses. He did find, however, that media use by beginning teachers was higher for those teachers who were in methods courses where the professor used a large amount and variety of media. Teachers from methods courses using little or no media continued from that example.

In Kentucky, a study to determine teacher attitudes toward non-print media was conducted by Bellamy, Whitaker and White (1978). They concluded:

“...the majority of teachers are afraid of media equipment, are unaware of resources available, and are unwilling to expend the extra effort required to locate media resources, plan for the use of such resources in a presentation, or make arrangements for set-up and operation of necessary equipment.” (p. 7)

“Often the use of such resources...may be regarded as a time-filler when the teacher is not prepared for class, or as a reward for good behavior by students, and is not incorporated in any meaningful way to supplement textbook content.” (p. 7)

“...most teachers apparently feel...that they are doing an adequate job of educating their students by depending exclusively on traditional materials (textbooks and teachers’ supplements or handbooks).” (p. 11)

To help overcome these problems of non-use they recommended personalized, in-service training so teachers could become aware of the benefits of media use in the classroom.

Laird (1978) found teachers in Springfield, Oregon to have a different perception of the use of media in the classroom. She found that: “..audiovisual materials and equipment play a major role in the education program of Springfield’s schools. ...and most teachers plan for the use of media in relation to their instructional goals and objectives.” (p. 23) As an example she indicated that the records showed that film use averaged 28 films per teacher per year. Teacher attitude was very positive regarding what media could provide for them in the classroom. “Teachers at all levels said that audiovisual presentations were very helpful in saving time that then could be devoted to the individual needs of students.” (p. 23) She found that math teachers used overhead projectors heavily while social studies and English teachers relied on films and tape recordings.

Jones (1982) was interested in looking at the relationship of media training and media use by student teachers and first year teachers. Her subjects were present and recently graduated students of education at Bowling Green University. She found that except for a few selected media, a teachers formal training in the use of media was not a significant factor in the actual use of media. She also determined that grade level was not a factor. The one thing that was of significance was the teachers opinion of the value of media. The greater the value the higher the use. While she was able to look at media use for specific media at different grade levels, she did not make any attempt to consider the discipline of the teachers involved.

Another study looking at the effect of training was conducted by Sibalwa (1982). His focus was on the Michigan State University pre-service teacher education program and how the media training

received there effected the media use of pre-service teachers. He concluded: "Pre-service teachers' education (formal or informal) in instructional media is important in developing skills and understanding. This education and their experience with media items will be the major factors determining the frequency with which they will use instructional media in their student teaching." (p. 103) It would appear that these two studies, Jones (1982) and Sibalwa (1982) arrived at different conclusions about the same idea. Perhaps the difference could be explained by the different populations, locations or questions asked.

Looking again at the student teacher, Proctor (1983) examined 4,042 lessons taught by 19 student teachers in Saskatchewan, Canada to determine the extent and purpose of media utilization. His analysis found that:

"...for every ten lessons taught by student teachers, media were not used in six lessons, non-textbook instructional learning resource based primarily on paper (low) technology were used in three lessons, media that required hardware for its presentation (intermediate technology) were used to teach one lesson, and no lessons were taught using any form of computer-based (high) technology."

"...when non-textbook instructional learning resources were used, they were employed primarily as aids to instruction rather than as the primary means to deliver instruction."

"...when media were used, print media such as spirit-duplicated pupil worksheets or handouts tended to be the most frequently used medium."

"...if media were not used in teaching the lessons, it was because of the perception that the textbook was an adequate resource rather than for reasons such as the lack of availability of the appropriate hardware and software." (p.121-122)

Proctor is somewhat more pessimistic about the use of media than some of the other writers. His review of literature and the

conclusions of his study brought him to the decision that while certain kinds of research, namely prescriptive, indicates that there are many benefits to both teacher and learner when media are used, in reality: "MEDIA ARE SELDOM USED". (p. 5)

Some support for the conclusion above was provided by Carter and Wedman (1984). Studying inservice teachers who had completed an introductory course in instructional media as part of their teacher education program they found that both production of and utilization of media was low especially for the more complex media formats. They concluded:

"Although there is a high degree of acceptability for using educational media in teaching, the actual use of certain items and techniques is low. There are two reasons for this situation. First, teachers are more likely to use those materials that are easiest and least expensive to produce. Second, the more advanced the technical requirements for equipment operation, the less likely it is that teachers will use that equipment." (p. cover 3)

The above conclusion continues to promote the perception that instructional media are seldom used in the classroom; however, it does provide some guidance for the media educator in the pre-service teacher education program. Because teachers are more likely to use the simpler, less costly instructional materials, emphasis on these could help improve their utilization. It also seems that better instruction regarding specifics of how to use selected media for selected topics or areas would be advantageous.

As a follow-up to Jones (1982), Carter and Schmidt (1985) conducted a study of both elementary and secondary student teachers who were given specific workshop training in the production and utilization of instructional media. Their findings

focused at three considerations; the adequacy of the collection of equipment and materials at the schools, the utilization of instructional media and the production of instructional media.

Concerning the adequacy question they found that:

“Ninety percent of the elementary student teachers perceived the schools in which they taught as having a rating of average or above. Eighty-nine percent of the secondary student teachers gave a similar rating for the schools in which they completed their experience.” (p. 31)

After compiling the data they found that few students actually used instructional materials in their teaching. “Except in two isolated cases...fifty percent or more of all secondary student teachers did not use instructional media in their teaching.” (p. 31) The elementary students were only slightly better. The question dealing with the production of instructional media yielded results that indicated an even lower rate than production. Some of the difference between elementary and secondary can be attributed to the difference in the two settings.

The recommendations that came out of this study could have significant impact on teacher education programs. A completely integrated approach to the teaching of instructional media is suggested. First, a required full term course in the production and utilization of instructional media. Second, specific media utilization activities become an integral component of all methods courses. And third, working with the cooperating and supervising teachers, instructional media utilization become a required part of the student teaching experience. The writers felt that these would help insure that beginning teachers would have a better understanding of the benefits of media and how to implement in their classroom.

Seidman (1986) studied a group of teachers in the Fort Worth, Texas public school system. His interest was to determine the amount of use they made of eleven specific media. His findings substantiate the practice of low media use.

“Only overhead transparencies, pictures from books and magazines, and games and simulations were used once a month or more by more than half of the schoolteachers in the survey. Overall, overhead transparencies were the most utilized materials with pictures from books and magazines second and games and simulations third.”

“It is clear that schoolteachers do not use much of the media equipment and materials at their disposal. When they do employ media, the simplest and most accessible are selected usually: overhead transparencies, book and magazine illustrations, games and simulations, phonograph records, and models.” (p. 20)

He concludes with two possible reasons for the kind of media use seen in the classrooms:

“...(1) negative attitudes toward teaching, ranging from ennui to despair, and (2) ineffective teacher education and inservice programs that fail to show prospective and practicing teachers how to use instructional media, particularly complex ones.” (p. 22)

Harrod (1977) adds fifty more reasons why teachers don't use media in the classroom. She has gathered some humorous excuses given by teachers of why they do not use media. Much of what she presents comes from personal observation as a media consultant. Of all of the fifty presented perhaps the last is the most significant and the one that relates most to research presented above. “Use media? Me? I'd like to, but...Is it, in reality, that 'I'm afraid'?” (p. 53) Being afraid often relates to a lack of understanding of how to apply instructional media to the teaching/learning process.

Much of the research reported in the literature suggests that one of the causes of non or low use of media in the classroom is inadequate or non-existent instruction and training of pre-service teachers in the production and use of instructional media. Of interest here, however, is the noticeable lack of literature that focuses at media as applied to specific teaching disciplines. Smith (1969) was interested in social studies and Laird mentioned some specifics regarding math, social studies and English teachers, but not much else was found as far as research based literature. There were a few items located that gave suggestions about utilization for specific teaching disciplines. (Rasmussen, 1968; Schure, 1968; Trow, 1968; Beckett, 1968; Thomas, 1982; Hansen, 1983; Blythe and Sweet, 1983; Sigda, 1983; Dyrenfurth and Miller, 1984) While each of these are beneficial it must be recognized that they are few. Smith (1969) indicated that one of the strong determining factors of whether a teacher would use instructional media in the social studies was having a model to follow in a professor in the methods course that was a user of media. Goodlad (1983) noted:

“Teachers teach as they were taught. They employ the techniques and material modeled during the sixteen or more years they were students in schools. Relatively late in this learning through modeling, they experience a modicum of professional preparation to teach -- presented largely in the same telling mode to which they had become accustomed.” (p. 469)

Perhaps media and methods educators should look inward to determine why what they teach is not practiced or implemented as much as they would like.

Comparative Media Research

With a few exceptions the descriptive literature described above seems to suggest that teachers feel instructional media in classroom is of little or no value. It leaves in question the need for training in instructional media and the expenditure of budgets for anything other than textbooks and workbooks. What is referred to as comparative media research is an attempt to identify the contributions of instructional media to the teaching/learning process. A rather large amount of research has been conducted that attempts to compare a particular media format or characteristic with a more traditional approach to instruction, usually a lecture or variation of the lecture. Several research reviews have been conducted in an attempt to draw applicable generalizations from this research: (Lumsdaine, 1963; Levie and Dickie, 1973; Jamison, Suppes, and Wells, 1974; Moldstad, 1974; Wilkinson, 1980; Clark and Salomon, 1985; Kemp, 1989.)

Clark and Salomon (1985) review the background of much of the comparative media studies. They state:

“Media research began during the behaviorist era in education, so early researchers assumed learners to be reactive, responding to external stimuli which were designed to control their behavior. Many early researchers operated on the belief that media in instruction offered great advantages in increased control of learning behaviors.” (p. 465)

This explains why much of this research focuses on relatively small, manipulative, attributes of the various media formats. Lumsdaine (1963), voiced concern that comparisons of different media on learning might not be useful. One of the difficulties expressed was in the difference in perception of media as simple

delivery instruments or as media having direct influence on learning in and of themselves. Lumsdaine (1963) reviewed and analyzed studies which had primarily utilized defensible methodology and produced significant differences between designated media treatments. He excluded the “media-versus-media” or “media-versus-conventional instruction” studies and focused on research dealing with controlled variation of specific factors. His reasoning was:

“What is needed are experiments which seek to reveal the influence of specific factors in the design characteristics of the media. These factors should define reproducible stimulus and response characteristics that can be implemented in future instructional materials and devices. In this way we can obtain experimental data to support the validity of generalizations on which to base future design decisions about media.” (p. 601)

There were four basic media that this collection of research dealt with; films and related media, instructional television, instructional audio, and auto-instructional materials. Some of the treatment variables of this review were; active student response, guidance, cueing or prompting, self-pacing, stimulus control, content and organization of instruction and repetition and redundancy. In general there was significant difference found in comparison to more traditional approaches.

Clark and Salomon (1985) suggest that Lumsdaine (1963) may have been somewhat inappropriate with his conclusions.

“...in most of the studies he reviewed, media were employed as simple vehicles for the delivery of instructional materials, and researchers manipulated such variables as text organization, size of step in programed instruction, cueing, or repeated exposures and prompting. None of these variables was generic to the media that the researchers purported to study.

Although media often were not the focus of the study, the results were erroneously interpreted as suggesting that learning benefits had been derived from various media.” (p. 465)

Ten years after Lumsdaine (1963) we find the same concerns about media-versus-media studies. Levie and Dickie (1973) observed that: “Hundreds of studies have been conducted to compare the effectiveness of one medium with another without having carefully defined what is being compared.” (p. 860) The research reviewed by Levie and Dickie (1973) seems to reflect the shift in the field of instructional technology and media away from an audiovisual communication orientation to the systems approach and instructional development orientation. As preface to their research review Levie and Dickie (1973) state:

“...it should be noted that most objectives may be attained through instruction presented by any of a variety of different media. ...that most media may be used effectively to present information instrumental to the attainment of numerous different objectives.” (p. 859)

These reviewers focused on media attributes, defined as “properties of stimulus materials which are manifest in the physical parameters of media. ...the capabilities of that medium -- to show objects in motion, objects in color, objects in three dimensions; to provide printed words, spoken words, simultaneous visual and auditory stimuli...” (p. 860) They felt these to be of greater importance than individual mediums because it allows the person having responsibility for the teaching/learning activity to focus on the learner and the learning task at hand first and then to utilize the appropriate medium or media to meet the need. They concluded their review by making a three part recommendation.

“Understanding media may be furthered by 1) specifying media in terms of attributes, 2) defining these attributes in terms which relate to the ways in which information is processed internally, and 3) discovering relationships between these attributes and other important instructional variables.” (p. 877)

A year after the above research review was published Jamison, Suppes and Wells (1974) surveyed comparisons of traditional instruction with instruction via computers, television and radio. They came to the conclusion that: “Students learn effectively from all these media, and relatively few studies indicate a significant difference in one medium over another or of one variant of a medium over another.” (p. 55)

Another review this same year, Moldstad (1974), used a “decision-oriented” approach to consider the available research. The decision-oriented approach to research is distinguished from “conclusive-oriented” research by the fact that the researcher is attempting to provide information for a decision-maker like an administrator. By looking at decision-oriented media research Moldstad (1974) makes four conclusions about media.

- “1. Significantly greater learning often results when media are integrated into the traditional instructional program.

2. Equal amounts of learning are often accomplished in significantly less time using instructional technology.

3. Multimedia instructional programs based upon a ‘systems approach’ frequently facilitate student learning more effectively than traditional instruction.

4. Multimedia and/or audiotutorial instructional programs are usually preferred by students when compared with traditional instruction.” (p. 390)

Many of the research projects sighted by Moldstad (1974) would be considered media-versus-media comparative studies by the

reviewers above and therefore not considered of much worth. However, when viewed from the perspective of the decision-oriented point of view they do have merit. It is interesting to note that most of the research used to justify the conclusions stated above does not deal with a medium as a stand alone or substitute for the teacher, but rather focuses on the integration of various media into the entire instructional program.

Wilkinson (1980) starts from the four conclusions of Moldstad (1974) and briefly reviews research on motion pictures, television, still pictures, audio materials, programmed and computer-assisted instruction and multimedia instruction. To conclude he quotes Schramm (1973 p. 61):

“...students can learn from media, but...We cannot say that teaching by media is necessarily as effective as, or more effective than, conventional classroom teaching because it is almost impossible to measure all the outcomes of instruction. Most of the research studies measure achievement, defined in terms of criterion-reference or standardized tests. A few measure some of the affective results, and a few others measure the time required to complete the work. But the total product of education is more than any of these; it is a changed person, with a set of values and abilities, a concept of culture and his place within it, and a living personality that governs his interactions with people and his internal life. No instructional research measures all that. However, there is ample reason for confidence that what instructional media can do, they can do well. This includes taking over the bulk of teaching in many subjects in the absence of direct teaching, supplementing classroom teaching with additional learning experience, providing directed and interactive practice, and in certain cases offering new opportunities to individualize learning and instruction.
(p. 20-21)

In terms of practical application of such an abundance of research that exists in the comparative media category perhaps

Schramm's "total" learner perception is most appropriate. While any given point of view can be argued for or against, it would seem more productive to look at all the research available to glean the benefits that are presented. Pertaining to the planning, production and use of instructional media, Kemp (1989), has identified fifteen (15) attributes that affect the development of effective instruction. From the research he has identified and abstracted one-hundred and four (104) findings or conclusions that support and give direction to the application of these attributes in the development of teaching/learning activities.

The contributions of the comparative media studies can be debated from a variety of points of view. Several, sometimes conflicting, conclusions can be drawn. However, there are some considerations that help to summarize the findings. Clark and Salomon (1985) summarize by stating that:

1. "...research on media has shown quite clearly that no medium enhances learning more than any other medium regardless of learning task, learner traits, symbolic elements, curriculum content, or setting.
2. Any new technology is likely to teach better than its predecessors because it generally provides better prepared instructional materials and its novelty engages learners.
3. In the future, researchers might ask not only how and why a medium operates in instruction and learning, but also why it should be used at all." (p. 474-5)

In spite of the "no significant difference" perception of most of the comparative studies much as been learned regarding the integration of media into a total system of instruction. To be most effective it is necessary to have an understanding of the attributes of the various media that are available and how to identify the specific needs of the learner that can be assisted by application of the

appropriate media. As instructional technology and media has developed from the relatively simple concept of visual materials to its present level of development a great deal of research has been conducted that has brought new insight into the instructional process. In order for this knowledge and understanding to have any impact it must be utilized by the classroom teacher. Regarding instructional media research Heinich, Molenda and Russell (1989) conclude:

“...research and practical experience have shown that much of the effectiveness of media depends on *how* they are integrated in the larger scheme.

The user of the material can help increase the impact of any audiovisual material by applying sound utilization techniques: having selected material with appropriate attributes, introduce it to learners by relating it to prior learning and indicating how it relates to today's objectives, present it under the best possible environmental conditions, elicit a response from viewers, review the content, and evaluate its impact.” (p. 24)

The descriptive research suggests that there is a need for better media instruction in the pre-service teacher education programs. The comparative media research suggests that for the findings of the research to have any direct effect upon the learners in the classroom the teacher must have a working understanding of what is available and what contributions the media can make. The last section of this literature review focuses on the findings and conclusions of the instructional media course content studies.

Instructional Media Course Content Research

Introductory instructional media course curriculum content has been of interest to researchers since the nineteen thirties.

According to Starnes (1937) the first separate course in visual aids was offered in 1921. The first research study conducted to determine what was being taught and what kinds of topics were being covered was concluded by Stracke (1932). From this first study to the present there have been three major questions that the researchers have been concerned with. First, what general categories of competencies are or should be taught in an introductory instructional media course? Second, what specific skills or competencies are or should be taught in an introductory instructional media course and third, what instructional approach or approaches should be implemented to teach an introductory instructional media course? A fourth consideration is addressed in a couple of studies and that is the existence or absence of a media component for teaching certification in each of the states within the United States.

In the *Summary Report* of the 1958 Okoboji Conference, Okoboji (1959), six major implementation competencies were identified for instructional media courses in pre-service teacher education programs:

- “1. Skill in diagnosing learning problems.
2. Ability to acquire a knowledge of a wide variety of audiovisual materials and equipment and their sources--local, national, and international.
3. Ability to gain knowledge and experience in the selection and use of audiovisual materials. For example: (a) knowledge of physical conditions essential to good classroom use of audiovisual materials; and (b) knowledge of the audiovisual potential of the school and community. (The latter includes organizing and maintaining audiovisual materials within the classroom and discovering resources and services in the school, school system, and community.)

4. Skill in simple preparation of materials appropriate to the needs and resources of the teacher and not otherwise available for classroom use. (Also, ability to determine when local production has inherent educational value.)

5. Ability to develop understanding of and/or appropriate competency in the operation of audiovisual equipment.

6. Ability to develop skill in evaluating results following the use of materials in the learning process. (p. 4-5)

Reporting on several committees and studies, Fulton and White (1959) and Fulton (1960), suggest:

“Teacher competencies in the selection and use of audiovisual materials on which there is general agreement may be classified under four major headings:

1. Proficiency in selection and evaluation of materials.

2. Proficiency in the utilization of appropriate instructional materials.

3. Proficiency in the production of simple instructional materials.

4. Proficiency in the preparation and use of physical facilities. (p. 159)

The University of Nebraska under contract with the Office of Education, U.S. Department of Health, Education and Welfare completed the Teacher Competencies Project. Regarding media competencies the project director Meierhenry (1967) proposes:

“There are three types of competencies which all teachers should have and which should be incorporated into the teacher education program.

First, there is need for theory in teacher education programs.

The second competency is called message design (popularly known as ‘programing’), the development of an instructional sequence or an instructional system.

Third, it is necessary for the prospective teacher to develop certain skills in the production of materials as well as in the operation of equipment.” (p. 1031)

Regarding the implementation of these competencies into the teacher education program his conclusion is very significant.

“...media competencies must now be deliberately planned with purposes and functions to be met rather than developed haphazardly, incidentally, or not at all. All persons responsible for the education of teachers...must provide for learning experiences involving media in order that prospective teachers will experience firsthand contributions of such learning resources.

In order for the teacher to operate successfully in the modern classroom, he must have frequent and personal encounters with media, their design and utilization.” (p. 1031)

As a follow-up to Meierhenry's (1966) project, Streeter (1967) conducted a study of the specific media competencies that resulted from the Teacher Competencies Project. After reviewing the data of media competency scores and frequency of use ratings he drew this conclusion:

“...for the purposes of teacher education the media competencies can be divided into three categories: basic understandings and skills needed to operate equipment and produce simple audiovisual materials; media competencies unique to a particular subject matter; and the general media theory, utilization, selection, and evaluation skills and understandings that seem to motivate a teacher to use educational media more extensively.” (p. 62)

This is the first and only time we see consideration given to media competencies that are specifically related to teaching discipline. This study does confirm the validity of the list of specific competencies that Meierhenry (1966) generates which will be discussed later.

One study, Lare (1974), attempts to identify significant media competencies and determine to what extent they are taught or provided pre-service teachers in teacher education programs. He developed a list of five competencies and two teacher actions related to media that a panel of experts in media instruction and elementary education methods agreed should be taught pre-service teachers.

The competencies were:

1. determine appropriate media
2. produce media
3. utilize media
4. evaluate media use
5. operate media equipment
6. list media sources
7. develop individual learning package (p. 167)

Two significant conclusions came from this study:

“1. Authorities surveyed in the fields of elementary methods and media are in substantial agreement in advocating the development of the media competencies devised by this writer.

2. The teacher-education institutions surveyed are not developing methods course media competencies advocated by authorities to any great extent in their elementary methods courses (social studies, language arts and reading, mathematics, and science). These are developed in approximately three-fourths of the methods courses. (p. 140)

Lare (1974) sets the premise for a national study conducted by the Teacher Education Committee of the Association for Educational Communications and Technology. AECT (1982) reports that:

“13 percent of the institutions offered absolutely no media training to their students. Although 87 percent of the institutions were teaching media skills, only 59 percent were actually incorporating it in *all* of their teacher education programs. There were 28 percent that required media instruction only in one or more programs.” (p. 33)

A second survey of this study indicated that: "38 percent of the states had no media requirements for teacher education students. Another 52 percent left the entire content of the program up to the individual institutions. Only four states--Louisiana, Ohio, Oregon and Wyoming--required any evidence of having met media standards." (p. 32) (Note: The National Association of State Directors of Teacher Education and Certification (1988) list Oregon as the only state requiring evidence of media competency.)

AECT (1982) also compiled information regarding the components of media instruction. They reported that: "These components included basic equipment operation, media utilization, media production, media selection, survey of media formats, and media communications theory." (p. 34)

This set of media components is substantiated by McCutcheon (1984). Referring to introductory media courses he indicates: "Students typically acquire practical skills: utilization techniques for the various media, operation of audiovisual equipment, production of simple media forms, and methods of appraising off-the-shelf media; besides the practical, students are exposed to theories that support the use of media: communication, perception, and learning psychology." (p. 9)

In summarizing the studies which have focused on the categories of media competencies which could be considered as components of media instruction, there are four categories that encompass the instructional media course content.

1. Principles of Communication, Selection, Evaluation and Research.
2. How to Produce Instructional Media Materials.
3. How to Utilization Instructional Media Materials.
4. How to Operate Instructional Media Equipment.

The general category descriptions are helpful in understanding the overall content structure of the introductory instructional media course, however, it is also important to identify the specific competencies that make up the categories. The sets of specific competencies constitute the skills and knowledges that the pre-service teacher will have available to take into the classroom. The emphasis between foundations, utilization, production and equipment operation can determine if these skills will be applicable in the classroom.

A list of forty-nine topics or competencies was compiled by Stracke (1932) in the first research effort to determine what is being taught in courses in visual instruction. Not all institutions surveyed were teaching all of these topics, but the list (see Table 2.1) does indicate a broad range of curriculum possibilities.

The second study that was concerned about instructional media course content was Starnes (1937-38). As a part of this study a list of forty-three topics was compiled, all of which were included or implied in Stracke (1932). The thing that is significant regarding competencies was that the following twelve were covered in 75 to 93 percent of the courses in both studies:

1. History of visual education.
2. Psychological justification for the use of visual aids.
3. Value of the school journey.
4. Technique of conducting the school journey.
5. Technique in the use of the stereoscope.
6. Advantages and disadvantages of the stereoscope.
7. Technique in the use of lantern slides, film slides and opaque projectors.
8. Advantages and disadvantages of lantern slides.
9. Advantages and disadvantages of opaque projectors.
10. Technique in the use of motion pictures.
11. Advantages and disadvantages of motion pictures.
12. Mechanics of projectors and projection. (p. 316)

Table 2.1: Forty-nine Instructional Media Competencies
Compiled by George A. Stracke - 1932

- | | |
|--|--|
| 1. The Philosophy and Psychology of Visual Instruction. | 25. Charts and Graphs |
| 2. Projectors - operation, mechanics and optics. | 26. Teacher training. |
| 3. Motion pictures. | 27. Diagrams. |
| 4. Sources of visual aids. | 28. Standard equipment recommendations. |
| 5. Lantern slides and their use. | 29. Photographic darkroom practice. |
| 6. Stereographs and their use. | 30. Research. |
| 7. Photographs and prints and their use. | 31. Classroom conditions. |
| 8. Exhibits. | 32. Globes. |
| 9. Organization of a city department. | 33. Laboratory practice in preparation of visual aids. |
| 10. History of Visual Instruction. | 34. Dramatization. |
| 11. Field trips. | 35. Demonstration lessons involving use of aids. |
| 12. Care, repair and storage of materials and equipment. | 36. Functions of a state department. |
| 13. Museum trips. | 37. Posters. |
| 14. Specimens. | 38. Tests of visual aids. |
| 15. Models | 39. Radio. |
| 16. Bibliography. | 40. School and community. |
| 17. Film slides. | 41. Still films. |
| 18. Blackboard materials and techniques. | 42. Cartoons. |
| 19. Photographic principles and practice. | 43. Organization of a county department. |
| 20. Visual aids in specific subjects. | 44. Textbook illustrations. |
| 21. Television. | 45. Screens. |
| 22. Types of visual aids (general discussion of) | 46. School museums. |
| 23. Organization of a school department. | 47. Puppets. |
| 24. Maps. | 48. Classroom demonstrations and experiments. |
| | 49. Duplicating processes - mimeograph, hectograph, etc. |
-

It should be noted that with some modification in the terminology used these same topics will be found in the majority of instructional media textbooks and introductory courses today.

A series of replicated studies, de Kieffer (1947, 1957, 1967) have compiled longitudinal information regarding the inclusion of ten topics in instruction media courses taught over these years. Even though these studies have only focused on some broad general topics

the results substantiate the perception that relatively little has changed over the years. As stated in de Kieffer (1970):

“The replies indicated that during the past two decades, there has been only a minor shift in emphasis in the solid backbone approach and content of the educational media courses. The areas of utilization, selection, equipment operation, and evaluation are still prominent. New areas such as theory of communication and instructional systems are, however, appearing as basic ingredients in the introductory courses.” (p. 46)

As reviewed above, the Teacher Competencies Project was reported by the project director Meierhenry (1966). He presented a list (See Table 2.2) of fifty-one media competencies that pre-service teacher education students should have some understanding. With appropriate terminology changes this list is very similar to that presented by Stacke (1932).

Meierhenry (1966) was used as the basis for three later studies dealing with instructional media competencies. Streeter (1973) used forty-seven of the original fifty-one competencies in a study to gain information about elements in a teacher's personal and professional background that positively or negatively affect the frequency with which the teacher uses educational media.

Rome (1973) wanted to determine which of Meierhenry's fifty-one instructional media competencies instructional media instructors, methods course instructors and high school principals would agree upon. His findings determined that forty-seven of the competencies were agreed to by more than 80 percent of each of the three populations. The remaining four were agreed to by more than 50 percent of the respondents.

Table 2.2: Fifty-one Instructional Media Competencies
Compiled by W. C. Meierhenry - 1966

UTILIZATION

1. Audio tape recording
2. Records
3. Radio
4. Television
5. Motion pictures
6. Overhead projection
7. Opaque projection
8. Filmstrips
9. Duplicating printed materials
10. Chalkboard
11. Field trips and community resources
12. Programmed instruction
13. Cartoons, sketches and diagrams
14. Charts
15. Posters
16. Bulletin boards
17. Display boards
18. Lettering
19. Mounting

RELATED TOPICS

20. Designing visual materials
21. Selection and Evaluation
22. Explosive growth of instructional Technology
23. Impact of new technology
24. Implications of learner centered and response oriented instruction
25. Psychology of learning
26. Operations research and systems analysis

27. Perception theory
28. Communication theory
29. Instructional research and media
30. Limitations and gaps in theory and research
31. Developing objectives followed by specification of instructional stimuli
32. Trying out, analyzing and modifying a unit
33. Experiencing instructional systems

EQUIPMENT OPERATION

34. 16mm projector
35. 8mm projector
36. 35mm filmstrip and slide projector
37. Overhead projector
38. Opaque projector
39. Record player
40. Tape recorder
41. Television receiver
42. Photocopier

PRODUCTION

43. Overhead transparencies
44. Audio tape recordings
45. Masters and paper copies
46. Rubber cement mounting
47. Tissue and cloth mounting
48. Lettering instructional materials
49. Simple sketches and cartoons
50. Displays such as charts, posters, bulletin boards, etc.
51. Effective use of the chalkboard

McCutcheon (1984) started with Meierhenry's (1966) list and by separating complex or combined topics and adding new items expanded it to a total of sixty-three competencies in order to reflect the current developments in the field of instructional technology. (See Table 2.3)

Table 2.3: Sixty-three Instructional Media Competencies
Compiled by John McCutcheon - 1984

HOW TO OPERATE:

1. 16mm projector
2. 8mm projector
3. Filmstrip projector
4. 2X2 slide projector
5. Overhead projector
6. Opaque projector
7. Record player
8. Reel-to-reel tape recorder
9. Cassette tape recorder
10. Spirit duplicator
11. Mimeograph
12. Video/camera/recorder/monitor system
13. Microcomputer/printer

HOW TO APPLY TO INSTRUCTION

14. Audiotape recordings
15. Records
16. Radio
17. Videotape recordings
18. Television
19. Motion pictures
20. Slides
21. Filmstrips
22. Overhead projection
23. Opaque projection
24. Chalkboards
25. Cartoon, sketches, and diagrams
26. Charts
27. Posters
28. Bulletin boards
29. Felt, flannel, magnetic, and hook and loop boards
30. Field trips and community resources
31. Programmed instruction
32. Games, simulations, and simulation games
33. Computer assisted instruction
34. Technological approaches such as Audio-tutorial, Personalized System of Instruction (PSI), etc.
35. Teacher duplicated materials

HOW TO PRODUCE:

36. Lettered materials using WRICO, dry transfer, stencil, etc.
37. Mounted materials using rubber cement, tissue, etc.
38. Laminated and other preserved Materials
39. Overhead transparencies: hand

40. Overhead transparencies: thermal
41. Overhead transparencies: Diazo
42. Demonstration and display boards
43. Duplicated instructional materials using photocopy, mimeograph, and/or spirit processes
44. Sketches and drawings
45. Audio recordings
46. Video recordings
47. Photography: slides or prints

PRINCIPLES OF COMMUNICATION, SELECTION, EVALUATION AND RESEARCH

48. Designing visual materials
49. Criteria for selection and evaluation
50. Explosive growth in communications and in storage/retrieval capabilities
51. Impact of technology on education
52. Implications of learner-centered instruction
53. Implications of response-oriented instruction
54. Psychology of learning - its implications for instructional technique
55. Systems analysis: experimental applications in education
56. Perception theory
57. Communications models: their use s tools in analyzing instructional problems
58. Instructional research related to use of media
59. Limitations and gaps in past and present media research
60. Future trends in media and technology
61. Developing behaviorally stated objectives
62. Instructional development: analyzing, designing, evaluating, and revising instruction systematically
63. Instructional systems: using teaching materials such as PSSC, BSCS, programmed instruction, etc., where all decisions have been make by someone other than the teacher

As a final check to verify the compilation of instructional media competencies, current instructional media textbooks were surveyed, Jensen (1986). All of the competencies in both the Meierhenry (1966) and McCutcheon (1984) lists were presented in at least one of the thirteen texts reviewed. With some modifications to meet personal observations and experiences the McCutcheon (1984) list was used as the basis for the current study being reported.

The last area of interest regarding instructional media course content deals with appropriate instructional approaches. Okoboji (1959) reports four possible approaches to the teaching of instructional media competencies. They are described as:

“The development of competencies can theoretically best be accomplished through a completely integrated program where the use of audiovisual techniques permeates all professional courses and particularly the methods courses. The success of the integrated program is contingent upon upon effective participation of all instructors of professional courses, a method of evaluating the student’s accomplishment, involvement of all students, and ample opportunity for laboratory experience as needed.

The integrated methods materials course. Here the audiovisual competencies would be achieved within the framework of the methods course or in cooperation with the audiovisual staff.

The formal course approach. The success of this approach is contingent upon completion of the course by all students, adequacy of the components of the course to provide the needed competencies, and ample opportunity for practical application through laboratory experiences.

The laboratory project approach. This is a program which gives all students sufficient time in an audiovisual laboratory to complete projects involving competencies applicable to their teaching interests. Success is contingent upon acceptance and participation by the entire faculty, the requirement that all students complete the program, the services of professionally qualified laboratory assistants, and a method of evaluating the students accomplishment. (p. 5)

The recommendations suggested above became the generally accepted instructional approaches for the teaching of instructional media competencies in teacher education programs. Fulton (1960) makes the following suggestion regarding instructional approaches for teaching instructional media competencies:

“Such a program might employ a combination of three or four methods: (1) the completion of a formal audiovisual course; (2) project participation in methods courses combined with laboratory assignments; (3) experience in an audiovisual laboratory with appropriate space, materials, equipment, and adequate personnel; and (4) liberal use of appropriate materials by teachers of the professional courses in their day-to-day instruction. (p. 494)

The AECT (1982) report of their national study concerning media instruction focused on three of the above described approaches. Their findings were reported as:

“...three basic methods surveyed were (1) the offering of the media course, (2) the interweaving of media instruction in one or more education courses in the curriculum, and (3) requiring media instruction as learning outside of the traditional courses. We found that, in general, 50 percent of the institutions preferred the course method, 44 percent the interwoven curriculum method, and 6 percent the outside learning method.” (p. 34)

Each of the instructional approaches described above either separately or in a variety of combinations has both advantages and disadvantages. One of the things implied, but not emphasized is for the pre-service teacher education student to be given opportunity to develop instructional media competencies in a context that is meaningful to her/his teaching interest. Only as a result of developing a perception of relevance of instructional media will the inservice teacher put out the effort to apply what has been learned.

Summary

From its early beginnings as visual instruction the field of instructional technology and media has progressed as a professional discipline through various stages that reflect the development of the teaching/learning process and of technology. Review and analysis of the definitions and movements or phases that mark the advancement of new knowledge about learning and the application of systems and technology to enhance learning indicates an ever increasing sophistication and complexity regarding the contributions made to the total process of learning by instructional technology.

A review of the literature available indicates a large amount of research and study has been conducted to determine what kind of instructional media is used in the classroom, which media provide what benefits and which do the better job and what instructional media competencies are significant to be taught in pre-service teacher education programs. While there is no absolute conclusion regarding the use of instructional media in the classroom, the general perception is that there is relatively little media used. Attempts have been made to determine the effect the level of training has on the use of instructional media. Of significance is the finding that role modeling in the pre-service methods courses by the professional faculty in teacher education programs has a direct influence on whether a beginning teacher will use media in that subject area.

As new technology and systems have been developed, accompanying research studies have been conducted to provide evidence of the technology's or system's benefit to the teaching/learning process when compared to either traditional

instructional practices or another media format. Some concern has been expressed about claims being made regarding the impact of a medium in and of itself on the learning process. Studies that recognize media as vehicles for learning and that focus on the benefits of their use in terms of reduction of learning time, the increase of the amount of learning in a fixed amount of time or in the accommodation of a variety of learning needs of students indicate that effective use of media can benefit both the teacher and the learner.

Much effort has been expended to determine what competencies are significant for pre-service teachers to learn and which of these competencies are being taught in teacher education programs. Significant contributions to this body of knowledge have been made by Stracke (1932), Meierhenry (1966), McCutcheon (1984) and others over the years. Four general categories of instructional media competencies have been agreed upon, namely: Principles of Communication, Selection, Evaluation and Research; How to Produce Instructional Media; How to Utilize Instructional Media; and How to Operate Media Equipment. Lists of over sixty individual instructional media competencies have been developed for these categories. These instructional media competencies are reflected in the introductory media courses and the textbooks being used in them.

The appropriate instructional approach has also been the topic of research or a component of the course content studies. From the literature review, four general approaches were identified. The formal instructional media course; integration of media competencies in methods courses combined with laboratory

assignments; integration of media competencies in all education courses; and a combination of the above along with experiences in a well designed, staffed and supplied instructional media laboratory were all described as possible answers to the need to teach instructional media competencies to pre-service teachers.

The literature identifies several sources for determining what should be taught in an introductory instructional media course. Studies were conducted to gather information from media instructors, methods course instructors, public school administrators, etc. There were no studies located that did anything more than ask inservice teachers what media they used in the classroom. The implication being that if they use it, it must be important enough to teach others. Nearly all of the studies reviewed seem to consider media or media competencies as being general in nature therefore applicable to all teaching situations or disciplines. No study was found that asked inservice teachers which instructional media competencies they considered important to them on the basis of their teaching discipline. There was no study identified that attempted to consider teaching discipline as a factor in whether instructional media was of value to the teacher in the classroom. This study was designed to answer those questions. It is unique in several ways:

1. It utilizes perceptions and insights developed by practicing, inservice teachers from various disciplines.
2. It offers information regarding the differences between disciplines and the instructional media competencies that inservice teachers would recommend for pre-service teachers of that discipline.

3. It offers insight to the value that inservice teachers place on the use of instructional media in the classroom based on their specific teaching discipline.
4. It offers recommendations of instructional approaches based on teaching disciplines.

CHAPTER 3

DESIGN AND PROCEDURES

This study was an investigation to determine the instructional media competencies that inservice teachers of secondary education teaching disciplines recommend for pre-service teachers in their discipline. The primary purpose of this study was to identify the instructional media competencies common to all teaching disciplines. These could be used to form the core content of an introductory instructional media course. In addition, the media competencies unique to each discipline were identified. These could be used for teaching discipline emphasis within the media course. Consideration was also given to the perceived value of instructional media use in the classroom, length of tenure as a teacher and the teaching location namely Hawaii, Oregon and Utah . Recommendations were studied relative to the instructional approach, i.e., formal course approach, integrated methods course approach or combination approach in relation to teaching discipline.

Statement of Hypothesis

The results of this study determine the retention or rejection of the following null hypotheses:

- H₀ 1. There is no significant difference in the recommendation of instructional media competencies among teachers in the secondary education teaching disciplines.
- H₀ 2. There is no significant difference in the perceived value of instructional media use in the classroom among teachers in secondary education teaching disciplines.

H₀ 3. There is no significant difference in the recommended instructional approach among teachers in secondary education teaching disciplines.

Research Questions

The study gave additional consideration to the following research questions each related to the instructional media competency recommendations and teaching disciplines.

1. Is there a difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on the state in which they are teaching?
2. Is there any difference in the recommendations of instructional media competencies among all teachers in Hawaii, Oregon or Utah?
3. Is there a difference in the perceived value of instructional media use in the classroom among teachers in secondary education teaching disciplines based on the state in which they are teaching?
4. Is there any difference in instructional media competency recommendations based on perceived value of media use in the classroom?
5. Is there any difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on perceived value of media use in the classroom?
6. Is there any difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on years of teaching experience?
7. Is there any difference in the factors for media non-use among teachers in secondary education teaching disciplines?

Population and Sample

The population of this study was inservice teachers of secondary education disciplines from public schools in the states of Hawaii, Oregon and Utah. A stratified sample of teachers was identified by randomly selecting schools from the states of the study. To control for the effects of school size and location, schools of comparable size from comparable areas (i.e., urban, rural, population size, etc.) were matched among states.

Preparation of the Instrument

The instrument was a mail administered questionnaire. It consisted of instructional media competencies combined with a six point continuous rating scale ranging from not recommended to recommended. This allowed the respondent to judgmentally recommend the inclusion of each competency in a pre-service teacher education program.

The development of the instrument was accomplished in three stages:

1. Related literature; (Stracke (1932), deBernardis and Brown (1946), Jensen (1986), Meierhenry (1966), Okoboji (1959) and Streeter (1969); were studied to identify lists of media competencies commonly accepted in the field. Current course syllabi from selected universities and colleges offering introductory instructional media courses (see description of pilot study, page 13) and current instructional media text books were also surveyed to refine and finalize the list of competencies. (See Table 3.1) In addition to the list of competencies, consideration was given to specific demographic information, ie., location of school, school type, number of years teaching, school enrollment, number of credit hours

completed in instructional media. Questions regarding value of instructional media use in the classroom, instructional approaches for teaching instructional media competencies and factors leading to non-use of media were also identified and formatted into the questionnaire design.

2. A jury panel of experts (see Appendix A) was selected that consisted of instructional media specialists and instructors as well as research specialists with expertise in questionnaire development. Using a modified Delphi procedure, the panel members were asked to respond to the list of competencies on the questionnaire. They were asked to reject, modify, add to or retain the competencies significant to the development of media skills for pre-service teacher education students. They were also asked to respond to the format and design of the questionnaire and to modify, add to or retain the additional questions included in the questionnaire. Their responses were used to complete the finalized questionnaire. All of the members of the panel responded. A review of the responses indicated a seventy-five percent agreement regarding the design, format and selection of competencies and questions.

3. The final questionnaire (see Appendix B) was reviewed by a research consultant for final recommendations. The questionnaire was then submitted to the panel for final acceptance or rejection. No panel members responded with further suggestions.

Table 3.1: Fifty-six Instructional Media Competencies

I. Principles of Communication, Selection, Evaluation and Research

1. Communication Theory
2. Design and Layout of Visual Materials
3. Instructional Design Theory and Practice
4. Media Selection and Evaluation Criteria
5. Impact of Technology on Education
6. Implications of Instructional Media Research
7. Future Trends of Media and Technology in Education
8. Copyright Laws and Education

II. How to PRODUCE Instructional Media Materials

9. Lettering for Instructional Materials
10. Mounting Visuals
11. Laminating Visuals
12. Machine Produced Overhead Transparencies
13. Handmade Overhead Transparencies
14. Display Boards (Bulletin Boards, Displays, etc.)
15. Duplicating Inst. Materials (Dittos, Xerox, etc.)
16. Illustration and Enlargement Techniques
17. Manipulatives (Mathematic materials, etc.)
18. Audio Recording
19. Video Recording (off-air recording)
20. Video Programming (Producing own programs)
21. Still photography
22. Slide/tape programs
23. Computer Assisted Instruction
24. Computer Programming
25. Computer Graphics
26. Games, simulations and media kits

III. How to UTILIZE Instructional Media Materials

27. Non-projected visuals
28. Overhead Transparencies
29. Display Boards (Bulletin Boards, etc.)
30. Flip Charts
31. Chalkboards
32. Duplicated Materials (Dittos, Xerox, etc.)
33. Manipulatives (Mathematic materials, etc.)
34. Audio Recordings
35. Instructional Films and Videos (tape & disc)
36. Broadcast Television
37. Slides
38. Filmstrips
39. Computer Assisted Instruction
40. Computer Interactive Video Programs
41. Games and Simulations
42. Free and Inexpensive Materials
43. Field Trips and Community Resources

IV. How to OPERATE Instructional Media Equipment

44. Overhead Projectors
 45. Spirit Duplicators (Ditto)
 46. Opaque Projectors
 47. Cassette Tape Recorders
 48. Record Players
 49. Video Tape Recorders
 50. Video Camcorder Systems
 51. Video Editing Systems
 52. 16mm Motion Picture Projectors
 53. 2X2 Slide Projectors
 54. Filmstrip Projectors
 55. Computer Interactive Video Systems
 56. Microcomputer Overhead Projector LCD Systems
-
-

The Dependent Variable

The first dependent variable of this study was the mean of the score assigned by respondents indicating the level of recommendation of instructional media competencies for inclusion in a pre-service teacher education program. The second dependent variable was the score assigned by respondents indicating the perceived value of instructional media use in the classroom. The third dependent variable was the score assigned by respondents indicating the level of recommendation for an instructional approach. Inservice teachers of secondary education teaching disciplines were asked to determine a level of recommendation for each instructional media competency, value of instructional media use and recommendation of instructional approach. The following six point scale with responses ranging from a low of 0 to a high of 5.0 was used for each competency and value question:

Not Recommended						Highly Recommended
0	1	2	3	4	5	
(No Value)						(Highly Valued)

The decision to utilize a six point continuous scale rather than a five point Likert-type scale was based on discussions relative to teacher evaluation studies. The use of this type of scale allows the respondent to determine a score based on a “ranking” of perception of the competency rather than a “categorical” decision. This scale also makes it necessary for the respondent to make a decision toward or away from recommendation without option for a “neutral” response. The instructional approach section of the questionnaire

asked the respondents to rank from 1st to 5th a set of predetermined instructional approaches along with a blank line labeled “other” for write-in responses.

The Independent Variable

The first independent variable of this study was the secondary education teaching discipline. There were thirteen teaching disciplines identified on the questionnaire; however, only twelve were used for the study. Two, “Computer Science” and “Mathematics” were combined as described below. The second independent variable was “years teaching.” While the initial statement on the questionnaire required an open response it was possible to group them into two groups, “few years” and “many years.” The third independent variable was state location, namely Hawaii, Oregon or Utah. A fourth independent variable was created by recoding the data for perceived value of instructional media use in the classroom into three categories. Responses from “0-3” were recoded to 1, while response “4” became 2 and response “5” became 3. This made it possible to look at the influence of each group of perceived value of instructional media use in the classroom upon secondary education teaching disciplines recommendations of instructional media competencies.

The Statistical Design

This study was an investigation to determine the instructional media competencies that inservice teachers of secondary education teaching disciplines recommend for pre-service teachers in their discipline. The primary purpose of this study was to identify the

instructional media competencies common to all teaching disciplines. These could be used to form the core content of an introductory instructional media course. In addition, the media competencies unique to each discipline were identified. These could be used for teaching discipline emphasis within the media course. In addition, consideration was given to the perceived value of instructional media use in the classroom, length of tenure as a teacher and the teaching location namely Hawaii, Oregon and Utah . Recommendations were also studied relative to the instructional approach, i.e., formal course approach, integrated methods course approach or combination approach in relation to teaching discipline. The design of the study included the following:

1. The population consisted of in-service teachers of secondary education teaching disciplines from public schools in the states of Hawaii, Oregon and Utah. A random numbers list was computer generated. Using current state school directories twenty-five (25) schools were randomly selected from each state. Each list of schools was reviewed for a match of size and location, ie., rural, urban and metropolitan. A mailing list was computer generated for each of thirteen disciplines for each school. A total of three-hundred and twenty-five (325) mailings for each state or a total of nine-hundred and seventy-five (975) was prepared.

Using the procedures outlined by Dillman (1978) a questionnaire was mailed to teachers of the secondary education teaching disciplines. A cover letter (see Appendix C) was included explaining the purpose of the study and the importance of each response to the success of the study. Each questionnaire was numbered for follow-up purposes. A business reply envelope was

included for return of the questionnaire. All the questionnaires were mailed on the same day.

Following Dillman's (1978) procedure a post-card follow-up reminder (see Appendix D) was prepared and mailed to all teachers in the study exactly one week after the first mailing.

As the questionnaires were returned they were checked off against the original mailing list. The intent was to send a second mailer with questionnaire to those not responding within a three week period. This was not accomplished due to the lack of time before the end of public school in the three states of the study.

Originally there were thirteen (13) secondary education teaching disciplines identified. As the questionnaires were returned and checked off it was noticed that there were very few being returned from "Computer Science" teachers. Most of the ones that were identified as "Computer Science" teachers had been addressed to "Mathematics" teachers. It was also observed that many being returned from "Mathematics" teachers had actually been addressed to "Computer Science" teachers. It was decided that for purposes of this study it would be appropriate to combine the teaching discipline category "Computer Science" with "Mathematics". The combined category was entitled "Mathematics/ Computer Science." This resulted in twelve secondary education teaching disciplines for the study.

A period of one week was allowed to lapse after receiving what seemed to be the last response before the data were compiled and submitted for computer analysis. At the time of data compilation four-hundred and sixteen (416) or 43% of the total questionnaires had been returned. All questionnaires were usable and were

included in the data pool. Of the four-hundred and sixteen (416) returns one-hundred and fifty-three (153) were from Hawaii. This represents a 47% return rate. There were one-hundred and twenty-six (126) from Oregon for a 39% return. Utah had one-hundred and thirty-seven (137) or a 42% return. The numbers returned were good considering only one follow-up reminder was sent. There were four additional questionnaires returned after the data were compiled and submitted. They were left out of the study. (See Table 3.2 for response frequencies by teaching discipline and location.)

2. The respondents were asked to make recommendations for instructional media competencies, perceived value of instructional media use in the classroom and recommendations of an instructional approach. The responses were recorded using a six point continuous scale, with values ranging from a low of 0 to a high of 5.0.

The data from the questionnaires were transferred to computer by the writer. The raw data were stored in disk form and then transferred to the university main frame Prime Computer for analysis. The analysis files were created and computed using the Statistical Package for Social Sciences-X (SPSSX) release 3.0.

3. The one-way analysis of variance was selected as the statistical analysis to test the three null hypotheses because they require the contrasting of two (2) or more means. According to Courtney (1984), the ANOVA provides a robust test when the following assumptions are met:

1. the data are derived from normally distributed populations.
2. the variances are common or equal or ratioed proportionally (i.e., where the variance for one group is directly proportional to the variance of the second group) for all groups.

3. the data are gathered from samples of individuals which have been randomly drawn from their respective populations. (p. 291)

The data for this study met the assumptions described above.

Table 3.2: Response Frequencies

	HAWAII	OREGON	UTAH	TOTAL
Art	9	8	12	29
Business	11	9	13	33
Foreign Language	17	8	14	39
Health	15	11	12	38
Home Economics	9	17	15	41
Industrial Arts	9	7	8	24
Language Arts	15	7	14	36
Math/Computer Science	26	16	16	58
Music	9	11	8	28
Physical Education	12	11	7	30
Science	12	16	10	38
Social Science	9	5	8	22
Total	153	126	137	416

Courtney (1984), further presents the mathematical model for the one-way analysis as follows:

$$Y_{ij} = \mu + \alpha_i + \varepsilon_{ij}$$

where, μ is a fixed by an unknown constant,

α_i is the effect of the condition being studied,

ε_{ij} is a random variable characterized as being normally and independently distributed with a mean equal to zero and variance equal to σ^2 . (p.292-3)

This model allows for the isolation of the influence of the condition, in this case the influence of teaching discipline, on the the dependent variable or the recommendations of instructional media competencies, perceived value of instructional media use in the classroom and appropriate instructional approach.

While the analysis of variance is a very powerful test to determine significant difference, Courtney (1984) describes the need for additional testing.

“In the analysis of variance, in instances where three or more means are involved, if the hypothesis that the means are equal is retained, no further tests are necessary. That is, if the means are found to be equal, then the researcher merely stops at that point and makes no further analysis. However, if the hypothesis is rejected, then the decision must be clarified regarding whether all or some of the means are different from each other. The analysis of variance does not provide for individual mean comparisons with every other mean being considered; it only looks at the overall groups of means together. Hence, further tests may be needed in order to separate out those individual means which are significantly different, along with those which are not different.” (p. 337)

Ott (1977) further explains that, “multiple comparison procedures have been developed to answer questions such as these.” (p.392) For this study the Duncan Multiple Range Test was

utilized to determine which of the means of the teaching disciplines differed significantly for each of the instructional media competencies. Ott (1977) describes the Duncan Multiple Range Test as being "...very powerful. That is, there is a high probability of declaring a difference when there is actually a difference between the population means." (p. 393) All ANOVA's that tested significantly were further tested using the Duncan procedure.

In addition to the one-way analysis of variance as described above, the t-Test was also used to develop information regarding one of the research questions (number 6) described above. The t-Test, as described by Courtney (1984), "...is a robust statistical method which is used for contrasting differences between two groups of data derived from interval scales." (p. 245)

A series of one-way analysis of variance, Duncan Multiple Range Tests, t-tests and cross tabulations were computed to test the hypotheses and research questions described above. (See Chapter 4 - FINDINGS AND ANALYSIS OF DATA for description of the results.) A total of six-hundred and eighty (680) one-way ANOVA's were computed. A total of six-hundred and seventy-two t-test's were completed. A series of cross tabulation tables and mean's tables were also completed.

4. The F Test was used to test the significance of the analysis. The alpha level for significance was set at $p=.05$ for all one-way ANOVA's. For informational purposes the t-Test results were compiled for $p=.10$ as well as $p=.05$.

5. Utilization of the data and information compiled requires more than quantitative analysis. The objective of the study is to develop a series of competency lists that are, first, common to

all secondary education teaching disciplines and that are, second, unique to each teaching discipline or groups of disciplines. This requires reviewing the data and making qualitative judgments about the importance of each competency by teaching discipline.

Summary

This study was designed to collect data regarding recommendations of instructional media competencies by teachers of secondary education teaching disciplines. Secondary education teachers of twelve different teaching disciplines were randomly selected from schools in three states, namely Hawaii, Oregon and Utah. Four hundred and sixteen (416) responded to a mail administered questionnaire. A series of one-way analysis of variance with Duncan Multiple Range Tests, t-Tests, cross tabulations and means tables were computed to determine any significant differences in the recommendations of fifty-six (56) instructional media competencies among teachers in secondary education teaching disciplines from the states of Hawaii, Oregon and Utah.

CHAPTER 4

FINDINGS AND ANALYSIS OF DATA

Responses to the questionnaire (Appendix B) elicited from teachers in secondary education teaching disciplines within selected states were compiled for computer analysis using the SPSSX release 3.0 statistical package. The findings were used to test the significance of the following null hypothesis:

- H₀ 1. There is no significant difference in the recommendation of instructional media competencies among teachers in the secondary education teaching disciplines.
- H₀ 2. There is no significant difference in the perceived value of instructional media use in the classroom among teachers in secondary education teaching disciplines.
- H₀ 3. There is no significant difference in the recommended instructional approach among teachers in secondary education teaching disciplines.

The data were further analyzed to obtain information relative to the following research questions:

1. Is there a difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on the state in which they are teaching?
2. Is there any difference in instructional media competency recommendations among all teachers in Hawaii, Oregon or Utah?
3. Is there a difference in the perceived value of instructional media use in the classroom among teachers in secondary education teaching disciplines based on the state in which they are teaching?

4. Is there any difference in instructional media competency recommendations based on perceived value of instructional media use in the classroom?
5. Is there any difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on perceived value of instructional media use in the classroom?
6. Is there any difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on years of teaching experience?
7. Is there any difference in the factors for media non-use among teachers in secondary education teaching disciplines?

(See Table 4.1 for relationships of factors being compared in each research question presented above.)

Results

H₀ 1. There is no significant difference in the recommendation of instructional media competencies among teachers in the secondary education teaching disciplines.

A one-way analysis of variance was computed for each of fifty-six (56) instructional media competencies plus four (4) "other" categories. (See Table 3.1) (The four "other" categories produced no responses on the returns so they were disregarded in the analysis.) Of the fifty-six ANOVA's completed, thirty-six (36) or 64% indicated a significant difference in recommendations of instructional media competencies between teachers in the secondary education teaching disciplines at the .05 level of confidence or above. For these competencies null hypothesis H₀ 1 is rejected. Twenty (20) or 36% indicated no significant difference. For these competencies null hypothesis H₀ 1 is retained.

Table 4.1 Research Question Factors of Comparison

● = Factors being compared

	Media Comp.	Total Teachers	Teacher Discipline	Teaching Location	Value of Media	Years of Exper.	Factors of Non-use
1. Is there a difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on the state in which they are teaching?	●		●	●			
2. Is there any difference in instructional media competency recommendations among all teachers in Hawaii, Oregon or Utah?	●	●		●			
3. Is there a difference in the perceived value of instructional media use in the classroom among teachers in secondary education teaching disciplines based on the state in which they are teaching?			●	●	●		
4. Is there any difference in instructional media competency recommendations based on perceived value of instructional media use in the classroom?	●	●			●		
5. Is there any difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on perceived value of instructional media use in the classroom?	●		●		●		
6. Is there any difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on years of teaching experience?	●		●			●	
7. Is there any difference in the factors for media non-use among teachers in secondary education teaching disciplines?			●				●

In order to determine which means of the teaching disciplines differed significantly, a Duncan Multiple Range Test was computed for each competency indicating significant difference. Table 4.2 lists all fifty-six competencies with each "F-ratio" and "F-probability" of significance. The "Population Mean" is also included for comparative purposes. Table 4.3* lists the thirty-six competencies indicating significant difference with the results of the Duncan Multiple Range Test.

*(In order to conserve space, the ANOVA displays have been modified by presenting only the "F-Ratio" and the "F-Probability". The "Population Mean" has been included for comparative purposes.)

Table 4.2 ANOVA Summary: Instructional Media Competencies

* = Indicates Significant Difference at or above .05	Population Mean	F-Ratio	F-Prob.
I. Principles of Communication, Selection, Evaluation and Research			
1. Communication Theory	3.2596	1.4477	.1490
2. Design and Layout of Visual Materials	3.6322	1.2949	.2246
3. Instructional Design Theory and Practice	3.2188	1.6033	.0952
4. Media Selection and Evaluation Criteria	3.5529	1.3788	.1800
5. Impact of Technology on Education	3.6538	2.7367	.0020 *
6. Implications of Instructional Media Research	2.9447	.4324	.9413
7. Future Trends of Media and Technology in Education	3.6538	.5140	.9413
8. Copyright Laws and Education	3.6274	1.4360	.1539
II. How to PRODUCE Instructional Media Materials			
9. Lettering for Instructional Materials	3.3702	2.0442	.0234 *
10. Mounting Visuals	3.3942	2.7028	.0023 *
11. Laminating Visuals	3.4471	2.0617	.0221 *
12. Machine Produced Overhead Transparencies	3.7909	.8752	.5649
13. Handmade Overhead Transparencies	3.7043	.8295	.6105
14. Display Boards (Bulletin Boards, Displays, etc.)	3.7019	2.6548	.0027 *
15. Duplicating Inst. Materials (Dittos, Xerox, etc.)	3.8918	.3884	.9604
16. Illustration and Enlargement Techniques	3.6587	1.9147	.0360 *
17. Manipulatives (Mathematics materials, etc.)	2.9760	7.2077	.0000 *
18. Audio Recording	3.2861	5.6204	.0000 *
19. Video Recording (off-air recording)	3.7139	3.0169	.0007 *
20. Video Programming (Producing own programs)	3.5240	4.3790	.0000 *
21. Still photography	2.7139	4.6700	.0000 *
22. Slide/tape programs	3.0505	3.2877	.0002 *

Table 4.2 ANOVA Summary: Instructional Media Competencies (cont.)

* = Indicates Significant Difference at or above .05	Population Mean	F-Ratio	F-Prob.
II. How to PRODUCE Instructional Media Materials (cont.)			
23. Computer Assisted Instruction	4.2476	1.0336	.4155
24. Computer Programming	3.5361	.6284	.8047
25. Computer Graphic	3.9087	1.9404	.0331 *
26. Games, simulations and media kits	3.5168	4.1389	.0000 *
III. How to UTILIZE Instructional Media Materials			
27. Non-projected visuals	3.1899	1.9897	.0281 *
28. Overhead Transparencies	3.8053	2.2802	.0104 *
29. Display Boards (Bulletin Boards, etc.)	3.6178	1.9276	.0345 *
30. Flip Charts	2.8125	1.7690	.0573
31. Chalkboards	3.5313	.4943	.9068
32. Duplicated Materials (Dittos, Xerox, etc.)	3.7957	1.0057	.4403
33. Manipulatives (Mathematics materials, etc.)	3.0168	5.5755	.0000 *
34. Audio Recordings	3.2380	7.0725	.0000 *
35. Instructional Films and Videos (tape & disc)	3.9183	2.9852	.0008 *
36. Broadcast Television	3.3534	1.5908	.0988
37. Slides	3.0986	5.0045	.0000 *
38. Filmstrips	3.0962	4.8241	.0000 *
39. Computer Assisted Instruction	4.1635	1.4610	.1436
40. Computer Interactive Video Programs	3.9279	1.1916	.2906
41. Games and Simulations	3.5721	3.8645	.0000 *
42. Free and Inexpensive Materials	4.0697	2.2720	.0107 *
43. Field Trips and Community Resources	3.9760	1.8556	.0435 *

Table 4.3 Thirty-six Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
5. Impact of Technology on Education	3.6538	2.7367	.0020

Duncan Multiple Range Test

<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>		Language Arts	Social Science	Health	Music	Home Economics	Math/Comp. Sc.	Science	Foreign Language	P.E.	Art	Business	Industrial Arts
Mean	Disciplines												
3.2500	Language Arts												
3.3636	Social Science												
3.3684	Health												
3.3929	Music												
3.4878	Home Economics												
3.5517	Math/Comp. Sc.												
3.5526	Science												
3.6410	Foreign Language												
3.9333	P.E.												
4.0690	Art	●	●	●									
4.1818	Business	●	●	●	●	●	●						
4.4167	Industrial Arts	●	●	●	●	●	●	●	●				

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
9. Producing Lettering for Instructional Materials	3.3702	2.0442	.0234

Duncan Multiple Range Test

		● - Indicates pairs of disciplines significantly diff. at or above .05											
Mean	Disciplines	Social Science	Music	Science	Math/Comp. Sc.	Foreign Language	Business	Health	Industrial Arts	Art	P.E.	Language Arts	Home Economics
2.9545	Social Science												
3.0714	Music												
3.0789	Science												
3.0862	Math/Comp. Sc.												
3.2308	Foreign Language												
3.2424	Business												
3.4474	Health												
3.4583	Industrial Arts												
3.6207	Art												
3.6333	P.E.												
3.8056	Language Arts	●	●	●	●								
3.8293	Home Economics	●	●	●	●								

Duncan Multiple Range Test

Duncan Multiple Range Test

[illegible]

Table 4.3 Thirty-six Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
14. Producing Display Boards (Bulletin Boards, Displays, etc.)	3.7019	2.6548	.0027

Duncan Multiple Range Test

		● - Indicates pairs of disciplines significantly diff. at or above .05											
Mean	Disciplines	Industrial Arts	Science	Math/Comp. Sc.	Music	Business	Social Science	Foreign Language	Language Arts	Art	Health	P.E.	Home Economics
3.0417	Industrial Arts												
3.8684	Science												
3.5172	Math/Comp. Sc.												
3.6071	Music												
3.6364	Business												
3.6364	Social Science												
3.6410	Foreign Language												
3.7778	Language Arts	●											
3.7931	Art	●											
3.9474	Health	●											
4.1667	P.E.	●	●	●									
4.1707	Home Economics	●	●	●									

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
16. Illustration and Enlargement Techniques	3.6587	1.9147	.0360

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Music	Math/Comp. Sc.	Industrial Arts	Language Arts	Social Science	Health	Science	Business	Foreign Language	Art	P.E.	Home Economics
3.0714	Music												
3.3966	Math/Comp. Sc.												
3.5000	Industrial Arts												
3.5278	Language Arts												
3.5909	Social Science												
3.6053	Health												
3.6842	Science												
3.7273	Business												
3.7436	Foreign Language												
3.9310	Art	●											
3.9333	P.E.	●											
4.1707	Home Economics	●	●	●	●								

Duncan Multiple Range Test

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
18. Producing Audio Recording	3.2861	5.6204	.0000

[illegible]

Table 4.3 Thirty-six Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
19. Video Recording (off-air recording)	3.7139	3.0169	.0007

Duncan Multiple Range Test

		<div> ● - Indicates pairs of disciplines significantly diff. at or above .05 </div>										
Mean	Disciplines	Math/Comp. Sc.	Business	Art	Home Economics	Health	Science	Social Science	Language Arts	Industrial Arts	Foreign Language	P.E.
3.1379	Math/Comp. Sc.											
3.3333	Business											
3.4828	Art											
3.6585	Home Economics	●										
3.6442	Health	●										
3.8158	Science	●										
3.8182	Social Science	●										
3.8611	Language Arts	●										
3.9167	Industrial Arts	●										
3.9744	Foreign Language	●										
4.1000	P.E.	●	●									
4.3571	Music	●	●	●	●							

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
20. Video Programming (Producing own programs)	3.5240	4.3790	.0000

Duncan Multiple Range Test

		<div> ● - Indicates pairs of disciplines significantly diff. at or above .05 </div>										
Mean	Disciplines	Math/Comp. Sc.	Business	Health	Art	Science	Social Science	Home Economics	Industrial Arts	Music	Language Arts	P.E.
2.8793	Math/Comp. Sc.											
2.9697	Business											
3.2368	Health											
3.3793	Art											
3.4211	Science											
3.5000	Social Science											
3.5366	Home Economics	●										
3.6667	Industrial Arts	●										
3.9643	Music	●	●	●								
3.9722	Language Arts	●	●	●								
4.1333	P.E.	●	●	●	●	●						
4.1538	Foreign Language	●	●	●	●	●						

Table 4.3 Thirty-six Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
25. Producing Computer Graphics	3.9087	1.9404	.0331

Duncan Multiple Range Test

		● - Indicates pairs of disciplines significantly diff. at or above .05											
Mean	Disciplines	Social Science	Music	Foreign Language	Language Arts	Home Economics	Health	P.E.	Science	Math/Comp. Sc.	Industrial Arts	Business	Art
3.4545	Social Science												
3.5000	Music												
3.5897	Foreign Language												
3.6389	Language Arts												
3.8537	Home Economics												
3.9737	Health												
4.0000	P.E.												
4.0263	Science												
4.0690	Math/Comp. Sc.												
4.0833	Industrial Arts												
4.1515	Business												
4.4138	Art	●	●	●	●								

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
26. Producing Games, simulations and Media kits	3.5168	4.1389	.0000

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Industrial Arts	Music	Art	Language Arts	Math/Comp. Sc.	Science	Business	Social Science	Health	P.E.	Foreign Language	Home Economics
2.7917	Industrial Arts												
2.8929	Music												
3.0000	Art												
3.3333	Language Arts												
3.4138	Math/Comp. Sc.												
3.4474	Science												
3.4545	Business												
3.6364	Social Science	●											
3.7105	Health	●	●	●									
3.7667	P.E.	●	●	●									
4.1282	Foreign Language	●	●	●	●	●	●	●					
4.1463	Home Economics	●	●	●	●	●	●	●					

Table 4.3 Thirty-six Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
27. Utilizing Non-projected Visuals	3.1899	1.9897	.0281

Duncan Multiple Range Test

		<div> ● - Indicates pairs of disciplines significantly diff. at or above .05 </div>									
Mean	Disciplines	Health	Business	Music	P.E.	Industrial Arts	Math/Comp. Sc.	Art	Language Arts	Social Science	Home Economics
2.6842	Health										
2.7576	Business										
2.9643	Music										
3.0667	P.E.										
3.1250	Industrial Arts										
3.1379	Math/Comp. Sc.										
3.1724	Art										
3.1944	Language Arts										
3.2727	Social Science										
3.5122	Home Economics	●	●								
3.5263	Science	●	●								
3.7179	Foreign Language	●	●								

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
28. Utilizing Overhead Transparencies	3.8053	2.2802	.0104

Duncan Multiple Range Test

		<div> ● - Indicates pairs of disciplines significantly diff. at or above .05 </div>									
Mean	Disciplines	Industrial Arts	Music	P.E.	Social Science	Art	Health	Science	Home Economics	Foreign Language	Language Arts
3.2917	Industrial Arts										
3.3214	Music										
3.4667	P.E.										
3.5909	Social Science										
3.6207	Art										
3.6316	Health										
3.8421	Science										
3.9756	Home Economics	●	●								
4.0000	Foreign Language	●	●								
4.0000	Language Arts	●	●								
4.1034	Math/Comp. Sc.	●	●	●							
4.1818	Business	●	●	●							

Table 4.3 Thirty-six Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
37. Utilizing Slides	3.0986	5.0045	.0000

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Math/Comp. Sc.	Music	Business	Health	P.E.	Industrial Arts	Social Science	Language Arts	Foreign Language	Home Economics	Science	Art
2.3966	Math/Comp. Sc.												
2.5000	Music												
2.6970	Business												
3.0000	Health	●											
3.1000	P.E.	●											
3.1667	Industrial Arts	●											
3.1818	Social Science	●											
3.1944	Language Arts	●	●										
3.4615	Foreign Language	●	●	●									
3.4634	Home Economics	●	●	●									
3.4737	Science	●	●	●									
3.9310	Art	●	●	●	●	●	●	●	●				

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
38. Utilizing Filmstrips	3.0962	4.8241	.0000

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Math/Comp. Sc.	Business	Music	Science	Foreign Language	Language Arts	Health	P.E.	Industrial Arts	Social Science	Home Economics	Art
2.3276	Math/Comp. Sc.												
2.7576	Business												
2.7857	Music												
2.8158	Science												
3.1282	Foreign Language	●											
3.1389	Language Arts	●											
3.2895	Health	●											
3.3000	P.E.	●											
3.3333	Industrial Arts	●											
3.3636	Social Science	●											
3.7073	Home Economics	●	●	●	●								
3.8621	Art	●	●	●	●	●	●						

Table 4.3 Thirty-six Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
46. Operating Opaque Projectors	3.1683	2.3282	.0088

Duncan Multiple Range Test

		<div> ● - Indicates pairs of disciplines significantly diff. at or above .05 </div>									
Mean	Disciplines	Business	Industrial Arts	Music	Science	Math/Comp. Sc.	Foreign Language	Health	Language Arts	P.E.	Art
2.3333	Business										
2.8750	Industrial Arts										
2.8929	Music										
2.9474	Science										
3.1034	Math/Comp. Sc.	●									
3.1282	Foreign Language	●									
3.2368	Health	●									
3.2778	Language Arts	●									
3.4000	P.E.	●									
3.5517	Art	●									
3.6364	Social Science	●									
3.6829	Home Economics	●									

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
47. Operating Cassette Tape Recorders	3.3966	2.0311	.0245

Duncan Multiple Range Test

		<div> ● - Indicates pairs of disciplines significantly diff. at or above .05 </div>									
Mean	Disciplines	Math/Comp. Sc.	Science	Business	Health	Industrial Arts	Language Arts	Foreign Language	Home Economics	P.E.	Art
2.9483	Math/Comp. Sc.										
3.0263	Science										
3.2424	Business										
3.3158	Health										
3.3333	Industrial Arts										
3.3333	Language Arts										
3.4872	Foreign Language										
3.5122	Home Economics										
3.5667	P.E.										
3.6552	Art										
4.0000	Music	●	●								
4.0455	Social Science	●	●								

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
48. Operating Record Players	2.9567	2.8666	.0012

Duncan Multiple Range Test

Mean	Disciplines	Business	Math/Comp. Sc.	Science	Foreign Language	Industrial Arts	Health	Language Arts	Art	P.E.	Home Economics	Social Science	Music
2.5152	Business												
2.5172	Math/Comp. Sc.												
2.6053	Science												
2.7436	Foreign Language												
2.7500	Industrial Arts												
3.0000	Health												
3.0000	Language Arts												
3.1034	Art												
3.1333	P.E.												
3.2439	Home Economics	●	●										
3.7273	Social Science	●	●	●	●	●							
3.8571	Music	●	●	●	●	●	●	●					

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
49. Operating Video Tape Recorders	4.1442	2.1919	.0142

Duncan Multiple Range Test

[illegible]

Table 4.3 Thirty-six Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
52. Operating 16mm Motion Picture Projectors	3.2668	2.6387	.0029

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Industrial Arts	Math/Comp. Sc.	Business	Language Arts	Music	Foreign Language	Art	Science	P.E.	Home Economics	Health	Social Science
2.7500	Industrial Arts												
2.8621	Math/Comp. Sc.												
2.9697	Business												
3.0000	Language Arts												
3.0000	Music												
3.2308	Foreign Language												
3.2414	Art												
3.4211	Science												
3.6333	P.E.	●	●										
3.6829	Home Economics	●	●										
3.6842	Health	●	●										
3.9545	Social Science	●	●	●	●	●							

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
53. Operating 2x2 Slide Projectors	2.9663	2.3053	.0095

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Industrial Arts	Business	Language Arts	Music	Math/Comp. Sc.	Science	Foreign Language	Health	Home Economics	P.E.	Social Science	Art
2.4583	Industrial Arts												
2.5758	Business												
2.6389	Language Arts												
2.6429	Music												
2.7241	Math/Comp. Sc.												
2.9737	Science												
3.0769	Foreign Language												
3.0789	Health												
3.0976	Home Economics												
3.3333	P.E.												
3.5909	Social Science	●	●	●	●	●							
3.6897	Art	●	●	●	●	●							

Table 4.3 Thirty-six Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
54. Operating Filmstrip Projectors	3.1250	3.1345	.0004

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Science	Math/Comp. Sc.	Business	Language Arts	Music	Foreign Language	Industrial Arts	Health	P.E.	Art	Home Economics	Social Science
2.6053	Science												
2.7414	Math/Comp. Sc.												
2.8485	Business												
2.8611	Language Arts												
2.9643	Music												
3.0256	Foreign Language												
3.0417	Industrial Arts												
3.3421	Health	●											
3.4000	P.E.	●											
3.6552	Art	●	●	●	●								
3.6829	Home Economics	●	●	●	●								
3.8636	Social Science	●	●	●	●	●	●						

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
56. Operating Microcomputer Overhead Projector LCD Systems	3.9063	2.1828	.0146

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Music	Language Arts	Health	Home Economics	Foreign Language	Art	P.E.	Science	Social Science	Industrial Arts	Math/Comp. Sc.	Business
3.1429	Music												
3.6111	Language Arts												
3.6316	Health												
3.6585	Home Economics												
3.7949	Foreign Language												
3.9655	Art	●											
3.9667	P.E.	●											
4.0263	Science	●											
4.0909	Social Science	●											
4.1250	Industrial Arts	●											
4.3276	Math/Comp. Sc.	●	●	●	●								
4.3636	Business	●	●	●	●								

H₀ 2. There is no significant difference in the perceived value of instructional media use in the classroom among teachers in secondary education teaching disciplines.

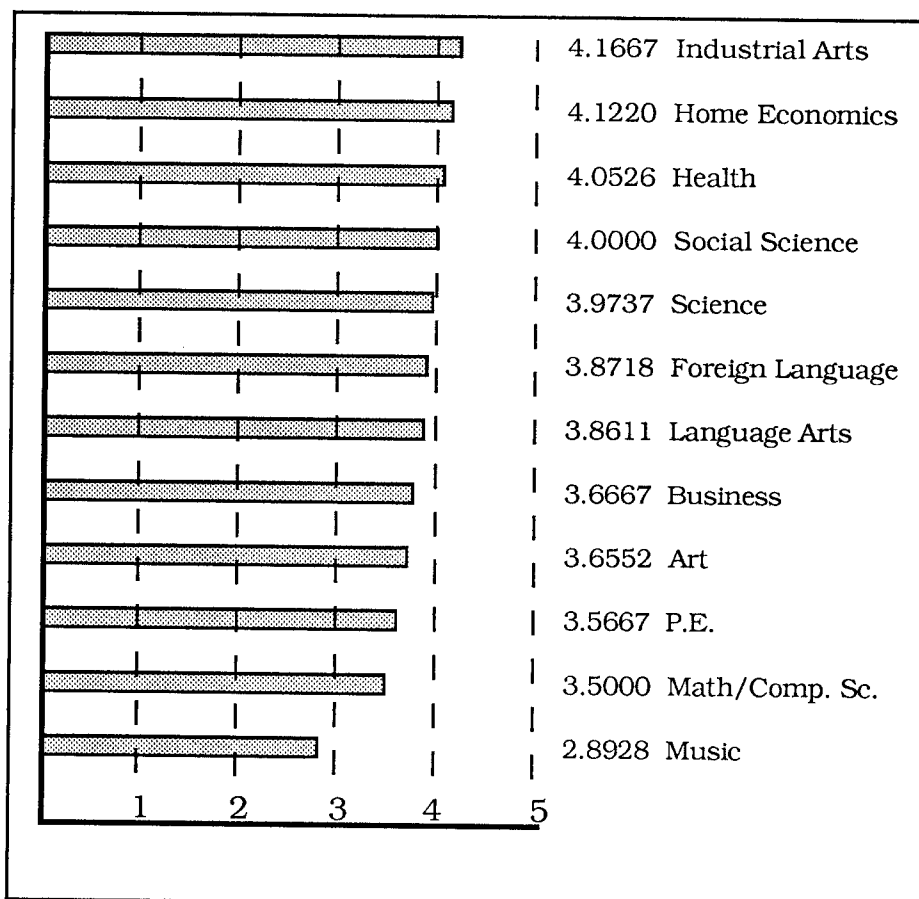
A one-way analysis of variance was computed along with the Duncan Multiple Range Test. A significant difference was indicated among how the teaching disciplines perceive the value of instructional media use in the classroom. Null hypothesis H₀ 2 is rejected at the .0002 level of confidence. The results of the Duncan Multiple Range Test indicate that Industrial Arts teachers have the highest perceived value of instructional media use in the classroom with a mean of 4.17 while Music teachers with a mean of 2.90 have the lowest perceived value of instructional media use in the classroom. Eleven of the teaching disciplines (Industrial Arts, Home Economics, Health, Social Sciences, Sciences, Foreign Languages, Language Arts, Business, Art, Physical Education and Mathematics/Computer Science) were significantly different from Music. Three of the teaching disciplines (Industrial Arts, Home Economics and Health) were significantly different than Mathematics/Computer Science and Music. Table 4.4 displays the ANOVA and the Duncan Multiple Range Test. Table 4.5 displays the relative ranking of teaching disciplines by perceived value of instructional media use in the classroom.

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between	11	43.0728	3.9157	3.3681	.0002
Withir	404	469.6868	1.1626		
Tota	415	512.7596			

[illegible]

Table 4.5 Relative Ranking of Teaching Disciplines by Perceived Value of Media Use in the Classroom



H₀ 3. There is no significant difference in the recommended instructional approach among teachers in secondary education teaching disciplines.

The following four instructional approaches for teaching instructional media competencies were presented in the questionnaire along with a fifth line, "other," that respondents could use to write in additional suggestions.

1. Formal Courses in Instructional Media.
2. Media Competencies Integrated within the Teaching Methods Courses.
3. Media Competencies Integrated within all Education Courses.
4. Combination of Formal Courses and an Integration of Media Competencies within the Teaching Methods Courses.

A one-way analysis of variance was computed for each of the four instructional approaches to determine if there were any significant differences among teachers in the secondary education teaching disciplines. There was no significant difference found for the first three instructional approaches. For these approaches the null hypothesis H_0 3 is retained. There was a significant difference found for the fourth instructional approach, ie., "Combination of Formal Courses and an Integration of Media Competencies with the Teaching Methods Courses." For this approach the null hypothesis H_0 3 is rejected at the .05 level of confidence. The Duncan Multiple Range Test indicates that Business teachers with the lowest ranking mean of 2.97 were significantly different from Home Economics teachers (mean = 1.98), Language Arts teachers (mean = 2.17) and Foreign Language teachers (mean = 2.19). Science (mean = 2.87) and Art teachers (mean = 2.83) were significantly different from Home Economic teachers. Because the respondents were asked to rank each instructional approach from 1st to 5th, the lower means indicate a high ranking while the higher means indicate a low ranking. Table 4.6 presents the set of ANOVA's and the Duncan Multiple Range Test for the fourth approach.

Table 4.6 Instructional Approach by Teaching Discipline-
ANOVA's with Duncan Multiple Range Test

1. Formal Course in Instructional Media

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between	11	18.8791	1.7163	1.0132	.4336
Within	404	684.3493	1.6939		
Tota	415	703.2284			

(No two groups are significantly different at the 0.050 level.)

2. Media Competencies Integrated within the Teaching Methods Courses.

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between	11	22.1914	2.0174	1.4654	.1418
Within	404	556.1836	1.3767		
Tota	415	578.3750			

(No two groups are significantly different at the 0.050 level.)

3. Media Competencies Integrated within **all** Education Courses.

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between	11	21.8713	1.9883	1.3456	.1968
Within	404	596.9724	1.4777		
Tota	415	618.8437			

(No two groups are significantly different at the 0.050 level.)

Table 4.6 Instructional Approach by Teaching Discipline-ANOVA's with Duncan Multiple Range Test (cont.)

4. Combination of Formal Courses and an Integration of Media Competencies within the Teaching Methods Courses.

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between	11	36.5729	3.3248	1.8901	.0390
Within	404	710.6483	1.7590		
Total	415	747.2212			

Duncan Multiple Range Test

<div> <p>● - Indicates pairs of disciplines significantly diff. at or above .05</p> </div>		Home Economics	Foreign Language	Language Arts	Math/Comp. Sc.	Social Science	P.E.	Health	Music	Industrial Arts	Science	Art	Business
Mean	Disciplines												
1.9268	Home Economics												
2.1538	Foreign Language												
2.1667	Language Arts												
2.3793	Math/Comp. Sc.												
2.4545	Social Science												
2.4667	P.E.												
2.5263	Health												
2.5357	Music												
2.5417	Industrial Arts												
2.8158	Science	●											
2.8276	Art	●											
2.9697	Business	●	●	●									

The population means for all four instructional approaches indicate very slight differences among the approaches, but do provide information sufficient to produce a relative ranking from first to fourth in preference. The following list represents the ranking of

recommendations for instructional approaches to teaching instructional media competencies in order of preference from first to fourth:

1. Mean = 2.44 Media Competencies Integrated within the Teaching Methods Courses.
2. Mean = 2.46 Combination of Formal Courses and an Integration of Media Competencies within the Teaching Methods Courses.
3. Mean = 2.85 Media Competencies Integrated with all Education Courses.
4. Mean = 3.12 Formal Courses in Instructional Media.

Table 4.7 presents the frequency counts and percentages for each instructional approach by each teaching discipline.

There were nine respondents who indicated a fifth instructional approach by responding to the “other” category. The following is the list of the responses as presented.

1. Practice helping full time teachers see actual needs.
2. Develop “media” portfolio.
3. Self teaching.
4. Hands-on work with media.
5. Half formal instruction before then half integrated into teaching methods courses.
6. Formal instructional media course prerequisite to methods courses.
7. Evaluating integrated instructional media.
8. On-the-job training.
9. I feel that these are better “workshop” skills - making them formal courses would take all the joy out of them.

Table 4.7 Instructional Approaches by Teaching Discipline:
Frequency Count and Percentages

1. Formal Courses in Instructional Media

Disciplines	High Ranking						Low Ranking					
	1st		2nd		3rd		4th		5th			
	#	%	#	%	#	%	#	%	#	%		
Art	6	21	7	24	4	14	7	24	5	17		
Business	8	24	4	12	7	21	13	39	1	3		
Foreign Language	4	10	7	18	9	23	12	31	7	18		
Health	6	16	3	8	7	18	17	45	5	13		
Home Economics	7	17	7	17	2	5	23	56	2	5		
Industrial Arts	7	29	5	21	2	8	8	33	2	8		
Language Arts	3	8	7	19	9	25	14	39	3	8		
Math/Comp. Sc.	9	16	5	9	8	14	29	50	7	12		
Music	7	25	2	7	5	18	11	39	3	11		
P.E.	9	30	4	13	4	13	12	40	1	3		
Science	7	18	6	16	3	8	17	45	5	13		
Social Science	2	9	4	18	4	18	9	41	3	14		
TOTAL	75	18	61	15	64	15	172	41	44	11		

Totals may not equal 100 due to rounding.

2. Media Competencies Integrated within the Teaching Methods Courses.

Disciplines	High Ranking						Low Ranking					
	1st		2nd		3rd		4th		5th			
	#	%	#	%	#	%	#	%	#	%		
Art	5	17	6	21	9	31	4	14	5	17		
Business	12	36	10	30	6	18	4	12	1	3		
Foreign Language	11	28	14	36	6	15	3	8	5	13		
Health	7	18	14	37	11	29	4	11	2	5		
Home Economics	7	17	13	32	16	39	3	7	2	5		
Industrial Arts	3	13	9	38	6	25	4	17	2	8		
Language Arts	12	33	7	19	8	22	7	19	2	6		
Math/Comp. Sc.	16	28	14	24	18	31	4	7	6	10		
Music	7	25	4	14	11	39	2	7	4	14		
P.E.	7	23	9	30	12	40	2	7	0	0		
Science	10	26	18	47	8	21	1	3	1	3		
Social Science	8	36	8	36	3	14	2	9	1	5		
TOTAL	105	25	126	30	114	27	40	10	31	8		

Totals may not equal 100 due to rounding.

Table 4.7 Instructional Approaches by Teaching Discipline:
Frequency Count and Percentages (cont.)

3. Media Competencies Integrated within **all** Education Courses.

Disciplines	High Ranking						Low Ranking					
	1st		2nd		3rd		4th		5th			
	#	%	#	%	#	%	#	%	#	%	#	%
Art	4	14	4	14	6	21	9	31	6	21		
Business	3	9	13	39	7	21	7	21	3	9		
Foreign Language	4	10	9	23	9	23	10	26	7	18		
Health	9	24	12	32	7	18	6	16	4	11		
Home Economics	5	12	10	24	12	29	12	29	2	5		
Industrial Arts	6	25	5	21	10	42	2	8	1	4		
Language Arts	4	11	11	31	10	28	9	25	2	6		
Math/Comp. Sc.	10	17	20	34	11	19	10	17	7	12		
Music	1	4	11	39	7	25	5	18	4	14		
P.E.	6	20	8	27	7	23	8	27	1	3		
Science	10	26	4	11	13	34	10	26	1	3		
Social Science	2	9	6	27	6	27	4	18	4	18		
TOTAL	64	15	113	27	105	25	92	22	42	10		

Totals may not equal 100 due to rounding.

4. Combination of Formal Courses and an Integration of Media Competencies within the Teaching Methods Courses.

Disciplines	High Ranking						Low Ranking					
	1st		2nd		3rd		4th		5th			
	#	%	#	%	#	%	#	%	#	%	#	%
Art	9	31	5	17	4	14	4	14	7	24		
Business	6	18	4	12	12	36	7	21	4	12		
Foreign Language	17	44	8	21	7	18	5	13	2	5		
Health	15	39	3	8	8	21	9	24	3	8		
Home Economics	21	51	8	20	6	15	6	15	0	0		
Industrial Arts	10	42	1	4	5	21	6	25	2	8		
Language Arts	15	42	88	22	6	17	6	17	1	3		
Math/Comp. Sc.	20	34	12	21	14	24	8	14	4	7		
Music	10	36	6	21	3	11	5	18	4	14		
P.E.	9	30	7	23	6	20	7	27	1	3		
Science	8	21	5	13	15	39	6	16	4	11		
Social Science	9	41	1	5	6	27	5	23	1	5		
TOTAL	149	36	68	16	92	22	74	18	33	8		

Totals may not equal 100 due to rounding.

Research Questions

While not stated as formal hypothesis the following research questions have been included in order to help clarify the information developed by this research. Each of the questions presented below expands upon what has been discussed relative to the impact of secondary education teaching disciplines upon teachers recommendations for specific instructional media competencies and their perceived value of instructional media use in the classroom. Consideration is also given to factors of non-use of instructional media and teaching disciplines.

- 1. Is there a difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on the state in which they are teaching?**

A one-way analysis of variance was computed for each of the fifty-six instructional media competencies controlling for the states of Hawaii, Oregon and Utah. A total of one-hundred and sixty-eight (168) ANOVA's were completed.

For the state of Hawaii, eleven (11) or 20% of the recommendations for instructional media competencies tested significantly different among secondary education teaching disciplines at the .05 level of confidence or higher. Forty-five (45) or 80% of the instructional media competencies showed no significant difference among teaching disciplines.

For the state of Oregon, twenty-two (22) or 39% of the recommendations for instructional media competencies tested significantly different among secondary education teaching

disciplines at the .05 level of confidence or higher. Thirty-four (34) or 61% of the instructional media competencies showed no significant difference among teaching disciplines.

For the state of Utah, eleven (11) or 20% of the recommendations for instructional media competencies tested significantly different among secondary education teaching disciplines at the .05 level of confidence or higher. Forty-five (45) or 80% of the instructional media competencies showed no significant difference among teaching disciplines.

A Duncan Multiple Range Test was computed for each instructional media competency found to have significant difference in order to determine which teaching disciplines were different.

Table 4.8 presents the "Population Mean", "F-Ratio" and "F-Probability" for the entire population and the states of Hawaii, Oregon and Utah. Table 4.8.1 presents the ANOVA results and Duncan Multiple Range Test for the recommendations of instructional media competencies by secondary education teachers in the state of Hawaii having a significant difference at or above the 0.05 level of confidence. Table 4.8.2 presents the ANOVA results and Duncan Multiple Range Test for the recommendations of instructional media competencies by secondary education teachers in the state of Oregon having a significant difference at or above the 0.05 level of confidence. Table 4.8.3 presents the ANOVA results and Duncan Multiple Range Test for the recommendations of instructional media competencies by secondary education teachers in the state of Utah having a significant difference at or above the 0.05 level of confidence. (To conserve space, only the "Population Mean", "F-Ratio" and "F-Probability" are included in the Tables.)

Table 4.8 ANOVA Summary: Instructional Media Competencies: Total Population And Each State

Bold indicates significance at .05 level	Total Population			Hawaii			Oregon			Utah		
	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.
Found. and Theory Comp:												
1. Communication Theory	3.2596	1.4477	.1490	3.4379	1.1676	.3149	3.0317	1.8768	.0495	3.2701	.9551	.4909
2. Design and Layout of Visual Materials	3.6322	1.2949	.2246	3.7059	.8257	.6146	3.5794	1.2160	.2844	3.5985	.7581	.6808
3. Instr. Design Theory and Practice	3.2188	1.6033	.0952	3.3529	.9207	.5225	3.1270	1.5017	.1403	3.1533	2.0903	.0256
4. Media Selection and Eval. Criteria	3.5529	1.3788	.1800	3.5882	1.2419	.2650	3.5635	1.4652	.1543	3.5036	2.1309	.0226
5. Impact of Technology on Education	3.6538	2.7367	.0020	3.6797	1.5652	.1154	3.6508	1.3588	.2021	3.6277	1.3494	.1954
6. Implications of Inst. Media Research	2.9447	.4324	.9413	3.1176	.8952	.5468	2.8492	1.4076	.1789	2.8394	1.3003	.2318
7. Future Trends of Media and Tech.	3.6538	.5140	.8940	3.7516	.6547	.7789	3.5556	1.9784	.0368	3.6350	.4436	.9332
8. Copyright Laws and Education	3.6274	1.4360	.1539	3.5752	.5791	.8434	3.5952	2.7026	.0040	3.7153	.2799	.9886
Production Competencies:												
9. Lettering for Instructional Materials	3.3702	2.0442	.0234	3.6340	.9196	.5235	3.0159	2.1451	.0223	3.4015	1.2708	.2489
10. Mounting Visuals	3.3942	2.7028	.0023	3.5686	1.1324	.3407	3.1349	2.0863	.0267	3.4380	1.4940	.1417
11. Laminating Visuals	3.4471	2.0617	.0221	3.6928	.6554	.7782	3.0873	2.3531	.0118	3.5036	1.1620	.3202
12. Machine Prod. Transparencies	3.7909	.8752	.5649	3.9216	.6783	.7573	3.5397	.8092	.6307	3.8759	.5853	.8379
13. Handmade Transparencies	3.7043	.8295	.6105	3.9085	1.1658	.3162	3.4524	.6848	.7505	3.7080	.8231	.6171
14. Display Boards (B.B., etc.)	3.7019	2.6548	.0027	3.9477	.6057	.8216	3.4683	2.6696	.0044	3.6423	1.2417	.2667
15. Duplicating Inst. Materials	3.8918	.3884	.9604	4.0000	.6471	.7857	3.7619	.5009	.8992	3.8905	.6090	.8183
16. Illus. and Enlarge. Techniques	3.6587	1.9147	.0360	3.8366	.6861	.7501	3.3889	.7396	.6985	3.7080	1.1318	.3423
17. Manipulatives (Math materials, etc.)	2.9760	7.2077	.0000	3.3007	2.6309	.0044	2.7698	4.1026	.0000	2.8029	3.0268	.0013
18. Audio Recording	3.2861	5.6204	.0000	3.3922	2.1559	.0201	3.1508	4.0460	.0001	3.2920	2.1288	.0227
19. Video Recording (off-air recording)	3.7139	3.0169	.0007	3.5686	1.4448	.1594	3.8016	2.1425	.0225	3.7956	2.1617	.0205
20. Video Programming	3.5240	4.3790	.0000	3.6667	4.0531	.0000	3.3730	1.2818	.2438	3.5036	2.1693	.0201

Table 4.8 ANOVA Summary: Instructional Media Competencies: Total Population And Each State (cont.)

Bold indicates significance at .05 level	Total Population			Hawaii			Oregon			Utah		
	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.
Production Competencies (cont.):												
21. Still photography	2.7139	4.6700	.0000	2.8954	2.2585	.0145	2.4921	2.3107	.0135	2.7153	2.7722	.0030
22. Slide/tape programs	3.0505	3.2877	.0002	3.2680	2.7955	.0025	2.9127	1.6037	.1068	2.9343	1.2438	.2653
23. Computer Assisted Instruction	4.2476	1.0336	.4155	4.3072	1.1490	.3283	4.2460	.8517	.5893	4.1825	.8755	.5661
24. Computer Programming	3.5361	.6284	.8047	3.7516	.8593	.5816	3.3889	.5497	.8652	3.4307	.2868	.9874
25. Computer Graphics	3.9087	1.9404	.0331	3.9216	.7643	.6750	3.8968	1.1678	.3172	3.9051	.9371	.5075
26. Games, simulations and media kits	3.5168	4.1389	.0000	3.6993	3.1709	.0007	3.3651	1.4989	.1413	3.4526	1.0518	.4058
Utilization Competencies:												
27. Non-projected visuals	3.1899	1.9897	.0281	3.2941	1.2510	.2593	3.0873	.7070	.7297	3.1679	1.3998	.1810
28. Overhead Transparencies	3.8053	2.2802	.0104	3.8824	1.5203	.1304	3.7540	1.4016	.1816	3.7664	.6592	.7744
29. Display Boards (Bulletin Boards, etc.)	3.6178	1.9276	.0345	3.7843	.8384	.6021	3.4048	1.4684	.1530	3.2677	.6216	.8076
30. Flip Charts	2.8125	1.7690	.0573	3.2288	1.2010	.2917	2.5079	1.3474	.2079	2.6277	1.1699	.3146
31. Chalkboards	3.5313	.4943	.9068	3.5752	.3950	.9562	3.3413	.5936	.8308	3.6569	.3049	.9838
32. Duplicated Materials	3.7957	1.0057	.4403	3.8758	.8178	.6223	3.6032	1.1343	.3416	3.8832	.7488	.6898
33. Manipulatives (Math materials, etc.)	3.0168	5.5755	.0000	3.1765	1.8459	.0517	2.9286	2.7940	.0030	2.9197	2.6098	.0050
34. Audio Recordings	3.2380	7.0725	.0000	3.2941	3.1344	.0008	3.1984	2.9499	.0018	3.2117	3.2826	.0006
35. Instr. Films and Videos (tape & disc)	3.9183	2.9852	.0008	3.8889	2.5946	.0049	3.9921	2.0747	.0276	3.8832	1.0448	.4116
36. Broadcast Television	3.3534	1.5908	.0988	3.5556	2.1079	.0233	3.1984	.5767	.8444	3.2701	.4939	.9042
37. Slides	3.0986	5.0045	.0000	3.1046	1.5300	.1270	3.1190	3.0995	.0011	3.0730	1.6153	.1021
38. Filmstrips	3.0962	4.8241	.0000	3.2288	1.1152	.3537	2.9206	3.4517	.0004	3.1095	1.8701	.0494
39. Computer Assisted Instruction	4.1635	1.4610	.1436	4.1895	1.2931	.2342	4.1587	.7579	.6808	4.1387	.7775	.6618
40. Comp. Interactive Video Programs	3.9279	1.1916	.2906	3.8105	1.2490	.2606	4.0238	.2877	.9871	3.9708	1.1604	.3214

Table 4.8 ANOVA Summary: Instructional Media Competencies: Total Population And Each State (cont.)

Bold indicates significance at .05 level	Total Population			Hawaii			Oregon			Utah		
	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.
Utilization Competencies (cont.):												
41. Games and Simulations	3.5721	3.8645	.0000	3.6667	2.3682	.0103	3.4841	1.2604	.2565	3.5474	1.6089	.1039
42. Free and Inexpensive Materials	4.0697	2.2720	.0107	4.1438	.6464	.7863	3.9524	3.0100	.0015	4.0949	1.4300	.1674
43. Field Trips and Community Resources	3.9760	1.8556	.0435	4.1830	1.3214	.2185	3.9762	.8699	.5717	3.7445	2.5198	.0067
Operation Competencies:												
44. Overhead Projectors	3.8582	1.3137	.2139	3.9412	.8101	.6299	3.8810	2.4809	.0079	3.7445	.5678	.8518
45. Spirit Duplicators (Ditto)	3.3846	1.9148	.0360	3.8039	1.3079	.2259	3.0159	1.2956	.2358	3.2555	1.5540	.1207
46. Opaque Projectors	3.1683	2.3282	.0088	3.3333	.9886	.4597	2.9603	1.7007	.0818	3.1752	1.2211	.2799
47. Cassette Tape Recorders	3.3966	2.0311	.0245	3.5294	.8540	.5868	3.2302	2.5206	.0070	3.4015	1.2104	.2868
48. Record Players	2.9567	2.8666	.0012	3.1895	.6235	.8065	2.8095	3.1703	.0009	2.8321	1.4066	.1778
49. Video Tape Recorders	4.1442	2.1919	.0142	4.0980	1.5714	.1134	4.2143	1.7895	.0637	4.1314	.7605	.6784
50. Video Camcorder Systems	4.0962	2.0938	.0198	4.0588	1.4146	.1725	4.2778	.7478	.6906	3.9708	1.4022	.1799
51. Video Editing Systems	3.6659	1.8572	.0433	3.7974	2.0621	.0269	3.4921	.4771	.9141	3.6788	.9437	.5014
52. 16mm Motion Picture Projectors	3.2668	2.6387	.0029	3.3660	1.3236	.2176	3.4683	2.5263	.0069	2.9708	.6499	.7827
53. 2X2 Slide Projectors	2.9663	2.3053	.0095	3.0980	.9600	.4857	2.8730	1.7534	.0705	2.9051	1.5215	.1317
54. Filmstrip Projectors	3.1250	3.1345	.0004	3.2157	.7691	.6702	2.9921	3.2700	.0006	3.1460	1.1678	.3161
55. Computer Interactive Video Systems	4.0505	.7754	.6648	4.0523	1.1255	.3458	4.1190	.3831	.9603	3.9854	.9636	.4830
56. Comp. Overhead Proj. LCD Systems	3.9063	2.1828	.0146	3.8301	1.5823	.1101	3.9921	.6489	.7832	3.9124	1.780	.0664

Duncan Multiple Range Test

Duncan Multiple Range Test

[illegible]

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
20. Video Programming. (Producing own programs.)	3.6667	4.0531	.0000

Duncan Multiple Range Test

[illegible]

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
21. Producing Still Photography	2.8954	2.2585	.0145

Duncan Multiple Range Test

[illegible]

Table 4.8.1 **Hawaii** - Eleven Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
22. Producing Slide/Tape Programs	3.2680	2.7955	.0025

Duncan Multiple Range Test

		<div> • - Indicates pairs of disciplines significantly diff. at or above .05 </div>										
Mean	Disciplines	Business	Math/Comp. Sc.	Music	Health	Industrial Arts	P.E.	Language Arts	Social Science	Foreign Language	Home Economics	Science
2.2727	Business											
2.4231	Math/Comp. Sc.											
3.1111	Music											
3.3333	Health	•	•									
3.3333	Industrial Arts	•	•									
3.4167	P.E.	•	•									
3.4667	Language Arts	•	•									
3.5556	Social Science	•	•									
3.5882	Foreign Language	•	•									
3.7778	Home Economics	•	•									
3.9167	Science	•	•									
4.1111	Art	•	•									

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
26. Producing Games, Simulations and Media Kits	3.6993	3.1709	.0007

Duncan Multiple Range Test

		<div> • - Indicates pairs of disciplines significantly diff. at or above .05 </div>										
Mean	Disciplines	Industrial Arts	Music	Art	Business	Language Arts	Math/Comp. Sc.	P.E.	Science	Social Science	Health	Home Economics
2.7778	Industrial Arts											
3.0000	Music											
3.1111	Art											
3.2727	Business											
3.3333	Language Arts											
3.5385	Math/Comp. Sc.											
3.7500	P.E.											
3.8333	Science											
4.1111	Social Science	•										
4.1333	Health	•	•									
4.4444	Home Economics	•	•	•	•	•						
4.5882	Foreign Language	•	•	•	•	•	•					

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
34. Utilizing Audio Recordings	3.2941	3.1344	.0008

Duncan Multiple Range Test

Mean	Disciplines	Math/Comp. Sc.	Health	Business	P.E.	Industrial Arts	Art	Language Arts	Home Economics	Science	Social Science	Music	Foreign Language
2.3462	Math/Comp. Sc.												
2.8000	Health												
3.0000	Business												
3.0000	P.E.												
3.1111	Industrial Arts												
3.2222	Art												
3.6000	Language Arts	●											
3.6667	Home Economics	●											
3.6667	Science	●											
3.6667	Social Science	●	●										
4.2222	Music	●	●										
4.2941	Foreign Language	●	●	●	●								

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
35. Utilizing Instructional Films and Videos (tape & disc)	3.8889	2.5946	.0049

Duncan Multiple Range Test

[illegible]

Table 4.8.1 **Hawaii** - Eleven Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
36. Utilizing Broadcast Television	3.5556	2.1079	.0233

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Business	Industrial Arts	Music	Math/Comp. Sc.	Health	Art	Language Arts	Foreign Language	P.E.	Science	Home Economics	Social Science
2.7273	Business												
3.0000	Industrial Arts												
3.1111	Music												
3.1154	Math/Comp. Sc.												
3.4000	Health												
3.5556	Art												
3.7333	Language Arts												
3.8824	Foreign Language	●											
3.9167	P.E.	●	●	●									
4.0833	Science	●	●	●	●								
4.2222	Home Economics	●	●	●	●	●							
4.3333	Social Science	●	●	●	●	●							

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
41. Utilizing Games and Simulations	3.6667	2.3682	.0103

Duncan Multiple Range Test

		● - Indicates pairs of disciplines significantly diff. at or above .05											
Mean	Disciplines	Industrial Arts	Art	Music	Business	P.E.	Math/Comp. Sc.	Language Arts	Science	Health	Social Science	Home Economics	Foreign Language
2.5556	Industrial Arts												
3.0000	Art												
3.0000	Music												
3.1818	Business												
3.5833	P.E.												
3.6154	Math/Comp. Sc.	●											
3.6667	Language Arts	●											
3.9167	Science	●											
4.0000	Health	●											
4.1111	Social Science	●											
4.3333	Home Economics	●	●	●									
4.3529	Foreign Language	●	●	●	●								

Table 4.8.2 **Oregon** - Twenty-Two Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
1. Communications Theory	3.0317	1.8768	.0495

Duncan Multiple Range Test

[illegible]

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
7. Future Trends of Media and Technology in Education	3.5556	1.9784	.0368

Duncan Multiple Range Test

[illegible]

Table 4.8.2 **Oregon** - Twenty-Two Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
10. Mounting Visuals	3.1349	2.0863	.0267

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Social Science	Foreign Language	Math/Comp. Sc.	Music	Industrial Arts	Science	Business	Language Arts	P.E.	Home Economics	Health	Art
2.0000	Social Science												
2.3750	Foreign Language												
2.7500	Math/Comp. Sc.												
2.8182	Music												
2.8571	Industrial Arts												
2.8750	Science												
3.1111	Business												
3.4286	Language Arts												
3.5455	P.E.	●											
3.5882	Home Economics	●	●										
3.7273	Health	●	●										
4.0000	Art	●	●	●									

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
11. Laminating Visuals	3.0873	2.3531	.0118

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Social Science	Foreign Language	Science	Math/Comp. Sc.	Business	Music	Industrial Arts	Home Economics	P.E.	Language Arts	Health	Art
1.8000	Social Science												
2.5000	Foreign Language												
2.6250	Science												
2.7500	Math/Comp. Sc.												
2.7778	Business												
2.8182	Music												
3.0000	Industrial Arts												
3.2941	Home Economics	●											
3.4545	P.E.	●											
3.5714	Language Arts	●											
4.0000	Health	●	●	●	●								
4.2500	Art	●	●	●	●	●	●						

Duncan Multiple Range Test

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
17. Producing Manipulatives (Mathematics materials, etc.)	2.7698	4.1026	.0000

Mean	Disciplines	Social Science	Music	Industrial Arts	Art	Business	Home Economics	Foreign Language	Health	P.E.	Language Arts	Science	Math/Comp. Sc.
1.0000	Social Science												
1.4545	Music												
2.0000	Industrial Arts												
2.3750	Art												
2.4444	Business												
2.4706	Home Economics												
2.7500	Foreign Language												
2.9091	Health	●	●										
3.0909	P.E.	●	●	●									
3.1429	Language Arts	●	●	●									
3.3750	Science	●	●										
4.1875	Math/Comp. Sc.	●	●	●	●	●	●	●	●				

Table 4.8.2 **Oregon** - Twenty-Two Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
18. Producing Audio Recordings	3.1508	4.0460	.0001

Duncan Multiple Range Test

		<div> ● - Indicates pairs of disciplines significantly diff. at or above .05 </div>										
Mean	Disciplines	Social Science	Art	Math/Comp. Sc.	Industrial Arts	Science	Business	P.E.	Health	Home Economics	Language Arts	Foreign Language
1.6000	Social Science											
2.3750	Art											
2.5000	Math/Comp. Sc.											
2.7143	Industrial Arts											
2.8750	Science											
3.0000	Business											
3.2727	P.E.	●										
3.3636	Health	●										
3.4118	Home Economics	●										
3.5714	Language Arts	●										
3.6250	Foreign Language	●										
4.8182	Music	●	●	●	●	●	●	●	●	●	●	●

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
19. Video Recording (Off-air Recording)	3.8013	2.1425	.0225

Duncan Multiple Range Test

		<div> ● - Indicates pairs of disciplines significantly diff. at or above .05 </div>										
Mean	Disciplines	Social Science	Art	Business	Math/Comp. Sc.	Science	Home Economics	Foreign Language	Industrial Arts	P.E.	Health	Language Arts
2.8000	Social Science											
3.0000	Art											
3.0000	Business											
3.3125	Math/Comp. Sc.											
3.8125	Science											
3.8235	Home Economics											
3.8750	Foreign Language											
4.0000	Industrial Arts											
4.0909	P.E.											
4.3636	Health	●	●	●								
4.4286	Language Arts	●	●	●								
4.7273	Music	●	●	●	●							

Table 4.8.2 **Oregon** - Twenty-Two Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
21. Producing Still Photography	2.4921	2.3107	.0135

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Social Science	Math/Comp. Sc.	Music	Business	Health	Foreign Language	P.E.	Industrial Arts	Home Economics	Science	Language Arts	Art
1.4000	Social Science												
1.6875	Math/Comp. Sc.												
1.9091	Music												
2.3333	Business												
2.3636	Health												
2.3750	Foreign Language												
2.5455	P.E.												
2.7143	Industrial Arts												
2.7647	Home Economics	●	●										
3.1250	Science	●	●	●									
3.1429	Language Arts	●	●	●									
3.3750	Art	●	●	●									

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
33. Utilizing Manipulatives (Mathematics materials, etc.)	2.9286	2.7940	.0030

Duncan Multiple Range Test

		● - Indicates pairs of disciplines significantly diff. at or above .05											
Mean	Disciplines	Music	Industrial Arts	Social Science	Art	Business	Home Economics	Language Arts	Health	Foreign Language	P.E.	Science	Math/Comp Sc
1.5455	Music												
1.8571	Industrial Arts												
2.2000	Social Science												
2.2500	Art												
2.6667	Business												
2.8824	Home Economics	●											
3.0000	Language Arts	●											
3.0909	Health	●											
3.1250	Foreign Language	●											
3.2727	P.E.	●											
3.4375	Science	●	●										
4.1250	Math/Comp. Sc.	●	●	●	●	●	●						

Duncan Multiple Range Test

Duncan Multiple Range Test

[illegible]

Table 4.8.2 Oregon - Twenty-Two Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
42. Utilizing Free and Inexpensive Materials	3.9524	3.0100	.0015

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Science	Math/Comp. Sc.	Language Arts	Social Science	Music	Business	Industrial Arts	Foreign Language	P.E.	Art	Home Economics	Health
3.0000	Science												
3.3750	Math/Comp. Sc.												
3.4286	Language Arts												
3.8000	Social Science												
3.8182	Music												
4.0000	Business												
4.0000	Industrial Arts												
4.1250	Foreign Language	●											
4.4545	P.E.	●	●										
4.5000	Art	●	●										
4.5882	Home Economics	●	●	●									
4.6364	Health	●	●	●									

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
44. Operate Overhead Projectors	3.8810	2.4809	.0079

Duncan Multiple Range Test

		● - Indicates pairs of disciplines significantly diff. at or above .05											
Mean	Disciplines	Art	Industrial Arts	Foreign Language	Science	Music	Math/Comp. Sc.	P.E.	Business	Social Science	Health	Language Arts	Home Economics
2.7500	Art												
2.8571	Industrial Arts												
3.3750	Foreign Language												
3.5000	Science												
3.6364	Music												
3.9375	Math/Comp. Sc.	●											
4.0000	P.E.	●											
4.1111	Business	●											
4.2000	Social Science	●											
4.4545	Health	●	●										
4.5714	Language Arts	●	●										
4.5882	Home Economics	●	●	●	●								

Table 4.8.2 **Oregon** - Twenty-Two Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
47. Operating Cassette Tape Recorder	3.2302	2.5206	.0070

Duncan Multiple Range Test

<div> <p>● - Indicates pairs of disciplines significantly diff. at or above .05</p> </div>		Industrial Arts	Math/Comp. Sc.	Science	Art	Foreign Language	Social Science	Home Economics	P.E.	Business	Language Arts	Health	Music
Mean	Disciplines												
2.2857	Industrial Arts												
2.3750	Math/Comp. Sc.												
2.6875	Science												
3.0000	Art												
3.0000	Foreign Language												
3.4000	Social Science												
3.4118	Home Economics												
3.4545	P.E.												
3.5556	Business												
3.5714	Language Arts												
3.8182	Health	●	●										
4.5455	Music	●	●	●	●	●							

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
48. Operate Record Players	2.8095	3.1703	.0009

Duncan Multiple Range Test

<div> <p>● - Indicates pairs of disciplines significantly diff. at or above .05</p> </div>		Industrial Arts	Math/Comp. Sc.	Science	Business	Foreign Language	Art	Health	Social Science	P.E.	Home Economics	Language Arts	Music
Mean	Disciplines												
1.4286	Industrial Arts												
2.0000	Math/Comp. Sc.												
2.0000	Science												
2.5556	Business												
2.6250	Foreign Language												
2.7500	Art												
3.1818	Health	●											
3.2000	Social Science	●											
3.2727	P.E.	●	●	●									
3.3529	Home Economics	●	●	●									
3.4286	Language Arts	●	●	●									
4.1818	Music	●	●	●	●	●							

Table 4.8.2 **Oregon** - Twenty-Two Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
52. Operating 16mm Motion Picture Projectors	3.4683	2.5263	.0069

Duncan Multiple Range Test

<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>		Industrial Arts	Music	Foreign Language	Math/Comp. Sc.	Art	Business	Science	Language Arts	P.E.	Home Economics	Health	Social Science
Mean	Disciplines												
2.0000	Industrial Arts												
2.5455	Music												
3.0000	Foreign Language												
3.1250	Math/Comp. Sc.												
3.3750	Art												
3.4444	Business												
3.6875	Science	●	●										
3.7143	Language Arts	●	●										
3.7273	P.E.	●	●										
4.0000	Home Economics	●	●										
4.1818	Health	●	●										
4.6000	Social Science	●	●										

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
54. Operating Filmstrip Projectors	2.9921	3.2700	.0006

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Science	Industrial Arts	Music	Math/Comp. Sc.	Foreign Language	Language Arts	Business	P.E.	Art	Home Economics	Health	Social Science
1.9375	Science												
2.2857	Industrial Arts												
2.3636	Music												
2.4375	Math/Comp. Sc.												
2.7500	Foreign Language												
2.8571	Language Arts												
2.8889	Business												
3.5455	P.E.	●											
3.6250	Art	●											
3.7647	Home Economics	●	●	●	●	●							
4.0000	Health	●	●	●	●	●							
4.2000	Social Science	●	●	●	●	●							

Duncan Multiple Range Test

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
18. Producing Audio Recordings	3.2920	2.1288	.0227

[illegible]

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
21. Producing Still Photography	2.7153	2.7722	.0030

Duncan Multiple Range Test

Mean	Disciplines	Music	Health	Social Science	Math/Comp. Sc.	Foreign Language	Home Economics	Business	Science	Language Arts	P.E.	Industrial Arts	Art
1.6250	Music												
1.8333	Health												
2.2500	Social Science												
2.5000	Math/Comp. Sc.												
2.5714	Foreign Language												
2.6667	Home Economics												
2.8462	Business	●											
2.9000	Science	●											
3.0000	Language Arts	●	●										
3.2857	P.E.	●	●										
3.3750	Industrial Arts	●	●										
3.7500	Art	●	●	●	●	●	●						

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
33. Utilizing Manipulatives (mathematics materials, etc.)	2.9197	2.6098	.0050

Duncan Multiple Range Test

[illegible]

Table 4.8.3 **Utah** - Eleven Significantly Different Instructional Media Competencies - ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
43. Utilizing Field Trips and Community Resources	3.7445	2.5198	.0067

Duncan Multiple Range Test

		Industrial Arts	Math/Comp. Sc.	P.E.	Health	Science	Social Science	Language Arts	Art	Foreign Language	Home Economics	Business
Mean	Disciplines											
2.8750	Industrial Arts											
3.1875	Math/Comp. Sc.											
3.2857	P.E.											
3.5000	Health											
3.5000	Science											
3.7500	Social Science											
3.8571	Language Arts											
3.9167	Art	●										
3.9286	Foreign Language	●										
3.9333	Home Economics	●										
4.3846	Business	●	●	●								
4.6250	Music	●	●	●	●	●						

● - Indicates pairs of disciplines significantly diff. at or above .05

2. Is there any difference in instructional media competency recommendations among all teachers in Hawaii, Oregon or Utah?

A one-way analysis of variance was computed for each of the fifty-six instructional media competencies using teaching location as a variable. Of the fifty-six ANOVA's completed, nineteen (19) or 34% indicated a significant difference in recommendations for instructional media competencies among all secondary education teachers in the states of Hawaii, Oregon and Utah at the .05 level of confidence or above. Thirty-seven (37) or 66% indicated no significant difference. A Duncan Multiple Range Test was conducted for each of the competencies indicating significant difference. Table 4.9 displays the ANOVA's and the Duncan Multiple Range Test for those instructional media competencies indicating a significant difference.

Table 4.9 Nineteen Significantly Different Instructional Media Competencies Among Teachers In the States of Hawaii, Oregon and Utah- ANOVA's with Duncan Tests

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
1. Communication Theory	3.2596	2.9609	.0529

Duncan Multiple Range Test

<div> <div>● - Indicates pairs of States significantly diff. at or above .05</div> </div>				
		Oregon	Utah	Hawaii
Mean	States			
3.0317	Oregon			
3.2701	Utah			
3.4379	Hawaii	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
9. Producing Lettering for Instructional Materials	3.3702	8.5504	.0002

Duncan Multiple Range Test

<div> <div>● - Indicates pairs of States significantly diff. at or above .05</div> </div>				
		Oregon	Utah	Hawaii
Mean	States			
3.0159	Oregon			
3.4015	Utah	●		
3.6340	Hawaii	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
10. Mounting Visuals	3.3942	4.6545	.0100

Duncan Multiple Range Test

<div> <div>● - Indicates pairs of States significantly diff. at or above .05</div> </div>				
		Oregon	Utah	Hawaii
Mean	States			
3.1439	Oregon			
3.4380	Utah	●		
3.5686	Hawaii	●		

Table 4.9 Nineteen Significantly Different Instructional Media Competencies Among Teachers In the States of Hawaii, Oregon and Utah- ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
11. Laminating Visuals	3.4471	9.2069	.0001

Duncan Multiple Range Test

<p>● - Indicates pairs of States significantly diff. at or above .05</p>				
Mean	States	Oregon	Utah	Hawaii
3.0873	Oregon			
3.5036	Utah	●		
3.6928	Hawaii	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
12. Producing Machine Produced Overhead Transparencies	3.7909	4.5950	.0106

Duncan Multiple Range Test

<p>● - Indicates pairs of States significantly diff. at or above .05</p>				
Mean	States	Oregon	Utah	Hawaii
3.5397	Oregon			
3.8759	Utah	●		
3.9216	Hawaii	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
13. Producing Handmade Overhead Transparencies	3.7043	5.8187	.0032

Duncan Multiple Range Test

<p>● - Indicates pairs of States significantly diff. at or above .05</p>				
Mean	States	Oregon	Utah	Hawaii
3.4524	Oregon			
3.7080	Utah			
3.9085	Hawaii	●		

Table 4.9 Nineteen Significantly Different Instructional Media Competencies Among Teachers In the States of Hawaii, Oregon and Utah- ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
14. Producing Display Boards (Bulletin Boards, Displays, etc.)	3.7019	6.7195	.0013

Duncan Multiple Range Test

<div> <p>● - Indicates pairs of States significantly diff. at or above .05</p> </div>				
Mean	States	Oregon	Utah	Hawaii
3.4683	Oregon			
3.6423	Utah			
3.9477	Hawaii	●	●	

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
16. Illustration and Enlargement Techniques	3.6587	4.8949	.0079

Duncan Multiple Range Test

<div> <p>● - Indicates pairs of States significantly diff. at or above .05</p> </div>				
Mean	States	Oregon	Utah	Hawaii
3.3889	Oregon			
3.7080	Utah	●		
3.8366	Hawaii	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
17. Manipulatives (Mathematics Materials, etc.)	2.9760	5.9219	.0029

Duncan Multiple Range Test

<div> <p>● - Indicates pairs of States significantly diff. at or above .05</p> </div>				
Mean	States	Oregon	Utah	Hawaii
2.7698	Oregon			
2.8029	Utah			
3.3007	Hawaii	●	●	

Table 4.9 Nineteen Significantly Different Instructional Media Competencies Among Teachers In the States of Hawaii, Oregon and Utah- ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
21. Producing Still Photography	2.7139	3.2711	.0389

Duncan Multiple Range Test

<div> <div>● - Indicates pairs of States significantly diff. at or above .05</div> </div>				
Mean	States	Oregon	Utah	Hawaii
2.4921	Oregon			
2.7153	Utah			
2.8954	Hawaii	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
23. Producing Slide/tape Programs	3.0505	3.1006	.0461

Duncan Multiple Range Test

<div> <div>● - Indicates pairs of States significantly diff. at or above .05</div> </div>				
Mean	States	Oregon	Utah	Hawaii
2.9127	Oregon			
2.9343	Utah			
3.2680	Hawaii	●	●	

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
24. Producing Computer Programming	3.5361	3.0866	.0467

Duncan Multiple Range Test

<div> <div>● - Indicates pairs of States significantly diff. at or above .05</div> </div>				
Mean	States	Oregon	Utah	Hawaii
3.3889	Oregon			
3.4307	Utah			
3.7516	Hawaii	●	●	

Table 4.9 Nineteen Significantly Different Instructional Media Competencies Among Teachers In the States of Hawaii, Oregon and Utah- ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
29. Utilizing Display Boards (Bulletin Boards, etc.)	3.6178	3.3532	.0359

Duncan Multiple Range Test

<div>● - Indicates pairs of States significantly diff. at or above .05</div>				
Mean	States	Oregon	Utah	Hawaii
3.4048	Oregon			
3.6277	Utah			
3.7843	Hawaii	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
30. Utilizing Flip Charts	2.8125	12.4264	.0000

Duncan Multiple Range Test

<div>● - Indicates pairs of States significantly diff. at or above .05</div>				
Mean	States	Oregon	Utah	Hawaii
2.5079	Oregon			
2.6277	Utah			
3.2288	Hawaii	●	●	

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
36. Utilizing Broadcast Television	3.3534	2.9973	.0510

Duncan Multiple Range Test

<div>● - Indicates pairs of States significantly diff. at or above .05</div>				
Mean	States	Oregon	Utah	Hawaii
3.1984	Oregon			
3.2701	Utah			
3.5556	Hawaii	●		

Table 4.9 Nineteen Significantly Different Instructional Media Competencies Among Teachers In the States of Hawaii, Oregon and Utah- ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
43. Utilizing Field Trips and Community Resources	3.9760	6.3790	.0019

Duncan Multiple Range Test

<div> <p>● - Indicates pairs of States significantly diff. at or above .05</p> </div>				
		Utah	Oregon	Hawaii
Mean	States			
3.7445	Utah			
3.9782	Oregon			
4.1830	Hawaii	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
45. Operating Spirit Duplicators (Ditto)	3.3846	4.5950	.0106

Duncan Multiple Range Test

<div> <p>● - Indicates pairs of States significantly diff. at or above .05</p> </div>				
		Oregon	Utah	Hawaii
Mean	States			
3.0159	Oregon			
3.2555	Utah			
3.8039	Hawaii	●	●	

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
48. Operating Record Players	2.9567	3.0238	.0497

Duncan Multiple Range Test

<div> <p>● - Indicates pairs of States significantly diff. at or above .05</p> </div>				
		Oregon	Utah	Hawaii
Mean	States			
2.8095	Oregon			
2.8321	Utah			
3.1895	Hawaii	●	●	

Table 4.9 Nineteen Significantly Different Instructional Media Competencies Among Teachers In the States of Hawaii, Oregon and Utah- ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
52. Operating 16mm Motion Picture Projectors	3.2668	5.0285	.0070

Duncan Multiple Range Test

<div style="border: 1px solid black; padding: 5px; display: inline-block;"> ● - Indicates pairs of States significantly diff. at or above .05 </div>				
		Utah	Oregon	Hawaii
Mean	States			
2.9708	Utah			
3.3660	Hawaii	●		
3.4683	Oregon	●		

3. Is there a difference in the perceived value of instructional media use in the classroom among teachers in secondary education teaching disciplines based on the state in which they are teaching?

A one-way analysis of variance was computed for each teaching location namely Hawaii, Oregon and Utah. For the states of Hawaii and Oregon there were no significant differences in the perceived value of instructional media use in the classroom found among teachers in the secondary education teaching disciplines.

For the state of Utah, a significant difference in the perceived value of instructional media use in the classroom among teachers in the secondary education teaching disciplines was found at the .0008 level of confidence. A Duncan Multiple Range Test was computed to determine which teaching disciplines were significantly different.

The result of the Duncan Procedure indicates that Science teachers in the state of Utah with a mean = 4.40 are significantly different than Music teachers with a mean = 2.25, Physical Education teachers with a mean = 3.14, Business teachers with a mean = 3.39 and Math/Computer Science teachers with a mean = 3.44. In addition, all other teachers, ie., Health, Home Economics, Industrial Arts, Art, Language Arts, Foreign Language, Social Science and Math/Computer Science are significantly different than Music teachers. See table 4.10 for the ANOVA's and the Duncan Multiple Range Test.

Table 4.10 Perceived Media Value by Teaching Discipline by State:
ANOVA with Duncan Multiple Range Test

Hawaii

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between	11	10.4809	.9528	.8111	.6289
Withir.	141	165.6365	1.1747		
Tota	152	176.1176			

No Two Groups are Significantly Different at the 0.050 Level.

Oregon

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between	11	24.2216	2.2020	1.7302	.0753
Withir.	114	145.0799	1.2726		
Tota	125	169.3016			

No Two Groups are Significantly Different at the 0.050 Level.

Table 4.10 Perceived Media Value by Teaching Discipline by State:
ANOVA with Duncan Multiple Range Test (cont.)

Utah

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F-Ratio	F-Prob.
Between	11	36.1831	3.2894	3.1906	.0008
Within	125	128.8680	1.0309		
Total	136	165.0511			

Duncan Multiple Range Test

<div> ● - Indicates pairs of disciplines significantly diff. at or above .05 </div>		Music	P.E.	Business	Math/Comp. Sc.	Social Science	Foreign Language	Language Arts	Art	Industrial Arts	Home Economics	Health	Science
Mean	Disciplines												
2.2500	Music												
3.1429	P.E.												
3.3846	Business	●											
3.4375	Math/Comp. Sc.	●											
3.7500	Social Science	●											
3.7857	Foreign Language	●											
3.8571	Language Arts	●											
4.0000	Art	●											
4.1250	Industrial Arts	●											
4.2000	Home Economics	●											
4.2500	Health	●											
4.4000	Science	●	●	●	●								

4. Is there any difference in instructional media competency recommendations based on perceived value of instructional media use in the classroom?

The data relative to perceived value of instructional media use in the classroom was recoded from continuous to categorical. Responses of 0, 1, 2, and 3 were grouped together into category

1=low perceived value of instructional media use in the classroom. Response 4 became category 2=medium perceived value of instructional media use in the classroom. Response 5 became category 3=high perceived value of instructional media use in the classroom. There were one-hundred and fifty-one (151) respondents or 36% in category 1-low perceived value; one-hundred and forty (140) respondents or 34% in category 2-medium perceived value; and one-hundred and twenty-five (125) respondents or 30% in category 3-high perceived value of instructional media use in the classroom.

After recoding, a one-way analysis of variance was computed for each of the fifty-six (56) instructional media competencies. Of the fifty-six ANOVA's completed, forty-one (41) or 73% indicated a significant difference in recommendations of instructional media competencies among teachers having low, medium and high perceived value of instructional media use in the classroom at the .05 level of confidence or above. See Table 4.11 for a summary of all the ANOVA's completed.

A Duncan Multiple Range Test was computed for each instructional media competency found to have significant difference to determine which level of perceived value of instructional media use in the classroom was different. See table 4.12 for the ANOVA's and the Duncan Multiple Range Test for those instructional media competencies indicating a significant difference.

Table 4.11 ANOVA Summary - Instructional Media Competencies by Perceived Value of Media Use

* = Indicates Significant Difference at or above .05	Population Mean	F-Ratio	F-Prob.
I. Principles of Communication, Selection, Evaluation and Research			
1. Communication Theory	3.2596	.4346	.6478
2. Design and Layout of Visual Materials	3.6322	4.3605	.0134 *
3. Instructional Design Theory and Practice	3.2188	.9770	.3773
4. Media Selection and Evaluation Criteria	3.5529	7.8859	.0004 *
5. Impact of Technology on Education	3.6538	4.3270	.0138 *
6. Implications of Instructional Media Research	2.9447	1.4951	.2254
7. Future Trends of Media and Technology in Education	3.6538	2.4368	.0887
8. Copyright Laws and Education	3.6274	.1312	.8771
II. How to PRODUCE Instructional Media Materials			
9. Lettering for Instructional Materials	3.3702	7.2203	.0008 *
10. Mounting Visuals	3.3942	8.8567	.0002 *
11. Laminating Visuals	3.4471	9.1793	.0001 *
12. Machine Produced Overhead Transparencies	3.7909	18.5367	.0000 *
13. Handmade Overhead Transparencies	3.7043	10.6749	.0000 *
14. Display Boards (Bulletin Boards, Displays, etc.)	3.7019	9.8942	.0001 *
15. Duplicating Inst. Materials (Dittos, Xerox, etc.)	3.8918	11.9800	.0000 *
16. Illustration and Enlargement Techniques	3.6587	10.6078	.0000 *
17. Manipulatives (Mathematics materials, etc.)	2.9760	10.5345	.0000 *
18. Audio Recording	3.2861	12.0530	.0000 *
19. Video Recording (off-air recording)	3.7139	14.0473	.0000 *
20. Video Programming (Producing own programs)	3.5240	8.4015	.0003 *
21. Still photography	2.7139	10.4468	.0000 *
22. Slide/tape programs	3.0505	15.5064	.0000 *

Table 4.11 ANOVA Summary - Instructional Media Competencies
by Perceived Value of Media Use (cont.)

* = Indicates Significant Difference at or above .05	Population Mean	F-Ratio	F-Prob.
II. How to PRODUCE Instructional Media Materials (cont.)			
23. Computer Assisted Instruction	4.2476	8.7516	.0002 *
24. Computer Programming	3.5361	.8119	.4447
25. Computer Graphic	3.9087	4.7121	.0095 *
26. Games, simulations and media kits	3.5168	9.4608	.0001 *
III. How to UTILIZE Instructional Media Materials			
27. Non-projected visuals	3.1899	2.2901	.0929
28. Overhead Transparencies	3.8053	7.8651	.0004 *
29. Display Boards (Bulletin Boards, etc.)	3.6178	1.2326	.2926
30. Flip Charts	2.8125	2.7115	.0676
31. Chalkboards	3.5313	.0018	.9982
32. Duplicated Materials (Dittos, Xerox, etc.)	3.7957	7.4230	.0007 *
33. Manipulatives (Mathematics materials, etc.)	3.0168	5.9778	.0028 *
34. Audio Recordings	3.2380	2.9529	.0533
35. Instructional Films and Videos (tape & disc)	3.9183	13.9690	.0000 *
36. Broadcast Television	3.3534	8.0877	.0004 *
37. Slides	3.0986	7.1586	.0009 *
38. Filmstrips	3.0962	8.4340	.0003 *
39. Computer Assisted Instruction	4.1635	5.0467	.0068 *
40. Computer Interactive Video Programs	3.9279	3.7646	.0240 *
41. Games and Simulations	3.5721	11.7514	.0000 *
42. Free and Inexpensive Materials	4.0697	7.0277	.0010 *
43. Field Trips and Community Resources	3.9760	2.5341	.0806

Table 4.12 Forty-one Significantly Different Instructional Media Competencies Among Teachers Having Low, Medium and High Perceived Value of Media Use in the Classroom: ANOVA's with Duncan Tests

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
2. Design and Layout of Visual Materials	3.6322	4.3605	.0134

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
3.4305	Low			
3.6429	Medium			
3.8640	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
4. Media Selection and Evaluation Criteria	3.5529	7.8859	.0004

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
3.2517	Low			
3.6929	Medium	●		
3.7600	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
5. Impact of Technology on Education	3.6538	4.3270	.0138

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
3.4901	Low			
3.5929	Medium			
3.9200	High	●	●	

Table 4.12 Forty-one Significantly Different Instructional Media Competencies Among Teachers Having Low, Medium and High Perceived Value of Media Use in the Classroom: ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
9. Producing Lettering for Instructional Materials	3.3702	7.2203	.0008

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
3.0795	Low			
3.4429	Medium	●		
3.6400	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
10. Mounting Visuals	3.3942	8.8567	.0002

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
3.0861	Low			
3.4786	Medium	●		
3.6720	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
11. Laminating Visuals	3.4471	9.1793	.0001

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
3.1325	Low			
3.5357	Medium	●		
3.7280	High	●		

Table 4.12 Forty-one Significantly Different Instructional Media Competencies Among Teachers Having Low, Medium and High Perceived Value of Media Use in the Classroom: ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
12. Producing Machined Produced Overhead Transparencies	3.7909	18.5367	.0000

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
3.3709	Low			
3.9500	Medium	●		
4.1200	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
13. Producing Handmade Overhead Transparencies	3.7043	10.6749	.0000

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
3.3974	Low			
3.7714	Medium	●		
4.0000	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
14. Producing Display Boards (Bulletin Boards, Displays, etc.)	3.7019	9.8942	.0001

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
3.4305	Low			
3.7071	Medium	●		
4.0240	High	●	●	

Table 4.12 Forty-one Significantly Different Instructional Media Competencies Among Teachers Having Low, Medium and High Perceived Value of Media Use in the Classroom: ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
15. Producing Duplicated Instructional Materials (Dittos, Xerox, etc.)	3.8918	11.9800	.0000

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
3.5497	Low			
3.9714	Medium	●		
4.2160	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
16. Illustration and Enlargement Techniques	3.6587	10.6078	.0000

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low		
		Medium		
		High		
Mean	Media Value Level			
3.3907	Low			
3.6000	Medium			
4.0480	High	●	●	

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
17. Producing Manipulatives (Mathematics materials, etc.)	2.9760	10.5345	.0000

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low		
		Medium		
		High		
Mean	Media Value Level			
2.5430	Low			
3.2000	Medium	●		
3.2429	High	●		

Table 4.12 Forty-one Significantly Different Instructional Media Competencies Among Teachers Having Low, Medium and High Perceived Value of Media Use in the Classroom: ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
18. Producing Audio Recordings	3.2861	12.0530	.0000

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Medium	Low	High
3.0786	Medium			
3.1060	Low			
3.7360	High	●	●	

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
19. Video Recording (off-air recording)	3.7139	14.0473	.0000

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
3.4305	Low			
3.6143	Medium			
4.1680	High	●	●	

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
20. Video Programming (Producing own Programs)	3.5240	8.4015	.0003

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
3.2649	Low			
3.4643	Medium			
3.9040	High	●	●	

Table 4.12 Forty-one Significantly Different Instructional Media Competencies Among Teachers Having Low, Medium and High Perceived Value of Media Use in the Classroom: ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
21. Producing Still Photography	2.7139	10.4468	.0000

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
2.3444	Low			
2.8357	Medium	●		
3.0240	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
22. Producing Slide/tape programs	3.0505	15.5064	.0000

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
2.5894	Low			
3.2000	Medium	●		
3.4400	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
23. Producing Computer Assisted Instruction	4.2476	8.7516	.0002

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
4.0331	Low			
4.2643	Medium	●		
4.4880	High	●	●	

Table 4.12 Forty-one Significantly Different Instructional Media Competencies Among Teachers Having Low, Medium and High Perceived Value of Media Use in the Classroom: ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
25. Producing Computer Graphics	3.9087	4.7121	.0095

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
3.7351	Low			
3.8714	Medium			
4.1600	High	●	●	

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
26. Producing Games, Simulations and Media Kits	3.5168	9.4608	.0001

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
3.1854	Low			
3.6000	Medium	●		
3.8240	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
28. Utilizing Overhead Transparencies	3.8053	7.8651	.0004

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
3.5099	Low			
3.9429	Medium	●		
4.0080	High	●		

Table 4.12 Forty-one Significantly Different Instructional Media Competencies Among Teachers Having Low, Medium and High Perceived Value of Media Use in the Classroom: ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
32. Utilizing Duplicated Materials (Dittos, Xerox, etc.)	3.7957	7.4230	.0007

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
3.5166	Low			
3.8571	Medium	●		
4.0640	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
33. Utilizing Manipulatives (Mathematics materials, etc.)	3.0168	5.9778	.0028

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
2.7152	Low			
3.0720	Medium	●		
3.2929	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
35. Utilizing Instructional Films and Videos (tape & disc)	3.9183	13.9690	.0000

Duncan Multiple Range Test

<p>● - Indicates pairs of Value Levels significantly diff. at or above .05</p>				
Mean	Media Value Level	Low	Medium	High
3.5894	Low			
3.9071	Medium	●		
4.3280	High	●	●	

Table 4.12 Forty-one Significantly Different Instructional Media Competencies Among Teachers Having Low, Medium and High Perceived Value of Media Use in the Classroom: ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
36. Utilizing Broadcast Television	3.3534	8.0877	.0004

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
3.0397	Low			
3.4214	Medium	●		
3.6560	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
37. Utilizing Slides	3.0986	7.1586	.0009

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low		
		Medium		
		High		
Mean	Media Value Level			
2.8013	Low			
3.1929	Medium	●		
3.3520	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
38. Utilizing Filmstrips	3.0962	8.4340	.0003

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
2.7815	Low			
3.1571	Medium	●		
3.4080	High	●		

Table 4.12 Forty-one Significantly Different Instructional Media Competencies Among Teachers Having Low, Medium and High Perceived Value of Media Use in the Classroom: ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
39. Utilizing Computer Assisted Instruction	4.1635	5.0467	.0068

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
4.0066	Low			
4.1429	Medium			
4.3760	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
40. Utilizing Computer Interactive Video Programs	3.9279	3.7646	.0240

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
3.7152	Low			
3.9643	Medium			
4.1440	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
41. Utilizing Games and Simulations	3.5721	11.7514	.0000

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
3.1921	Low			
3.7286	Medium	●		
3.8560	High	●		

Table 4.12 Forty-one Significantly Different Instructional Media Competencies Among Teachers Having Low, Medium and High Perceived Value of Media Use in the Classroom: ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
42. Utilizing Free and Inexpensive Materials	4.0697	7.0277	.0010

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
3.9272	Low			
3.9714	Medium			
4.3520	High	●	●	

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
44. Operating Overhead Projectors	3.8582	10.8532	.0000

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
3.5166	Low			
3.9214	Medium	●		
4.2000	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
46. Operating Opaque Projectors	3.1683	6.4480	.0017

Duncan Multiple Range Test

		Low	Medium	High
<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
Mean	Media Value Level			
2.8543	Low			
3.2500	Medium	●		
3.4560	High	●		

Table 4.12 Forty-one Significantly Different Instructional Media Competencies Among Teachers Having Low, Medium and High Perceived Value of Media Use in the Classroom: ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
47. Operating Cassette Tape Recorders	3.3966	3.1208	.0452

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
3.2318	Low			
3.3571	Medium			
3.6400	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
49. Operating Video Tape Recorders	4.1442	10.9367	.0000

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
3.9338	Low			
4.0500	Medium			
4.5040	High	●	●	

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
50. Operating Video Camcorder Systems	4.0962	7.3505	.0007

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>					
		Low	Medium	High	
Mean	Media Value Level				
3.9007	Low				
4.0286	Medium				
4.4080	High	●	●		

Table 4.12 Forty-one Significantly Different Instructional Media Competencies Among Teachers Having Low, Medium and High Perceived Value of Media Use in the Classroom: ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
51. Operating Video Editing Systems	3.6659	5.4140	.0048

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
3.4371	Low			
3.6714	Medium			
3.9360	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
52. Operating 16mm Motion Picture Projectors	3.2668	7.7811	.0005

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
2.9338	Low			
3.3714	Medium	●		
3.5520	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
53. Operating 2x2 Slide Projectors	2.9663	6.2030	.0022

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
2.6623	Low			
3.0357	Medium	●		
3.2560	High	●		

Table 4.12 Forty-one Significantly Different Instructional Media Competencies Among Teachers Having Low, Medium and High Perceived Value of Media Use in the Classroom: ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
54. Operating Filmstrip Projectors	3.1250	5.9409	.0029

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
2.8344	Low			
3.2071	Medium	●		
3.3840	High	●		

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
55. Operating Computer Interactive Video Systems	4.0505	9.3680	.0001

Duncan Multiple Range Test

<div>● - Indicates pairs of Value Levels significantly diff. at or above .05</div>				
		Low	Medium	High
Mean	Media Value Level			
3.8013	Low			
4.0071	Medium			
4.4000	High	●	●	

5. Is there any difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on perceived value of instructional media use in the classroom?

A one-way analysis of variance was computed for each of the fifty-six instructional media competencies controlling for each of three categories (low, medium and high) of perceived value of instructional media in the classroom. A total of one-hundred and sixty-eight (168) ANOVA's were completed.

Selecting only teachers with a **low** perceived value of instructional media use in the classroom twenty-two (22) or 39% of the recommendations for instructional media competencies tested significantly different among secondary education teaching disciplines at the .05 level of confidence or higher. Thirty-four (34) or 61% of the instructional media competencies showed no significant difference among teaching disciplines.

Selecting only teachers with a **medium** perceived value of instructional media use in the classroom sixteen (16) or 29% of the recommendations for instructional media competencies tested significantly different among secondary education teaching disciplines at the .05 level of confidence or higher. Forty (40) or 71% of the instructional media competencies showed no significant difference among teaching disciplines.

Selecting only teachers with a **high** perceived value of instructional media use in the classroom three (3) or 5% of the recommendations for instructional media competencies tested significantly different among secondary education teaching disciplines at the .05 level of confidence or higher. Fifty-three (53)

or 95% of the instructional media competencies showed no significant difference among teaching disciplines.

A Duncan Multiple Range Test was computed for each instructional media competency found to have significant difference in order to determine which teaching disciplines were different.

Table 4.13 presents the “Population Mean”, “F-Ratio” and “F-Probability” for the entire population and the “Low”, “Medium” and “High” levels of perceived value of instructional media use in the classroom. Table 4.13.1 presents the ANOVA results and Duncan Multiple Range Test for the recommendations of instructional media competencies by secondary education teachers with a “**low**” level of perceived value of instructional media use in the classroom having a significant difference at or above the 0.05 level of confidence. Table 4.13.2 presents the ANOVA results and Duncan Multiple Range Test for the recommendations of instructional media competencies by secondary education teachers with a “**medium**” level of perceived value of instructional media use in the classroom having a significant difference at or above the 0.05 level of confidence. Table 4.13.3 presents the ANOVA results and Duncan Multiple Range Test for the recommendations of instructional media competencies by secondary education teachers with a “**high**” level of perceived value of instructional media use in the classroom having a significant difference at or above the 0.05 level of confidence. (To conserve space, only the “Population Mean”, “F-Ratio” and “F-Probability” are included in the Tables.)

Table 4.13 ANOVA Summary: Instructional Media Competencies by Perceived Value of Instructional Media Use in the Classroom for Total Population and each Value Level

Bold indicates significance at .05 level	Total Population			Low Media Value			Medium Media Value			High Media Value		
	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.
Found. and Theory Comp:												
1. Communication Theory	3.2596	.4346	.6478	3.2914	1.3765	.1904	3.1714	.9321	.5120	3.3200	1.1535	.3276
2. Design and Layout of Visual Materials	3.6322	4.3605	.0134	3.4305	.8283	.6120	3.6429	.6049	.8219	3.8640	1.3655	.1989
3. Instr. Design Theory and Practice	3.2188	.9770	.3773	3.1060	1.1461	.3306	3.2500	.4357	.9374	3.3200	1.5400	.1269
4. Media Selection and Eval. Criteria	3.5529	7.8859	.0004	3.2517	.8312	.6091	3.6929	.6912	.7449	3.7600	1.0705	.3913
5. Impact of Technology on Education	3.6538	4.3270	.0138	3.4901	2.6404	.0043	3.5929	1.4085	.1766	3.9200	.7186	.7187
6. Implications of Inst. Media Research	2.9447	1.4951	.2254	2.8079	1.4405	.1614	3.0500	1.1718	.3130	3.9920	1.0543	.4046
7. Future Trends of Media and Tech.	3.6538	2.4368	.0887	3.4901	1.5155	.1323	3.7714	.7992	.6406	3.7200	.5960	.8287
8. Copyright Laws and Education	3.6274	.1312	.8771	3.6026	1.8749	.0476	3.6143	.4376	.9364	3.6720	.6113	.8160
Production Competencies:												
9. Lettering for Instructional Materials	3.3702	7.2203	.0008	3.0795	1.1122	.3562	3.4429	3.5385	.0002	3.6400	.6995	.7368
10. Mounting Visuals	3.3942	8.8567	.0002	3.0661	1.4607	.1531	3.4786	2.7164	.0035	3.6720	1.0482	.4097
11. Laminating Visuals	3.4471	9.1793	.0001	3.1325	1.0022	.4477	3.5357	2.7006	.0037	3.7280	1.2457	.2656
12. Machine Prod. Transparencies	3.7909	18.537	.0000	3.3709	1.7040	.0783	3.9500	.9511	.4944	4.1200	.1481	.9993
13. Handmade Transparencies	3.7043	10.675	.0000	3.3974	.9410	.5034	3.7714	1.4330	.1658	4.0000	.8340	.6065
14. Display Boards (B.B., etc.)	3.7019	9.8942	.0001	3.4305	2.1318	.0218	3.7071	1.6110	.1030	4.0240	.9025	.5405
15. Duplicating Inst. Materials	3.8918	11.980	.0000	3.5497	.6602	.7738	3.9714	1.1194	.3515	4.2160	.6934	.7425
16. Illus. and Enlarge. Techniques	3.6587	10.608	.0000	3.3907	1.5722	.1134	3.6000	1.3026	.2302	4.0480	.7542	.6845
17. Manipulatives (Math materials, etc.)	2.9760	10.535	.0000	2.5430	4.3389	.0000	3.2429	3.3203	.0005	3.2000	2.0671	.0283
18. Audio Recording	3.2861	12.053	.0000	3.1060	3.7851	.0001	3.0786	2.4244	.0089	3.7360	1.2457	.2656
19. Video Recording (off-air recording)	3.7139	14.047	.0000	3.4305	1.8272	.0548	3.6143	1.1246	.3475	4.1680	1.4025	.1813
20. Video Programming	3.5240	8.4015	.0003	3.2649	1.5318	.1266	3.4643	3.1729	.0008	3.9040	1.5139	.1360

Table 4.13 ANOVA Summary: Instructional Media Competencies by Perceived Value of Instructional Media Use in the Classroom for Total Population and each Value Level (cont.)

Bold indicates significance at .05 level	Total Population			Low Media Value			Medium Media Value			High Media Value		
	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.
Production Competencies (cont.):												
21. Still photography	2.7139	10.447	.0000	2.3444	3.3094	.0005	2.8357	2.7629	.0030	3.0240	1.6027	.1073
22. Slide/tape programs	3.0505	15.506	.0000	2.5894	2.1940	.0179	3.2000	2.6724	.0040	3.4400	.9410	.5043
23. Computer Assisted Instruction	4.2476	8.7516	.0002	4.0331	1.9881	.0338	4.2643	.9556	.4902	4.4880	.5933	.8303
24. Computer Programming	3.5361	.8119	.4447	3.4636	1.1016	.3645	3.5000	.4483	.9308	3.6640	.7198	.7175
25. Computer Graphics	3.9087	4.7121	.0095	3.7351	2.2872	.0134	3.8714	.4739	.9164	4.1600	1.2462	.2653
26. Games, simulations and media kits	3.5168	9.4608	.0001	3.1854	2.8596	.0021	3.6000	1.5307	.1281	3.8240	1.3814	.1912
Utilization Competencies:												
27. Non-projected visuals	3.1899	2.2901	.0929	3.0265	1.2887	.2370	3.2000	1.3166	.2224	3.3760	1.3920	.1862
28. Overhead Transparencies	3.8053	7.8651	.0004	3.5099	1.0287	.4245	3.9429	1.4957	.1407	4.0080	.8952	.5474
29. Display Boards (Bulletin Boards, etc.)	3.6178	1.2326	.2926	3.5099	1.1668	.3156	3.7357	1.9353	.0405	3.6160	.9374	.5076
30. Flip Charts	2.8125	2.7115	.0676	2.6093	1.1941	.2965	2.9286	3.0852	.0010	2.9280	.3552	.9701
31. Chalkboards	3.5313	.0018	.9982	3.5364	.4171	.9565	3.5286	.7154	.7221	3.5280	.7110	.7259
32. Duplicated Materials	3.7957	7.4230	.0007	3.5166	.9169	.5261	3.8571	1.2908	.2369	4.0640	.8463	.5946
33. Manipulatives (Math materials, etc.)	3.0168	5.9778	.0028	2.7152	3.2676	.0005	3.2929	2.7016	.0037	3.0720	1.0398	.4167
34. Audio Recordings	3.2380	2.9529	.0533	3.1457	4.0298	.0000	3.1214	4.0456	.0000	3.4800	1.0937	.3727
35. Instr. Films and Videos (tape & disc)	3.9183	13.969	.0000	3.5894	1.7707	.0646	3.9071	1.1696	.3146	4.3280	1.7273	.0761
36. Broadcast Television	3.3534	8.0877	.0004	3.0397	.7046	.7325	3.4214	2.0240	.0310	3.6560	.7557	.6829
37. Slides	3.0986	7.1586	.0009	2.8013	2.6181	.0046	3.1929	2.4305	.0088	3.3520	1.4540	.1590
38. Filmstrips	3.0962	8.4340	.0003	2.7815	2.0991	.0241	3.1571	3.4386	.0003	3.4080	1.2911	.2385
39. Computer Assisted Instruction	4.1635	5.0467	.0068	4.0066	1.5624	.1164	4.1429	.9216	.5220	4.3760	.8001	.6397
40. Comp. Interactive Video Programs	3.9279	3.7646	.0240	3.7152	1.1652	.3167	3.9643	.2316	.9949	4.1440	.8087	.6313

Table 4.13 ANOVA Summary: Instructional Media Competencies by Perceived Value of Instructional Media Use in the Classroom for Total Population and each Value Level (cont.)

Bold indicates significance at .05 level	Total Population			Low Media Value			Medium Media Value			High Media Value		
	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.	Pop. Mean	F- Ratio	F- Prob.
Utilization Competencies (cont.):												
41. Games and Simulations	3.5721	11.751	.0000	3.1921	2.7209	.0033	3.7286	1.6001	.1061	3.8560	1.3993	.1828
42. Free and Inexpensive Materials	4.0697	7.0277	.0010	3.9272	2.3963	.0094	3.9714	1.6075	.1041	4.3520	1.2209	.2814
43. Field Trips and Community Resources	3.9760	2.5341	.0806	3.8609	1.4818	.1447	3.9500	1.1636	.3188	4.1440	.7862	.6532
Operation Competencies:												
44. Overhead Projectors	3.8582	10.853	.0000	3.5166	1.7792	.0630	3.9214	.9220	.5216	4.2000	.8869	.5554
45. Spirit Duplicators (Ditto)	3.3846	2.4263	.0896	3.1656	1.9076	.0431	3.4929	1.3606	.1994	3.5280	1.1206	.3519
46. Opaque Projectors	3.1683	6.4480	.0017	2.8543	2.4291	.0085	3.2500	.8193	.6209	3.4560	1.2670	.2526
47. Cassette Tape Recorders	3.3966	3.1208	.0452	3.2318	1.2769	.2439	3.3571	1.2102	.2867	3.6400	1.3372	.2133
48. Record Players	2.9567	2.2375	.1080	2.8013	2.0425	.0287	2.9286	1.3943	.1831	3.1760	1.3927	.1858
49. Video Tape Recorders	4.1442	10.937	.0000	3.9338	.7987	.6411	4.0500	2.4535	.0082	4.5040	1.5814	.1136
50. Video Camcorder Systems	4.0962	7.3505	.0007	3.9007	1.0403	.4146	4.0286	1.5870	.1100	4.4080	.9982	.4526
51. Video Editing Systems	3.6659	5.4140	.0048	3.4371	1.5152	.1324	3.6714	1.6127	.1025	3.9360	1.7974	.0624
52. 16mm Motion Picture Projectors	3.2668	7.7811	.0005	2.9338	1.6100	.1021	3.3714	1.8564	.0512	3.5520	.9640	.4832
53. 2X2 Slide Projectors	2.9663	6.2030	.0022	2.6623	1.8959	.0447	3.0357	1.0550	.4029	3.2560	1.9998	.0346
54. Filmstrip Projectors	3.1250	5.9409	.0029	2.8344	1.9978	.0329	3.2071	1.2187	.2811	3.3840	2.0617	.0288
55. Computer Interactive Video Systems	4.0505	9.3680	.0001	3.8013	.6745	.7608	4.0071	.6081	.8192	4.4000	.7199	.7174
56. Comp. Overhead Proj. LCD Systems	3.9063	2.4347	.0889	3.7417	1.9427	.0388	3.9000	1.0726	.3884	4.1120	.8965	.5462

Duncan Multiple Range Test

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
8. Copyright Laws and Education	3.6026	1.8749	.0476

Duncan Multiple Range Test

[illegible]

Duncan Multiple Range Test

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
17. Producing Manipulatives (Mathematics materials, etc.)	2.5430	4.3389	.0001

[illegible]

Table 4.13.1 **Low Media Value** - Twenty-two Significantly Different Instructional Media Competencies:
ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
22. Producing Slide/tape programs	2.5894	2.1940	.0179

Duncan Multiple Range Test

Mean	Disciplines	Industrial Arts	Math/Comp. Sc.	Social Science	Language Arts	Music	Foreign Language	Health	P.E.	Business	Science	Home Economics	Art
1.6667	Industrial Arts												
2.0833	Math/Comp. Sc.												
2.1250	Social Science												
2.1818	Language Arts												
2.2632	Music												
2.4167	Foreign Language												
2.5556	Health												
2.8000	P.E.												
2.8462	Business												
3.2000	Science												
3.4545	Home Economics	●	●	●	●	●							
3.5385	Art	●	●	●	●	●							

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
23. Producing Computer Aided Instruction	4.0331	1.9881	.0338

Duncan Multiple Range Test

[illegible]

Table 4.13.1 **Low Media Value** - Twenty-two Significantly Different Instructional Media Competencies:
ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
25. Producing Computer Graphics	3.7351	2.2872	.0134

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Industrial Arts	Social Science	Music	Health	Foreign Language	Language Arts	Home Economics	P.E.	Math/Comp. Sc.	Business	Science	Art
2.6667	Industrial Arts												
3.1250	Social Science												
3.3158	Music												
3.3333	Health												
3.4167	Foreign Language												
3.4545	Language Arts												
3.8182	Home Economics												
3.8667	P.E.												
3.9583	Math/Comp. Sc.	●											
4.2308	Business	●											
4.3000	Science	●											
4.4615	Art	●	●	●	●	●							

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
26. Producing Games, Simulations and Media Kits	3.1854	2.8596	.0021

Duncan Multiple Range Test

		<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>											
Mean	Disciplines	Industrial Arts	Music	Language Arts	Art	Math/Comp. Sc.	Social Science	Business	Science	P.E.	Health	Foreign Language	Home Economics
1.6667	Industrial Arts												
2.6842	Music												
2.7273	Language Arts												
2.7692	Art												
3.0000	Math/Comp. Sc.	●											
3.0000	Social Science	●											
3.1538	Business	●											
3.4000	Science	●											
3.6000	P.E.	●											
3.7778	Health	●	●										
4.0000	Foreign Language	●	●	●	●								
4.2727	Home Economics	●	●	●	●	●							

Duncan Multiple Range Test

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
34. Utilizing Audio Recordings	3.1457	4.0298	.0000

[illegible]

Table 4.13.1 **Low Media Value** - Twenty-two Significantly Different Instructional Media Competencies: ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
37. Utilizing Slides	2.8013	2.6181	.0046

Duncan Multiple Range Test

<div> <p>● - Indicates pairs of disciplines significantly diff. at or above .05</p> </div>		Math/Comp. Sc.	Music	Industrial Arts	Language Arts	Business	Foreign Language	Social Science	Home Economics	P.E.	Health	Science	Art
Mean	Disciplines												
2.2083	Math/Comp. Sc.												
2.2632	Music												
2.3333	Industrial Arts												
2.4545	Language Arts												
2.4615	Business												
3.0000	Foreign Language												
3.0000	Social Science												
3.0909	Home Economics												
3.1333	P.E.	●											
3.2222	Health	●											
3.3000	Science	●											
3.9231	Art	●	●	●	●	●							

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
38. Utilizing Filmstrips	2.7815	2.0991	.0241

Duncan Multiple Range Test

<div> <p>● - Indicates pairs of disciplines significantly diff. at or above .05</p> </div>		Language Arts	Math/Comp. Sc.	Industrial Arts	Foreign Language	Business	Music	Science	Social Science	Home Economics	P.E.	Health	Art
Mean	Disciplines												
2.1818	Language Arts												
2.2083	Math/Comp. Sc.												
2.3333	Industrial Arts												
2.5833	Foreign Language												
2.6154	Business												
2.6316	Music												
2.7000	Science												
3.1250	Social Science												
3.1818	Home Economics												
3.2000	P.E.	●	●										
3.4444	Health	●	●										
3.6923	Art	●	●	●	●	●	●						

Duncan Multiple Range Test

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
42. Utilizing Free and Inexpensive Materials	3.9272	2.3963	.0094

[illegible]

Table 4.13.1 **Low Media Value** - Twenty-two Significantly Different Instructional Media Competencies:
ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
45. Operating Spirit Duplicators (Ditto)	3.1656	1.9076	.0431

Duncan Multiple Range Test

<div> <p>● - Indicates pairs of disciplines significantly diff. at or above .05</p> </div>		Industrial Arts	Foreign Language	Science	Business	Language Arts	Music	Art	Health	P.E.	Math/Comp. Sc.	Social Science	Home Economics
Mean	Disciplines												
1.6667	Industrial Arts												
2.5000	Foreign Language												
2.6000	Science												
2.7692	Business												
2.8182	Language Arts												
2.8947	Music												
3.1538	Art												
3.2222	Health												
3.5333	P.E.	●											
3.8750	Math/Comp. Sc.	●	●										
3.8750	Social Science	●	●										
3.9091	Home Economics	●	●										

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
46. Operating Opaque Projectors	2.8543	2.4291	.0085

Duncan Multiple Range Test

<div> <p>● - Indicates pairs of disciplines significantly diff. at or above .05</p> </div>		Business	Industrial Arts	Foreign Language	Science	Music	Language Arts	Social Science	Health	Math/Comp. Sc.	P.E.>	Art	Home Economics
Mean	Disciplines												
2.0000	Business												
2.0000	Industrial Arts												
2.0833	Foreign Language												
2.1000	Science												
2.6316	Music												
2.9091	Language Arts												
3.0000	Social Science												
3.1111	Health												
3.1250	Math/Comp. Sc.	●											
3.3333	P.E.>	●	●	●									
3.3846	Art	●	●	●									
4.0000	Home Economics	●	●	●	●	●							

Duncan Multiple Range Test

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
53. Operating 2x2 Slide Projectors	2.6623	1.8959	.0447

[illegible]

Duncan Multiple Range Test

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
56. Operating Computer Overhead Projector LCD Systems	3.7417	1.9427	.0388

[illegible]

Table 4.13.2 **Medium Media Value** - Sixteen Significantly Different Instructional Media Competencies:
ANOVA's with Duncan Tests

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
9. Producing Lettering for Instructional Materials	3.4429	3.5385	.0002

Duncan Multiple Range Test

		● - Indicates pairs of disciplines significantly diff. at or above .05											
Mean	Disciplines	Science	Math/Comp. Sc.	Foreign Language	Music	Health	Art	Business	Industrial Arts	Language Arts	Social Science	Home Economics	P.E.
2.4667	Science												
2.8333	Math/Comp. Sc.												
3.3077	Foreign Language												
3.3333	Music												
3.3571	Health	●											
3.5556	Art	●											
3.5833	Business	●											
3.6250	Industrial Arts	●											
4.0000	Language Arts	●	●										
4.0000	Social Science	●	●										
4.1429	Home Economics	●	●										
4.6000	P.E.	●	●										

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
10. Mounting Visuals	3.4786	2.7164	.0035

Duncan Multiple Range Test

		● - Indicates pairs of disciplines significantly diff. at or above .05											
Mean	Disciplines	Math/Comp. Sc.	Music	Health	Science	Business	Foreign Language	Art	Industrial Arts	Language Arts	Social Science	Home Economics	P.E.
2.9583	Math/Comp. Sc.												
3.0000	Music												
3.0714	Health												
3.1333	Science												
3.3333	Business												
3.3846	Foreign Language												
3.4444	Art												
3.5000	Industrial Arts												
3.9412	Language Arts	●	●	●									
4.0000	Social Science	●	●	●									
4.2857	Home Economics	●	●	●	●	●	●	●					
4.6000	P.E.	●	●	●	●	●	●	●					

Duncan Multiple Range Test

Duncan Multiple Range Test

[illegible]

Table 4.13.2 **Medium Media Value** - Sixteen Significantly Different Instructional Media Competencies:
ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
18. Producing Audio Recordings	3.0786	2.4244	.0089

Duncan Multiple Range Test

● - Indicates pairs of disciplines significantly diff. at or above .05		Math/Comp. Sc.	Business	Art	Science	Industrial Arts	Health	Home Economics	Foreign Language	P.E.	Social Science	Language Arts	Music
Mean	Disciplines												
2.4583	Math/Comp. Sc.												
2.7500	Business												
2.7778	Art												
2.8667	Science												
2.8750	Industrial Arts												
3.0000	Health												
3.2857	Home Economics												
3.3846	Foreign Language	●											
3.4000	P.E.	●											
3.5000	Social Science	●											
3.7647	Language Arts	●	●	●	●								
4.6667	Music	●	●	●	●	●	●						

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
20. Video Programming (Producing own programs)	3.4643	3.1729	.0008

Duncan Multiple Range Test

● - Indicates pairs of disciplines significantly diff. at or above .05		Math/Comp. Sc.	Science	Business	Health	Home Economics	Art	Social Science	Industrial Arts	Foreign Language	Language Arts	Music	P.E.
Mean	Disciplines												
2.6667	Math/Comp. Sc.												
2.8667	Science												
3.1667	Business												
3.2857	Health												
3.3571	Home Economics												
3.4444	Art												
3.6667	Social Science												
3.8750	Industrial Arts	●											
4.2308	Foreign Language	●	●										
4.2941	Language Arts	●	●	●	●								
4.3333	Music	●	●	●	●								
4.4000	P.E.	●	●	●	●								

Duncan Multiple Range Test

Duncan Multiple Range Test

[illegible]

Table 4.13.2 **Medium Media Value** - Sixteen Significantly Different Instructional Media Competencies:
ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
29. Utilizing Display Boards (Bulletin Boards, Displays, etc.)	3.7357	1.9353	.0405

Duncan Multiple Range Test

		● - Indicates pairs of disciplines significantly diff. at or above .05											
Mean	Disciplines	Social Science	Science	Math/Comp. Sc.	Music	Industrial Arts	Art	Foreign Language	P.E.	Language Arts	Health	Home Economics	Business
3.1667	Social Science												
3.2667	Science												
3.2914	Math/Comp. Sc.												
3.3333	Music												
3.6250	Industrial Arts												
3.6667	Art												
3.6923	Foreign Language												
4.0000	P.E.												
4.0588	Language Arts	●	●										
4.0714	Health	●	●										
4.2143	Home Economics	●	●										
4.2500	Business	●	●										

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
30. Utilizing Flip Charts	2.9286	3.0852	.0010

Duncan Multiple Range Test

<div>● - Indicates pairs of disciplines significantly diff. at or above .05</div>		Industrial Arts	Math/Comp. Sc.	Art	Science	Music	Foreign Language	Health	Language Arts	Business	Social Science	P.E.	Home Economics
Mean	Disciplines												
2.0000	Industrial Arts												
2.2917	Math/Comp. Sc.												
2.4444	Art												
2.4667	Science												
2.6667	Music												
3.0000	Foreign Language												
3.2143	Health	●	●										
3.2941	Language Arts	●	●										
3.4167	Business	●	●										
3.5000	Social Science	●	●										
3.6000	P.E.	●	●										
3.7143	Home Economics	●	●	●	●								

Table 4.13.2 **Medium Media Value** - Sixteen Significantly Different Instructional Media Competencies:
ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
33. Utilizing Manipulatives (Mathematics materials, etc.)	3.2929	2.7016	.0037

Duncan Multiple Range Test

		<div> ● - Indicates pairs of disciplines significantly diff. at or above .05 </div>										
Mean	Disciplines	Industrial Arts	Art	Music	Language Arts	Science	Health	Home Economics	Foreign Language	Social Science	Business	P.E.
2.3750	Industrial Arts											
2.5556	Art											
2.6667	Music											
2.8235	Language Arts											
3.1333	Science											
3.2143	Health											
3.2143	Home Economics											
3.2308	Foreign Language											
3.5000	Social Science											
3.5833	Business											
3.6000	P.E.											
4.2500	Math/Comp. Sc.	●	●	●	●	●	●	●	●			

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
34. Utilizing Audio Recordings	3.1214	4.0456	.0000

Duncan Multiple Range Test

		<div> ● - Indicates pairs of disciplines significantly diff. at or above .05 </div>										
Mean	Disciplines	Math/Comp. Sc.	Health	Industrial Arts	P.E.	Science	Home Economics	Business	Art	Social Science	Language Arts	Foreign Language
2.2083	Math/Comp. Sc.											
2.4286	Health											
2.6250	Industrial Arts											
3.2000	P.E.											
3.2000	Science	●										
3.2143	Home Economics	●										
3.2500	Business	●										
3.4444	Art	●										
3.5000	Social Science	●										
3.6471	Language Arts	●	●									
4.1538	Foreign Language	●	●	●	●	●						
4.3333	Music	●	●	●	●	●						

Table 4.13.2 **Medium Media Value** - Sixteen Significantly Different Instructional Media Competencies:
ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
36. Utilizing Broadcast Television	3.4214	2.0240	.0310

Duncan Multiple Range Test

[illegible]

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
37. Utilizing Slides	3.1929	2.4305	.0088

Duncan Multiple Range Test

[illegible]

Table 4.13.3 **High Media Value** - Three Significantly Different Instructional Media Competencies:
ANOVA's with Duncan Tests (cont.)

Instructional Media Competency	Pop. Mean	F-Ratio	F-Probability
54. Operating Filmstrip Projectors	3.3840	2.0617	.0288

Duncan Multiple Range Test

<div> ● - Indicates pairs of disciplines significantly diff. at or above .05 </div>		Science	Business	Math/Comp. Sc.	Industrial Arts	Language Arts	Health	P.E.	Foreign Language	Home Economics	Music	Social Science	Art
Mean	Disciplines												
2.3846	Science												
2.6250	Business												
2.8000	Math/Comp. Sc.												
3.0000	Industrial Arts												
3.1250	Language Arts												
3.4000	Health												
3.4000	P.E.												
3.5714	Foreign Language												
3.9375	Home Economics	●											
4.1667	Music	●											
4.2500	Social Science	●											
4.4286	Art	●	●										

6. Is there any difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on years of teaching experience?

The question of number of years teaching full time was an open ended question on the questionnaire. After compiling the data it was determined that the range for years teaching was a low of one year to a high of thirty-five years with a median of seventeen years. The years teaching data were then recoded into two categories. Responses of low to sixteen years were grouped into category 1=low

and responses of seventeen to high were grouped into category 2=high. After the years teaching data were recoded a t-Test was computed for each of the fifty-six instructional media competencies controlling for each of the secondary education teaching disciplines. A total of 672 individual tests were completed. By setting the alpha level at .05 there were only thirty-one (31) combinations of instructional media competencies and secondary education teaching disciplines that indicated a significant difference between teachers with low years of teaching and high years of teaching. By extending the alpha level to .10 an additional forty-two (42) combinations of instructional media competencies and secondary education teaching disciplines indicated a significant difference between teachers with low years of teaching and high years of teaching. Table 4.14 displays the results of the t-Tests for those combinations of instructional media competencies and secondary education teaching disciplines which indicate a significant difference.

Table 4.14 t-Test Summary: Significantly Different Instructional Media Competency Recommendations by Years of Experience

* = .05 level of confidence
** = .10 level of confidence

Discipline	Number of Cases		Degrees of Freedom
Art	Low Years of Experience	17	27
	High Years of Experience	12	

3. Instructional Theory and Practice

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.2941	.686	.166	1.99	.057 **
High	3.3333	1.826	.527		

5. Impact of Technology on Education

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.7647	.970	.235	-2.26	.032 *
High	4.5000	.674	.195		

22. Producing Slide/tape programs

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.0588	.899	.218	2.00	.056 **
High	3.2500	1.288	.372		

40. Utilizing Computer Interactive Video Systems

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.2941	.849	.206	1.72	.097 **
High	3.5833	1.379	.398		

43. Utilizing Field Trips and Community Resources

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.8235	1.015	.246	-2.17	.039 *
High	4.5833	.793	.229		

Discipline	Number of Cases		Degrees of Freedom
Business	Low Years of Experience	16	31
	High Years of Experience	17	

17. Producing Manipulatives (Mathematics materials, etc.)

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.0625	1.482	.370	1.77	.086 **
High	2.1176	1.576	.382		

24. Producing Computer Programming

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.0000	1.095	.274	2.18	.037 *
High	3.0000	1.500	.364		

Table 4.14 t-Test Summary: Significantly Different Instructional Media Competency Recommendations by Years of Experience (cont.)

* = .05 level of confidence
** = .10 level of confidence

Discipline	Number of Cases		Degrees of Freedom
Business (cont.)	Low Years of Experience	16	31
	High Years of Experience	17	

26. Producing Games, Simulations and Media Kits

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.8750	.957	.239	2.15	.039 *
High	3.0588	1.197	.290		

36. Utilizing Broadcast Television

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.5000	1.461	.365	2.05	.049 *
High	2.4706	2.4706	.344		

38. Utilizing Filmstrips

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.1875	1.515	.379	1.81	.080 **
High	2.3529	1.115	.270		

41. Utilizing Games and Simulations

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.9375	.929	.232	1.70	.100 **
High	3.1765	1.551	.376		

53. Operating 2x2 Slide Projectors

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.3125	1.401	.350	3.08	.004 *
High	1.8824	1.269	.308		

Discipline	Number of Cases		Degrees of Freedom
Foreign Language	Low Years of Experience	22	37
	High Years of Experience	17	

18. Producing Audio Recordings

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.2727	1.279	.273	-2.34	.025 *
High	4.1176	.857	.208		

30. Utilizing Flip Charts

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	2.2273	1.478	.315	-2.88	.007 *
High	3.4706	1.125	.273		

Table 4.14 t-Test Summary: Significantly Different Instructional Media Competency Recommendations by Years of Experience (cont.)

* = .05 level of confidence
** = .10 level of confidence

Discipline	Number of Cases		Degrees of Freedom
Foreign Language (cont.)	Low Years of Experience	22	37
	High Years of Experience	17	

32. Utilizing Duplicated Materials (Dittos, Xerox, etc.)

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.5909	1.054	.225	-2.18	.035 *
High	4.3529	1.115	.270		

34. Utilizing Audio Recordings

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.5000	1.102	.235	-3.06	.004 *
High	4.4706	.800	.194		

35. Utilizing Instructional Films and Videos (tape & disc)

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.8182	1.259	.268	-2.56	.015 *
High	4.6471	.493	.119		

38. Utilizing Filmstrips

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	2.8636	1.207	.257	-1.71	.096 **
High	3.4706	.943	.229		

44. Operating Overhead Projectors

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.4545	1.224	.261	-1.78	.083 **
High	4.1176	1.054	.256		

48. Operating Record Players

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	2.3636	1.465	.312	-1.86	.071 **
High	3.2353	1.437	.349		

Discipline	Number of Cases		Degrees of Freedom
Health	Low Years of Experience	17	36
	High Years of Experience	21	

1. Communication Theory

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	2.7647	1.251	.304	-1.89	.066 **
High	3.5238	1.209	.264		

Table 4.14 t-Test Summary: Significantly Different Instructional Media Competency Recommendations by Years of Experience (cont.)

* = .05 level of confidence
** = .10 level of confidence

Discipline	Number of Cases		Degrees of Freedom
Health (cont.)	Low Years of Experience	17	36
	High Years of Experience	21	

37. Utilizing Slides

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.4118	1.176	.285	1.79	.082 **
High	2.6667	1.354	.295		

43. Utilizing Field Trips and Community Resources

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.1176	.928	.225	1.98	.055 **
High	3.3810	1.284	.280		

46. Operating Opaque Projectors

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.7059	1.047	.254	1.86	.070 **
High	2.8571	1.621	.354		

56. Operating Microcomputer Overhead Projector LCD Systems

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.2353	1.033	.250	2.15	.039 *
High	3.1429	1.878	.410		

Discipline	Number of Cases		Degrees of Freedom
Home Economics	Low Years of Experience	29	39
	High Years of Experience	12	

31. Utilizing Chalkboards

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.9310	1.163	.216	1.89	.067 **
High	3.0833	1.621	.468		

47. Operating Cassette Tape Recorders

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.2759	1.099	.204	-2.06	.046 *
High	4.0833	1.240	.358		

Table 4.14 t-Test Summary: Significantly Different Instructional Media Competency Recommendations by Years of Experience (cont.)

* = .05 level of confidence
** = .10 level of confidence

Discipline	Number of Cases		Degrees of Freedom
Industrial Arts	Low Years of Experience	11	22
	High Years of Experience	13	

10. Mounting Visuals

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.9091	.831	.251	2.62	.016 *
High	2.6154	1.446	.401		

19. Video Recording (off-air recording)

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.3636	.674	.203	1.73	.097 **
High	3.5385	1.450	.402		

21. Producing Still Photography

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.8182	1.079	.325	2.56	.018 *
High	2.4615	1.450	.402		

25. Producing Computer Graphics

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.5455	.522	.157	1.74	.096 *
High	3.6923	1.548	.429		

26. Producing Games, Simulations and Media Kits

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.3636	1.120	.338	2.09	.048 *
High	2.3077	1.316	.365		

36. Utilizing Broadcast Television

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.8182	1.079	.325	2.00	.058 **
High	2.7692	1.423	.395		

Discipline	Number of Cases		Degrees of Freedom
Language Arts	Low Years of Experience	16	34
	High Years of Experience	20	

33. Utilizing Manipulatives

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.2500	1.921	.323	1.74	.091 **
High	2.4500	1.432	.320		

Table 4.14 t-Test Summary: Significantly Different Instructional Media Competency Recommendations by Years of Experience (cont.)

* = .05 level of confidence
** = .10 level of confidence

Discipline	Number of Cases		Degrees of Freedom
Language Arts (cont.)	Low Years of Experience	16	34
	High Years of Experience	20	

35. Utilizing Instructional Films and Videos (tape & disc)

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.4375	.629	.157	1.98	.056 **
High	3.7000	1.380	.309		

38. Utilizing Filmstrips

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.5000	1.317	.329	1.73	.092 **
High	2.8500	.933	.209		

Discipline	Number of Cases		Degrees of Freedom
Math/Comp. Sc.	Low Years of Experience	27	56
	High Years of Experience	31	

14. Producing Display Boards (Bulletin Boards, Displays, etc.)

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.7778	.751	.145	1.94	.057 **
High	3.2903	1.101	.198		

29. Utilizing Display Boards (Bulletin Boards, Displays, etc.)

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.7407	.859	.165	2.65	.011 *
High	3.0968	.978	.176		

42. Utilizing Free and Inexpensive Materials

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.0741	1.035	.199	1.68	.099 **
High	3.6452	.915	.164		

48. Operating Record Players

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	2.9630	1.160	.223	2.39	.020 *
High	2.1290	1.455	.261		

49. Operating Video Tape Recorders

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.8889	1.013	.195	1.94	.058 **
High	3.2903	1.296	.233		

Table 4.14 t-Test Summary: Significantly Different Instructional Media Competency Recommendations by Years of Experience (cont.)

* = .05 level of confidence
** = .10 level of confidence

Discipline	Number of Cases		Degrees of Freedom
Math/Comp. Sc. (cont.)	Low Years of Experience	27	56
	High Years of Experience	31	

51. Operating Video Editing Systems

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.5185	.935	.180	1.76	.084 **
High	2.9355	1.482	.266		

52. Operating 16mm Motion Picture Projectors

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.1481	1.099	.212	1.89	.064 **
High	2.6129	1.054	.189		

53. Operating 2x2 Slide Projectors

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.1852	1.111	.214	2.69	.009 *
High	3.3226	1.301	.234		

54. Operating Filmstrip Projectors

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.0370	1.160	.223	1.82	.074 **
High	2.4839	1.151	.207		

Discipline	Number of Cases		Degrees of Freedom
Music	Low Years of Experience	18	26
	High Years of Experience	10	

1. Communication Theory

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	2.7222	1.565	.369	-2.35	.027 *
High	4.0000	.943	.298		

29. Utilizing Display Boards (Bulletin Boards, Displays, etc.)

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.7778	1.263	.298	2.08	.047 *
High	2.6000	1.713	.542		

32. Utilizing Duplicated Materials (Dittos, Xerox, etc.)

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.6667	.840	.198	-2.34	.027 *
High	4.4000	.699	.221		

Table 4.14 t-Test Summary: Significantly Different Instructional Media Competency Recommendations by Years of Experience (cont.)

* = .05 level of confidence
** = .10 level of confidence

Discipline	Number of Cases		Degrees of Freedom
Music (cont.)	Low Years of Experience	18	26
	High Years of Experience	10	

40. Utilizing Computer Interactive Video Programs

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.6667	1.328	.313	1.77	.088 **
High	2.5000	2.173	.687		

Discipline	Number of Cases		Degrees of Freedom
P.E.	Low Years of Experience	10	28
	High Years of Experience	20	

2. Design and Layout of Visual Materials

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.0000	.667	.211	1.96	.060 **
High	3.2000	1.196	.268		

54. Operating Filmstrip Projectors

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	2.9000	.568	.180	-1.72	.096 **
High	3.6500	1.309	.293		

Discipline	Number of Cases		Degrees of Freedom
Science	Low Years of Experience	17	36
	High Years of Experience	21	

6. Implications of Instructional Media Research

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	2.5294	1.375	.333	-1.69	.099 **
High	3.1905	1.030	.225		

19. Video Recording (off-air recording)

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.4706	1.231	.298	-1.97	.057 **
High	4.0952	.700	.153		

22. Producing Slide/tape programs

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.8235	1.286	.312	1.83	.076 **
High	3.1429	1.014	.221		

Table 4.14 t-Test Summary: Significantly Different Instructional Media Competency Recommendations by Years of Experience (cont.)

* = .05 level of confidence
** = .10 level of confidence

Discipline	Number of Cases		Degrees of Freedom
Science (cont.)	Low Years of Experience	17	36
	High Years of Experience	21	

23. Producing Computer Aided Instruction

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.6471	.786	.191	1.93	.062 **
High	4.0952	.944	.206		

25. Producing Computer Graphics

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.4118	.712	.173	1.88	.068 **
High	3.7143	1.384	.302		

26. Producing Games, Simulations and Media Kits

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.8235	1.015	.246	1.87	.070 **
High	3.1429	1.195	.261		

36. Utilizing Broadcast Television

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.1176	1.054	.256	2.67	.011 *
High	3.0952	1.261	.275		

37. Utilizing Slides

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.8235	1.468	.356	1.72	.094 **
High	3.1905	.750	.164		

42. Utilizing Free and Inexpensive Materials

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.0000	1.061	.257	2.12	.041 *
High	3.2381	1.136	.248		

43. Utilizing Field Trips and Community Resources

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.2941	.920	.223	2.02	.051 **
High	3.7143	.845	.184		

50. Operating Video Camcorder Systems

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.8235	1.131	.274	-2.12	.041 *
High	4.4286	.598	.130		

Table 4.14 t-Test Summary: Significantly Different Instructional Media Competency Recommendations by Years of Experience (cont.)

* = .05 level of confidence
** = .10 level of confidence

Discipline	Number of Cases		Degrees of Freedom
Social Science	Low Years of Experience	10	20
	High Years of Experience	12	

12. Producing Machine Produced Overhead Transparencies

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.3000	.675	.213	1.88	.074 **
High	3.3333	1.497	.432		

19. Video Recording (off-air recording)

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.6000	.516	.163	2.12	.047 *
High	3.1667	2.082	.601		

22. Producing Slide/tape Programs

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	3.6000	1.174	.371	1.80	.087 **
High	2.4167	1.782	.514		

26. Producing Games, Simulations and Media Kits

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.5000	.707	.224	2.51	.021 *
High	2.9167	1.881	.543		

29. Utilizing Display Boards (Bulletin Boards, Displays, etc.)

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.0000	.816	.258	1.81	.085 **
High	2.9167	1.730	.499		

31. Utilizing Chalkboards

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.0000	.943	.298	1.91	.070 **
High	2.9167	1.564	.452		

35. Utilizing Instructional Films and Videos (tape & disc)

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.5000	.527	.167	1.85	.079 **
High	3.4167	1.782	.514		

38. Utilizing Filmstrips

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.1000	1.101	.348	2.25	.036 *
High	2.7500	1.603	.463		

Table 4.14 t-Test Summary: Significantly Different Instructional Media Competency Recommendations by Years of Experience (cont.)

* = .05 level of confidence
** = .10 level of confidence

Discipline	Number of Cases		Degrees of Freedom
Social Science (cont.)	Low Years of Experience	10	20
	High Years of Experience	12	

41. Utilizing Games, Simulations and Media Kits

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.3000	.949	.300	1.76	.093 **
High	3.3333	1.497	.432		

42. Utilizing Free and Inexpensive Materials

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.5000	.707	.224	2.12	.047 *
High	3.3333	1.614	.466		

43. Utilizing Field Trips and Community Resources

Group	Mean	Stand. Deviation	Stand. Error	t-Value	2-Tail Prob.
Low	4.5000	.707	.224	2.15	.044 *
High	3.2500	1.712	.494		

7. Is there any difference in the factors for media non-use among teachers in secondary education teaching disciplines?

The Non-Use Factors question on the questionnaire consisted of seven (7) statements that describe possible reasons for deciding **not** to use instructional media in the classroom. The respondents were asked to check all that applied. In addition, an "other" category was included on which they could write in any additional non-use factors that were meaningful to them. Of the seven (7) listed decision factors, two elicited significant response from the total

population. For non-use factor number four, "Arranging to use media is too great a hassle," there were two-hundred and thirty-three (233) or 56% out of four-hundred and sixteen (416) that checked this as a decision factor for them. The second ranking non-use factor was number six, "Media materials in the schools are outdated." There were two-hundred and twenty-one (221) or 53.1% that checked this as a decision factor for them. Table 4.15 displays all of the responses by teaching discipline.

There were eighty-nine (89) write-in responses for the "other" category. Analysis of these produced four (4) additional non-use factors that seem to be significant. The additional categories were:

- 1-Instructional media materials too expensive.
- 2-Media hardware not available.
- 3-Instructional media materials not available.
- 4-No time to prepare instructional media materials.

Table 4.15 Frequency Count of Factors for Non-Use of Instructional Media by Teaching Discipline

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Non-Use Factors	N=416	N=29	N=33	N=39	N=38	N=41	N=24	N=36	N=58	N=28	N=30	N=38	N=22
1. Textbook materials are adequate enough.	69	1	9	2	5	7	6	9	19	2	1	7	1
2. Do not believe media would help.	21	3	2	2	0	3	1	1	3	4	0	1	1
3. Media is too time consuming.	122	8	13	18	5	8	5	15	19	6	7	13	5
4. Arranging to use media is too great a hassle.	233	20	20	23	17	21	10	21	41	15	15	18	12
5. Media hardware are too difficult to operate.	38	1	5	5	2	6	2	5	3	4	2	2	1
6. Media materials in the school are outdated.	221	20	23	22	17	27	12	11	31	15	12	20	11
7. No administrative support for using media.	59	5	4	4	5	4	8	5	11	4	3	4	2
8. Other	89	8	3	10	9	9	4	4	17	8	6	9	2

To assist with qualitative analysis and determination of appropriate lists of instructional media competencies by teaching disciplines, a series of means tables were developed of all fifty-six instructional media competencies by teaching disciplines. Table 4.16 presents the means for each competency by each discipline as well as the total population mean. Tables 4.17 through 4.19 present the means for each competency by each discipline while controlling for location. Tables 4.20 through 4.22 present the means for each competency by each discipline while controlling for perceived value of instructional media use in the classroom.

Table 4.23 presents the breakdown of the recommendation scale by percentiles. This provides some criteria for the selection of instructional media competencies either for the total population of secondary education teaching disciplines or for individual teaching disciplines. A mean of 4.00 or better is at or above the 80th percentile and represents a very strong recommendation for a particular instructional media competency. A mean between 3.50 and 3.95 or the 70th to 79th percentile represents a strong recommendation for any given instructional media competency. Table 4.24 presents a summary of the competencies by teaching discipline and the selection of each competency by discipline at or above the 70th and 80th percentiles. The competencies selected for the total population are from those indicating no significant difference from the analysis of variance described above. However, four competencies have been selected for the total population as a result of those competencies being selected by all disciplines. (A list of recommended instructional media competencies is provided in chapter five.)

Table 4.16 Means Table: Instructional Media Competencies by Teaching Disciplines

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/Computer Science	Music	Physical Education	Science	Social Science
Foundation and Theory Competencies:													
1. Communication Theory	3.26	3.52	3.64	2.87	3.18	3.68	3.13	3.31	3.29	3.18	3.37	2.76	3.18
2. Design and Layout of Visual Materials	3.63	4.21	3.42	3.62	3.61	3.85	4.00	3.69	3.48	3.54	3.47	3.42	3.46
3. Instructional Design Theory and Practice	3.22	3.90	3.15	3.10	3.03	3.44	3.50	3.33	3.04	3.11	3.43	3.00	3.77
4. Media Selection and Evaluation Criteria	3.55	3.55	3.82	3.49	3.40	3.95	3.42	3.81	3.36	3.11	3.43	3.68	3.55
5. Impact of Technology on Education	3.65	4.07	4.18	3.64	3.37	3.49	4.42	3.25	3.55	3.39	3.93	3.55	3.36
6. Implications of Inst. Media Research	2.95	3.17	3.06	2.85	2.90	2.93	2.88	2.97	2.90	2.64	3.20	2.90	3.05
7. Future Trends of Media and Tech. in Educ	3.65	3.76	3.85	3.74	3.61	3.63	3.79	3.67	3.64	3.32	3.80	3.58	3.41
8. Copyright Laws and Education	3.63	3.59	3.73	3.51	3.50	3.83	3.63	3.56	3.55	4.25	3.80	3.47	3.14
Production Competencies:													
9. Lettering for Instructional Materials	3.37	3.62	3.24	3.23	3.45	3.83	3.46	3.81	3.09	3.07	3.63	3.08	2.96
10. Mounting Visuals	3.39	3.86	3.12	3.33	3.37	3.95	3.21	3.67	3.09	2.93	3.73	3.29	3.18
11. Laminating Visuals	3.45	3.93	3.24	3.54	3.76	3.71	3.42	3.67	3.14	3.00	3.60	3.18	3.23
12. Machine Prod. Transparencies	3.79	3.55	4.00	3.87	3.92	3.85	3.50	3.86	3.79	3.36	3.93	3.84	3.77
13. Handmade Transparencies	3.70	3.48	3.61	3.82	3.74	3.98	3.54	3.86	3.72	3.32	3.60	3.79	3.73
14. Display Boards (B.B., etc.)	3.70	3.79	3.64	3.64	3.95	4.17	3.04	3.78	3.52	3.61	4.17	3.37	3.64
15. Duplicating Inst. Materials (Dittos, Xerox, etc.)	3.89	3.79	3.76	3.90	4.03	3.98	3.54	3.89	3.91	3.96	4.03	3.82	4.00
16. Illustration and Enlargement Techniques	3.66	3.93	3.73	3.74	3.61	4.17	3.50	3.53	3.40	3.07	3.93	3.68	3.59
17. Manipulatives (Mathematics materials, etc.)	2.98	2.69	2.58	2.33	2.82	2.88	2.75	2.81	4.19	2.11	3.27	3.53	2.64
18. Audio Recording	3.29	3.04	3.09	3.64	3.21	3.37	3.29	3.56	2.55	4.54	3.40	3.16	3.23
19. Video Recording (off-air recording)	3.71	3.48	3.33	3.97	3.68	3.66	3.92	3.86	3.14	4.36	4.10	3.82	3.82
20. Video Programming (Producing own programs)	3.52	3.38	2.97	4.15	3.24	3.54	3.67	3.97	2.88	3.96	4.13	3.42	3.50

Table 4.16 Means Table: Instructional Media Competencies by Teaching Disciplines (cont.)

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Production Competencies (Cont.):													
21. Still photography	2.71	3.72	2.52	2.67	2.42	2.85	3.08	2.92	2.07	2.21	2.97	3.16	2.50
22. Slide/tape programs	3.05	3.72	2.79	3.13	3.00	3.34	2.88	3.33	2.33	2.75	3.30	3.45	2.96
23. Computer Assisted Instruction	4.25	4.04	4.52	4.36	4.00	4.29	4.33	4.17	4.35	4.29	4.03	4.34	4.14
24. Computer Programming	3.54	3.59	3.49	3.59	3.63	3.59	3.21	3.17	3.55	3.79	3.83	3.53	3.41
25. Computer Graphics	3.91	4.41	4.15	3.59	3.97	3.85	4.08	3.64	4.07	3.50	4.00	4.03	3.43
26. Games, simulations and media kits	3.52	3.00	3.46	4.13	3.71	4.15	2.79	3.33	3.41	2.89	3.77	3.45	3.64
Utilization Competencies:													
27. Non-projected visuals	3.19	3.17	2.76	3.72	2.68	3.51	3.13	3.19	3.14	2.96	3.07	3.53	3.27
28. Overhead Transparencies	3.81	3.62	4.18	4.00	3.63	3.98	3.29	4.00	4.10	3.32	3.47	3.84	3.59
29. Display Boards (Bulletin Boards, etc.)	3.62	3.93	4.00	3.67	3.63	3.98	3.25	3.75	3.40	3.36	3.83	3.18	3.41
30. Flip Charts	2.81	2.69	2.91	2.77	3.03	3.29	2.38	3.00	2.48	2.54	3.20	2.53	3.00
31. Chalkboards	3.53	3.38	3.76	3.49	3.37	3.68	3.54	3.36	3.76	3.57	3.37	3.47	3.41
32. Duplicated Materials (Dittos, Xerox, etc.)	3.80	3.35	4.15	3.92	3.66	4.04	3.79	3.69	3.83	3.93	3.57	3.71	3.82
33. Manipulatives (Mathematics materials, etc.)	3.02	2.69	2.82	2.51	2.87	3.12	2.67	2.81	4.05	2.04	3.03	3.40	3.27
34. Audio Recordings	3.24	3.01	3.24	3.92	3.05	3.20	2.71	3.53	2.38	4.54	3.26	3.18	3.36
35. Instructional Films and Videos (tape & disc)	3.92	3.90	3.82	4.18	4.11	4.02	3.83	4.03	3.17	4.04	4.20	4.24	3.91
36. Broadcast Television	3.35	3.41	2.97	3.59	3.24	3.37	3.25	3.69	2.95	3.18	3.60	3.55	3.77
37. Slides	3.10	3.93	2.70	3.46	3.00	3.46	3.17	3.19	2.40	2.50	3.10	3.47	3.18
38. Filmstrips	3.10	3.86	2.76	3.13	3.29	3.71	3.33	3.14	2.33	2.79	3.30	2.82	3.36
39. Computer Assisted Instruction	4.16	3.97	4.33	4.33	4.00	4.46	4.33	4.06	4.33	3.89	3.97	4.03	4.00
40. Computer Interactive Video Programs	3.93	4.00	4.00	4.28	3.87	4.10	3.92	3.81	3.86	3.25	3.83	4.16	3.86

Table 4.16 Means Table: Instructional Media Competencies by Teaching Disciplines (cont.)

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Utilization Competencies (Cont.):													
41. Games and Simulations	3.57	3.17	3.55	4.10	3.87	4.00	2.71	3.47	3.60	2.82	3.73	3.50	3.77
42. Free and Inexpensive Materials	4.07	4.28	4.06	4.46	4.24	4.34	4.04	3.94	3.85	4.04	4.20	3.58	3.86
43. Field Trips and Community Resources	3.98	4.14	4.18	4.10	3.71	4.15	3.96	3.89	3.60	4.46	4.03	3.97	3.82
Operation Competencies:													
44. Overhead Projectors	3.86	3.72	3.97	3.74	3.82	4.15	3.42	3.92	4.12	3.39	3.77	3.76	4.18
45. Spirit Duplicators (Ditto)	3.40	3.31	2.79	3.33	3.50	3.61	2.67	3.31	3.66	3.21	3.53	3.29	4.23
46. Opaque Projectors	3.17	3.55	2.33	3.13	3.24	3.68	2.88	3.28	3.10	2.89	3.40	2.95	3.64
47. Cassette Tape Recorders	3.40	3.66	3.24	3.49	3.32	3.51	3.33	3.33	2.95	4.00	3.57	3.03	4.05
48. Record Players	2.96	3.10	2.52	2.74	3.00	3.24	2.75	3.00	2.52	3.86	3.13	2.61	3.73
49. Video Tape Recorders	4.14	4.14	4.09	4.26	4.26	4.24	4.33	4.03	3.57	4.39	4.37	4.21	4.41
50. Video Camcorder Systems	4.10	3.83	4.09	4.31	4.00	3.98	4.54	4.11	3.62	4.39	4.40	4.16	4.32
51. Video Editing Systems	3.67	3.93	3.52	3.92	3.66	3.59	4.04	3.50	3.21	3.61	4.13	3.53	4.00
52. 16mm Motion Picture Projectors	3.27	3.24	2.97	3.23	3.68	3.68	2.75	3.00	2.86	3.00	3.63	3.42	3.96
53. 2X2 Slide Projectors	2.97	3.69	2.58	3.08	3.08	3.10	2.46	2.64	2.72	2.64	3.33	2.97	3.59
54. Filmstrip Projectors	3.13	3.66	2.85	3.03	3.34	3.68	3.04	2.86	2.74	2.96	3.40	2.61	3.86
55. Computer Interactive Video Systems	4.05	4.10	4.09	4.31	3.97	4.02	3.92	3.78	4.04	3.71	4.13	4.26	4.23
56. Microcomputer Overhead Proj. LCD Systems	3.91	3.97	4.36	3.80	3.63	3.66	4.13	3.61	4.33	3.14	3.97	4.03	4.09

Table 4.17 **Hawaii** - Means Table: Instructional Media Competencies by Teaching Disciplines

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Foundation and Theory Competencies:													
1. Communication Theory	3.44	3.89	3.36	3.00	3.27	4.56	2.67	3.60	3.42	3.56	3.50	3.33	3.56
2. Design and Layout of Visual Materials	3.71	4.00	3.27	4.18	3.67	4.00	3.78	3.87	3.27	3.67	3.58	3.92	3.67
3. Instructional Design Theory and Practice	3.35	3.67	2.82	3.77	3.07	3.56	3.78	3.60	2.89	3.11	3.58	3.58	3.33
4. Media Selection and Evaluation Criteria	3.59	4.00	3.36	3.94	3.53	4.22	3.33	3.80	3.08	3.33	3.33	4.08	3.56
5. Impact of Technology on Education	3.68	4.11	4.27	3.59	3.47	4.00	4.44	3.47	3.15	3.67	4.08	3.42	3.67
6. Implications of Inst. Media Research	3.12	4.22	2.91	3.24	3.00	3.33	3.11	2.87	2.92	2.78	3.17	3.25	3.11
7. Future Trends of Media and Tech. in Educ	3.75	4.33	4.09	3.77	3.47	3.78	4.22	3.67	3.54	3.78	3.58	3.67	3.78
8. Copyright Laws and Education	3.58	3.22	3.64	3.47	3.33	4.11	3.67	3.53	3.42	4.00	3.58	3.75	3.67
Production Competencies:													
9. Lettering for Instructional Materials	3.63	3.22	3.46	3.59	3.53	3.89	4.11	4.13	3.46	3.11	3.83	3.50	3.89
10. Mounting Visuals	3.57	3.67	3.00	3.59	3.40	4.11	3.44	3.87	3.31	3.00	3.92	3.83	4.00
11. Laminating Visuals	3.69	3.67	3.36	3.82	3.87	3.89	3.78	3.73	3.42	3.33	3.67	3.83	4.22
12. Machine Prod. Transparencies	3.92	3.44	4.00	4.12	3.93	3.67	3.78	4.07	3.96	3.44	3.92	4.33	3.89
13. Handmade Transparencies	3.91	3.33	3.91	4.12	3.87	3.89	4.33	4.13	3.92	3.11	3.67	4.33	3.89
14. Display Boards (B.B., etc.)	3.95	3.56	4.18	4.06	4.07	4.22	3.67	4.07	3.92	3.44	4.08	3.92	3.89
15. Duplicating Inst. Materials (Dittos, Xerox, etc.)	4.00	3.67	4.27	4.24	3.87	3.56	3.56	4.07	4.15	3.89	4.00	3.92	4.33
16. Illustration and Enlargement Techniques	3.84	3.89	3.82	4.00	3.73	4.33	4.00	3.67	3.65	3.22	4.00	4.00	4.00
17. Manipulatives (Mathematics materials, etc.)	3.30	3.11	2.73	2.71	2.93	3.56	3.33	2.40	4.31	2.89	3.75	3.67	3.56
18. Audio Recording	3.39	3.67	2.91	3.94	3.27	3.56	3.89	3.67	2.54	4.00	3.33	3.42	3.67
19. Video Recording (off-air recording)	3.57	3.67	3.00	3.94	3.60	3.89	3.78	3.73	2.85	3.67	4.17	3.58	3.78
20. Video Programming (Producing own programs)	3.67	3.67	2.82	4.35	3.80	3.89	3.89	4.27	2.69	3.44	4.58	3.50	3.78

Table 4.17 **Hawaii** - Means Table: Instructional Media Competencies by Teaching Disciplines (cont.)

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Production Competencies (Cont.):													
21. Still photography	2.90	4.00	2.27	2.88	2.93	3.33	3.11	2.73	2.04	3.11	3.17	3.42	3.33
22. Slide/tape programs	3.27	4.11	2.27	3.59	3.33	3.78	3.33	3.47	2.42	3.11	3.42	3.92	3.56
23. Computer Assisted Instruction	4.31	4.00	4.27	4.41	4.20	4.67	4.22	4.00	4.50	4.11	4.08	4.33	4.78
24. Computer Programming	3.75	3.56	3.45	4.06	4.07	4.22	3.67	3.00	3.77	3.89	4.08	3.67	3.56
25. Computer Graphics	3.92	4.00	4.09	3.82	4.20	4.11	3.78	3.33	4.04	3.56	4.00	4.33	3.67
26. Games, simulations and media kits	3.70	3.11	3.27	4.59	4.13	4.44	2.78	3.33	3.54	3.00	3.75	3.83	4.11
Utilization Competencies:													
27. Non-projected visuals	3.29	3.22	3.18	3.88	2.53	3.56	3.00	3.07	3.23	3.33	2.92	4.00	3.78
28. Overhead Transparencies	3.88	3.78	4.27	4.12	3.47	3.89	3.56	4.13	4.35	3.22	3.17	3.92	3.89
29. Display Boards (Bulletin Boards, etc.)	3.78	3.78	4.27	3.88	3.93	4.22	3.78	4.00	3.62	3.00	3.83	3.58	3.44
30. Flip Charts	3.23	2.89	3.36	3.35	3.80	3.78	3.33	3.07	2.73	2.78	3.25	3.25	3.67
31. Chalkboards	3.58	3.11	3.46	3.47	3.53	4.00	4.00	3.33	3.65	3.44	3.50	3.83	3.67
32. Duplicated Materials (Dittos, Xerox, etc.)	3.88	3.33	4.18	4.12	3.67	4.11	3.44	3.67	4.00	4.22	3.42	3.92	4.33
33. Manipulatives (Mathematics materials, etc.)	3.18	2.89	2.82	2.65	2.93	3.78	3.33	2.60	4.08	2.56	2.92	3.33	3.67
34. Audio Recordings	3.29	3.22	3.00	4.29	2.80	3.67	3.11	3.60	2.35	4.22	3.00	3.67	3.67
35. Instructional Films and Videos (tape & disc)	3.89	3.67	3.45	4.29	4.47	4.22	3.78	3.87	3.00	3.89	4.45	4.42	3.78
36. Broadcast Television	3.56	3.56	2.73	3.88	3.40	4.22	3.00	3.73	3.12	3.11	3.92	4.08	4.33
37. Slides	3.11	3.89	2.45	3.53	2.80	3.78	3.33	3.13	2.58	2.78	2.92	3.50	3.44
38. Filmstrips	3.23	3.56	2.55	3.35	3.33	3.89	3.67	3.13	2.73	3.11	3.50	3.25	3.56
39. Computer Assisted Instruction	4.19	4.00	4.00	4.41	4.07	4.89	4.22	4.00	4.42	3.78	3.92	3.92	4.44
40. Computer Interactive Video Programs	3.81	4.00	3.64	4.24	3.73	4.67	3.78	3.27	3.77	2.78	3.58	4.33	4.00

Table 4.17 **Hawaii** - Means Table: Instructional Media Competencies by Teaching Disciplines (cont.)

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Utilization Competencies (Cont.):													
41. Games and Simulations	3.67	3.00	3.18	4.35	4.00	4.33	2.56	3.67	3.62	3.00	3.58	3.92	4.11
42. Free and Inexpensive Materials	4.14	4.00	3.64	4.41	4.07	4.56	4.00	4.20	4.15	4.33	4.00	4.08	4.22
43. Field Trips and Community Resources	4.18	4.22	4.18	4.24	3.87	4.56	4.67	3.93	3.81	4.44	4.33	4.42	4.44
Operation Competencies:													
44. Overhead Projectors	3.94	4.11	3.92	4.12	3.67	4.11	3.67	3.67	4.35	3.33	3.50	4.17	4.22
45. Spirit Duplicators (Ditto)	3.80	3.44	3.09	4.24	3.47	4.11	3.11	3.40	4.19	3.56	3.75	4.33	4.33
46. Opaque Projectors	3.33	3.78	2.27	3.29	3.07	4.00	3.44	3.20	3.35	3.00	3.58	3.50	3.89
47. Cassette Tape Recorders	3.53	3.67	3.09	3.88	3.13	4.11	3.89	3.27	3.27	3.56	3.42	3.50	4.33
48. Record Players	3.19	3.11	2.64	3.18	3.13	3.78	3.33	3.13	2.85	3.56	3.17	3.33	3.89
49. Video Tape Recorders	4.10	4.44	3.73	4.41	4.13	4.67	4.33	3.73	3.50	4.00	4.42	4.42	4.33
50. Video Camcorder Systems	4.06	4.33	3.73	4.35	3.86	4.33	4.56	4.07	3.46	3.89	4.75	4.08	4.11
51. Video Editing Systems	3.80	4.11	3.18	4.12	4.07	4.00	3.56	3.80	3.08	3.78	4.67	3.83	4.11
52. 16mm Motion Picture Projectors	3.37	3.11	2.64	3.71	3.67	3.78	3.33	2.80	2.96	3.56	3.67	3.67	4.11
53. 2X2 Slide Projectors	3.10	3.33	2.36	3.47	2.73	3.67	2.78	2.80	2.92	3.33	3.17	3.33	3.78
54. Filmstrip Projectors	3.22	3.33	2.55	3.35	3.07	3.78	3.56	2.93	2.92	3.56	3.33	3.25	3.78
55. Computer Interactive Video Systems	4.05	4.33	3.73	4.35	4.20	4.44	3.89	3.53	3.96	3.33	4.33	4.17	4.44
56. Microcomputer Overhead Proj. LCD Systems	3.83	4.33	4.09	3.94	3.13	4.22	3.89	3.33	4.23	2.56	3.92	3.92	4.22

Table 4.18 **Oregon** - Means Table: Instructional Media Competencies by Teaching Disciplines

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Foundation and Theory Competencies:													
1. Communication Theory	3.03	3.13	3.67	1.75	3.00	3.77	3.57	3.86	2.81	2.73	2.91	2.50	2.80
2. Design and Layout of Visual Materials	3.58	4.50	3.11	3.25	3.64	3.94	4.14	3.86	3.56	3.64	3.18	3.13	3.20
3. Instructional Design Theory and Practice	3.13	3.50	3.33	2.50	3.00	3.41	3.43	3.71	3.38	3.45	3.09	2.63	1.40
4. Media Selection and Evaluation Criteria	3.56	2.50	3.78	3.25	3.82	3.94	3.57	4.29	3.69	3.27	3.64	3.56	2.60
5. Impact of Technology on Education	3.65	3.88	4.11	3.88	3.36	3.29	4.43	3.14	4.06	3.55	3.91	3.56	3.20
6. Implications of Inst. Media Research	2.85	2.25	2.78	2.38	3.18	3.06	2.86	3.43	2.94	2.82	3.36	2.75	1.40
7. Future Trends of Media and Tech. in Educ	3.56	3.13	3.89	3.88	3.73	3.77	3.43	3.57	3.94	3.18	4.00	3.25	1.80
8. Copyright Laws and Education	3.60	3.38	3.78	3.50	3.82	3.65	3.43	3.43	3.75	4.55	4.00	3.19	1.40
Production Competencies:													
9. Lettering for Instructional Materials	3.02	3.88	2.78	2.13	3.73	3.47	3.00	3.43	2.69	2.82	3.45	2.63	1.60
10. Mounting Visuals	3.14	4.00	3.11	2.38	3.73	3.59	2.86	3.43	2.75	2.82	3.55	2.88	2.00
11. Laminating Visuals	3.09	4.25	2.78	2.50	4.00	3.29	3.00	3.57	2.75	2.82	3.45	2.63	1.80
12. Machine Prod. Transparencies	3.54	2.88	4.00	3.25	4.18	3.59	3.14	3.43	3.69	3.18	3.73	3.50	3.40
13. Handmade Transparencies	3.45	3.00	3.44	3.25	3.82	3.65	2.57	3.71	3.63	3.45	3.45	3.44	3.40
14. Display Boards (B.B., etc.)	3.47	4.00	3.56	3.00	3.91	4.00	2.29	3.43	3.06	3.45	4.36	2.94	3.20
15. Duplicating Inst. Materials (Dittos, Xerox, etc.)	3.76	3.75	3.78	3.25	4.36	3.94	3.43	3.86	3.63	3.91	3.91	3.56	3.40
16. Illustration and Enlargement Techniques	3.39	3.63	3.44	3.38	3.36	4.00	3.14	3.00	3.06	3.00	3.73	3.50	2.60
17. Manipulatives (Mathematics materials, etc.)	2.77	2.38	2.44	2.75	2.91	2.47	2.00	3.14	4.19	1.45	3.09	3.38	1.00
18. Audio Recording	3.15	2.38	3.00	3.63	3.36	3.41	2.71	3.57	2.50	4.82	3.27	2.88	1.60
19. Video Recording (off-air recording)	3.80	3.00	3.00	3.88	4.36	3.83	4.00	4.43	3.31	4.73	4.09	3.81	2.80
20. Video Programming (Producing own programs)	3.37	3.13	2.44	4.00	3.45	3.53	3.86	3.86	2.75	4.00	3.83	3.19	2.60

Table 4.18 **Oregon** - Means Table: Instructional Media Competencies by Teaching Disciplines (cont.)

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Production Competencies (Cont.):													
21. Still photography	2.49	3.38	2.33	2.38	2.36	2.77	2.71	3.14	1.69	1.91	2.55	3.13	1.40
22. Slide/tape programs	2.91	3.13	2.78	2.50	3.00	3.59	2.43	3.29	2.06	2.82	3.00	3.50	2.00
23. Computer Assisted Instruction	4.25	3.88	4.67	4.13	4.09	4.24	4.57	4.57	4.25	4.46	4.09	4.38	3.20
24. Computer Programming	3.39	3.50	3.44	3.25	3.73	3.18	2.57	3.00	3.44	3.91	3.73	3.31	3.20
25. Computer Graphics	3.90	4.75	4.22	3.25	3.91	3.71	4.43	3.86	4.06	3.45	3.82	4.00	3.20
26. Games, simulations and media kits	3.37	3.13	3.11	3.50	3.36	4.24	2.57	3.29	3.44	2.73	3.91	3.25	2.60
Utilization Competencies:													
27. Non-projected visuals	3.09	3.00	2.11	3.38	2.82	3.29	3.14	3.71	3.13	3.18	3.09	3.25	2.60
28. Overhead Transparencies	3.75	3.13	4.11	3.88	4.18	4.00	2.71	4.29	4.00	3.45	3.45	3.88	3.00
29. Display Boards (Bulletin Boards, etc.)	3.41	4.13	3.56	3.38	3.36	3.88	2.29	3.71	3.13	3.55	3.82	2.88	3.00
30. Flip Charts	2.51	2.13	2.89	2.63	2.64	3.00	1.71	3.43	2.19	2.18	3.09	2.06	2.00
31. Chalkboards	3.34	3.25	3.89	3.13	3.09	3.53	3.00	3.43	3.75	3.45	3.27	3.13	2.40
32. Duplicated Materials (Dittos, Xerox, etc.)	3.60	2.50	4.00	3.75	3.91	3.82	3.86	3.86	3.75	3.73	3.55	3.38	2.40
33. Manipulatives (Mathematics materials, etc.)	2.93	2.25	2.67	3.13	3.09	2.88	1.86	3.00	4.13	1.55	3.27	3.44	2.20
34. Audio Recordings	3.20	2.38	2.89	3.88	3.55	3.24	2.57	3.72	2.56	4.73	3.36	2.88	2.60
35. Instructional Films and Videos (tape & disc)	3.99	3.63	3.67	4.38	4.18	4.35	4.57	4.71	3.06	3.91	4.09	4.19	3.40
36. Broadcast Television	3.20	3.00	2.67	3.50	3.36	3.29	3.57	3.86	2.63	3.09	3.36	3.19	3.60
37. Slides	3.12	4.00	2.33	3.38	3.27	3.65	3.29	3.29	2.19	2.36	3.18	3.69	2.80
38. Filmstrips	2.92	4.13	2.89	2.75	3.73	3.59	3.29	2.86	1.75	2.27	3.09	2.50	3.00
39. Computer Assisted Instruction	4.16	3.75	4.44	4.00	4.18	4.41	4.71	4.43	4.25	4.00	4.00	4.00	3.40
40. Computer Interactive Video Programs	4.02	3.88	3.89	4.13	4.27	3.88	3.86	4.43	4.00	3.91	4.18	4.19	3.40

Table 4.18 **Oregon** - Means Table: Instructional Media Competencies by Teaching Disciplines (cont.)

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Utilization Competencies (Cont.):													
41. Games and Simulations	3.48	3.25	3.11	3.50	3.91	4.00	2.86	3.29	3.81	2.64	4.00	3.31	3.20
42. Free and Inexpensive Materials	3.95	4.50	4.00	4.13	4.64	4.59	4.00	3.43	3.38	3.82	4.45	3.00	3.80
43. Field Trips and Community Resources	3.98	4.38	3.89	4.13	3.73	4.12	4.29	3.86	3.69	4.36	4.18	3.94	2.80
Operation Competencies:													
44. Overhead Projectors	3.88	2.75	4.11	3.38	4.45	4.59	2.86	4.57	3.94	3.64	4.00	3.50	4.20
45. Spirit Duplicators (Ditto)	3.02	2.50	3.11	2.88	3.64	3.53	1.57	3.29	2.88	2.64	3.36	2.63	4.20
46. Opaque Projectors	2.96	2.63	2.44	2.88	3.64	3.53	1.86	3.57	2.69	2.55	3.45	2.50	4.00
47. Cassette Tape Recorders	3.23	3.00	3.56	3.00	3.82	3.41	2.29	3.57	2.38	4.55	3.46	2.69	3.40
48. Record Players	2.81	2.75	2.56	2.63	3.18	3.35	1.43	3.43	2.00	4.18	3.27	2.00	3.20
49. Video Tape Recorders	4.21	3.88	4.11	3.75	4.55	4.47	4.29	4.86	3.44	4.73	4.36	4.13	4.40
50. Video Camcorder Systems	4.28	3.88	4.33	4.25	4.46	4.18	4.43	4.57	3.88	4.82	4.09	4.25	4.80
51. Video Editing Systems	3.49	3.75	3.11	3.63	3.36	3.53	4.14	3.29	3.25	3.46	3.73	3.25	4.20
52. 16mm Motion Picture Projectors	3.47	3.38	3.44	3.00	4.18	4.00	2.00	3.71	3.13	2.55	3.73	3.69	4.60
53. 2X2 Slide Projectors	2.87	3.63	2.00	2.38	3.55	3.35	2.29	2.29	2.50	2.18	3.55	2.94	3.60
54. Filmstrip Projectors	2.99	3.63	2.89	2.75	4.00	3.77	2.29	2.86	2.44	2.36	3.55	1.94	4.20
55. Computer Interactive Video Systems	4.12	4.00	4.00	4.38	3.82	4.12	3.57	4.14	4.25	4.46	3.91	4.25	4.40
56. Microcomputer Overhead Proj. LCD Systems	3.99	3.63	4.33	3.75	4.18	3.82	4.57	3.43	4.44	3.82	3.73	3.88	4.40

Table 4.19 **Utah** - Means Table: Instructional Media Competencies by Teaching Disciplines

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Foundation and Theory Competencies:													
1. Communication Theory	3.27	3.50	3.85	3.36	3.25	3.07	3.25	2.71	3.56	3.38	3.86	2.50	3.00
2. Design and Layout of Visual Materials	3.60	4.17	3.77	3.14	3.50	3.67	4.13	3.43	3.75	3.25	3.71	3.30	3.38
3. Instructional Design Theory and Practice	3.15	4.33	3.71	2.64	3.00	3.40	3.25	2.86	2.94	2.63	3.71	2.90	3.00
4. Media Selection and Evaluation Criteria	3.50	3.92	4.23	3.07	2.83	3.80	3.38	3.57	3.50	2.63	3.29	3.40	4.13
5. Impact of Technology on Education	3.63	4.17	4.15	3.57	3.25	3.40	4.38	3.07	3.69	2.88	3.71	3.70	3.75
6. Implications of Inst. Media Research	2.84	3.00	3.39	2.64	2.50	2.53	2.63	2.86	2.81	2.25	3.00	2.70	4.00
7. Future Trends of Media and Tech. in Educ	3.64	3.75	3.62	3.64	3.67	3.40	3.36	3.71	3.50	3.00	3.86	4.00	4.00
8. Copyright Laws and Education	3.72	4.00	3.77	3.57	3.42	3.87	3.75	3.64	3.56	4.13	3.86	3.60	3.63
Production Competencies:													
9. Lettering for Instructional Materials	3.40	3.75	3.39	3.43	3.08	4.20	3.13	3.64	2.88	3.38	3.57	3.30	2.75
10. Mounting Visuals	3.44	3.92	3.23	3.57	3.00	4.27	3.25	3.57	3.06	3.00	3.71	3.30	3.00
11. Laminating Visuals	3.50	3.92	3.46	3.79	3.42	4.07	3.38	3.64	3.06	2.88	3.71	3.30	3.00
12. Machine Prod. Transparencies	3.88	4.08	4.00	3.93	3.67	4.27	3.50	3.86	3.63	3.50	4.29	3.80	3.88
13. Handmade Transparencies	3.71	3.92	3.46	3.79	3.50	4.40	3.50	3.64	3.50	3.38	3.71	3.70	3.75
14. Display Boards (B.B., etc.)	3.64	3.83	3.23	3.50	3.83	4.33	3.00	3.64	3.31	4.00	4.00	3.40	3.63
15. Duplicating Inst. Materials (Dittos, Xerox, etc.)	3.89	3.92	3.31	3.86	3.92	4.27	3.63	3.71	3.81	4.13	4.29	4.10	4.00
16. Illustration and Enlargement Techniques	3.71	4.17	3.85	3.64	3.67	4.27	3.25	3.64	3.31	3.00	4.14	3.60	3.75
17. Manipulatives (Mathematics materials, etc.)	2.80	2.58	2.54	1.64	2.58	2.93	2.75	3.07	4.00	2.13	2.71	3.60	2.63
18. Audio Recording	3.29	3.00	3.31	3.29	3.00	3.20	3.13	3.43	2.63	4.75	3.71	3.30	3.75
19. Video Recording (off-air recording)	3.80	3.67	3.85	4.07	3.17	3.33	4.00	3.71	3.44	4.63	4.00	4.10	4.50
20. Video Programming (Producing own programs)	3.50	3.33	3.46	4.00	2.33	3.33	3.25	3.71	3.31	4.50	3.86	3.70	3.75

Table 4.19 **Utah** - Means Table: Instructional Media Competencies by Teaching Disciplines (cont.)

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Production Competencies (Cont.):													
21. Still photography	2.72	3.75	2.85	2.57	1.83	2.67	3.38	3.00	2.50	1.63	3.29	2.90	2.25
22. Slide/tape programs	2.93	3.83	3.23	2.93	2.58	2.80	2.75	3.21	2.44	2.25	3.57	2.80	2.88
23. Computer Assisted Instruction	4.18	4.17	4.62	4.43	3.67	4.13	4.25	4.14	4.19	4.25	3.86	4.30	4.00
24. Computer Programming	3.43	3.67	3.54	3.21	3.00	3.67	3.25	3.43	3.31	3.50	3.57	3.70	3.38
25. Computer Graphics	3.91	4.50	4.15	3.50	3.75	3.87	4.13	3.86	4.13	3.50	4.29	3.70	3.38
26. Games, simulations and media kits	3.45	2.83	3.85	3.93	3.50	3.87	3.00	3.36	3.19	3.00	3.57	3.30	3.75
Utilization Competencies:													
27. Non-projected visuals	3.17	3.25	2.85	3.71	2.75	3.73	3.25	3.07	3.00	2.25	3.29	3.40	3.13
28. Overhead Transparencies	3.77	3.83	4.15	3.93	3.33	4.00	3.50	3.71	3.81	3.25	4.00	3.70	3.63
29. Display Boards (Bulletin Boards, etc.)	3.63	3.92	4.08	3.57	3.50	3.93	3.50	3.50	3.31	3.50	3.86	3.20	3.63
30. Flip Charts	2.63	2.92	2.54	2.14	2.42	3.33	1.88	2.71	2.38	2.75	3.29	2.40	2.88
31. Chalkboards	3.66	3.67	3.92	3.71	3.42	3.67	3.50	3.36	3.94	3.88	3.29	3.60	3.75
32. Duplicated Materials (Dittos, Xerox, etc.)	3.88	3.92	4.23	3.79	3.42	4.20	4.13	3.64	3.63	3.88	3.86	4.00	4.13
33. Manipulatives (Mathematics materials, etc.)	2.92	2.83	2.92	2.00	2.58	3.00	2.63	2.93	3.94	2.13	2.86	3.40	3.50
34. Audio Recordings	3.21	3.50	3.69	3.50	2.92	2.87	2.38	3.36	2.25	4.63	3.57	3.10	3.50
35. Instructional Films and Videos (tape & disc)	3.88	4.25	4.23	3.93	3.58	3.53	3.25	3.86	3.56	4.38	3.86	4.10	4.38
36. Broadcast Television	3.27	3.58	3.39	3.29	2.92	2.93	3.25	3.57	3.00	3.38	3.43	3.50	3.25
37. Slides	3.07	3.92	3.15	3.43	3.00	3.07	2.88	3.21	2.31	2.38	3.29	3.10	3.13
38. Filmstrips	3.11	3.92	2.85	3.07	2.83	3.73	3.00	3.29	2.25	3.13	3.29	2.80	3.38
39. Computer Assisted Instruction	4.14	4.08	4.54	4.43	3.75	4.27	4.13	3.93	4.25	3.88	4.00	4.20	3.88
40. Computer Interactive Video Programs	3.97	4.08	4.39	4.43	3.67	4.00	4.13	4.07	3.88	2.88	3.71	3.90	4.00

Table 4.19 **Utah** - Means Table: Instructional Media Competencies by Teaching Disciplines (cont.)

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Utilization Competencies (Cont.):													
41. Games and Simulations	3.55	3.25	4.15	4.14	3.67	3.80	2.75	3.36	3.38	2.88	3.57	3.30	3.75
42. Free and Inexpensive Materials	4.10	4.33	4.46	4.71	4.08	3.93	4.13	3.93	3.81	4.00	4.14	3.90	3.50
43. Field Trips and Community Resources	3.75	3.92	4.39	3.93	3.50	3.93	2.88	3.86	3.19	4.63	3.29	3.50	3.75
Operation Competencies:													
44. Overhead Projectors	3.75	4.08	3.92	3.50	3.42	3.67	3.63	3.86	3.94	3.13	3.86	3.70	4.13
45. Spirit Duplicators (Ditto)	3.26	3.75	2.31	2.50	3.42	3.40	3.13	3.21	3.56	3.63	3.43	3.10	4.13
46. Opaque Projectors	3.18	4.00	2.31	3.07	3.08	3.67	3.13	3.21	3.13	3.25	3.00	3.00	3.13
47. Cassette Tape Recorders	3.40	4.08	3.15	3.29	3.08	3.27	3.63	3.29	3.00	3.75	4.00	3.00	4.13
48. Record Players	2.83	3.33	2.39	2.29	2.67	2.80	3.25	2.64	2.50	3.75	2.86	2.70	3.88
49. Video Tape Recorders	4.13	4.08	4.39	4.36	4.17	3.73	4.38	3.93	3.81	4.38	4.29	4.10	4.50
50. Video Camcorder Systems	3.97	3.42	4.23	4.29	3.75	3.53	4.63	3.93	3.63	4.38	4.29	4.10	4.25
51. Video Editing Systems	3.68	3.92	4.08	3.86	3.42	3.40	4.50	3.29	3.38	3.63	3.86	3.60	3.75
52. 16mm Motion Picture Projectors	2.97	3.25	2.92	2.79	3.25	3.27	2.75	2.86	2.44	3.00	3.43	2.70	3.38
53. 2X2 Slide Projectors	2.91	4.00	3.15	3.00	3.08	2.47	2.25	2.64	2.63	2.50	3.29	2.60	3.38
54. Filmstrip Projectors	3.15	3.92	3.08	2.79	3.08	3.53	3.13	2.79	2.75	3.13	3.29	2.90	3.75
55. Computer Interactive Video Systems	3.99	4.00	4.46	4.21	3.83	3.67	4.25	3.86	3.94	3.13	4.14	4.40	3.88
56. Microcomputer Overhead Proj. LCD Systems	3.91	3.92	4.62	3.64	3.75	3.13	4.00	4.00	4.38	2.88	4.43	4.40	3.75

Table 4.20 **Low Media Value** - Means Table: Instructional Media Competencies by Teaching Disciplines

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/Computer Science	Music	Physical Education	Science	Social Science
Foundation and Theory Competencies:													
1. Communication Theory	3.29	3.69	4.08	3.25	3.44	4.18	2.83	3.09	2.92	2.90	3.20	3.20	3.00
2. Design and Layout of Visual Materials	3.43	4.23	3.54	3.58	3.33	3.46	2.83	3.36	3.21	3.37	3.40	3.50	3.13
3. Instructional Design Theory and Practice	3.11	3.85	3.31	3.17	3.44	3.00	3.33	3.00	2.63	2.95	3.47	3.00	2.50
4. Media Selection and Evaluation Criteria	3.25	3.00	3.92	3.25	3.11	3.64	3.17	3.55	3.00	2.90	3.13	3.40	3.54
5. Impact of Technology on Education	3.49	3.77	4.46	4.00	2.78	3.18	4.33	2.55	3.25	3.16	3.60	4.00	3.25
6. Implications of Inst. Media Research	2.81	3.08	3.23	3.08	3.11	2.64	1.83	2.46	2.54	2.32	3.13	3.40	3.00
7. Future Trends of Media and Tech. in Educ	3.49	3.62	3.85	3.83	3.89	3.55	3.67	3.18	3.04	2.95	3.80	4.00	3.38
8. Copyright Laws and Education	3.60	3.39	4.00	3.33	3.89	4.00	3.33	3.09	3.21	4.32	3.67	3.80	2.88
Production Competencies:													
9. Lettering for Instructional Materials	3.08	3.62	3.00	2.75	3.11	3.64	2.83	3.18	3.21	2.79	3.40	2.70	2.25
10. Mounting Visuals	3.09	3.77	3.00	2.92	3.22	3.64	2.00	3.18	3.13	2.68	3.47	2.70	2.75
11. Laminating Visuals	3.13	3.85	3.15	3.17	3.22	3.55	2.67	3.09	3.25	2.79	3.20	2.60	2.63
12. Machine Prod. Transparencies	3.37	2.92	4.23	3.08	3.33	3.18	2.50	3.00	3.75	3.05	3.60	3.50	3.63
13. Handmade Transparencies	3.40	3.00	3.85	3.25	3.11	3.55	3.50	3.18	3.88	3.16	3.47	3.00	3.38
14. Display Boards (B.B., etc.)	3.43	3.31	3.23	3.08	3.78	3.64	2.17	3.18	3.50	3.68	4.13	2.90	3.63
15. Duplicating Inst. Materials (Dittos, Xerox, etc.)	3.55	3.54	3.62	3.25	3.67	3.36	2.83	3.46	3.79	3.79	3.67	3.00	3.88
16. Illustration and Enlargement Techniques	3.39	3.69	3.92	3.08	3.56	4.00	3.17	3.00	3.67	2.74	3.60	3.00	3.00
17. Manipulatives (Mathematics materials, etc.)	2.54	2.39	2.46	1.58	2.00	2.73	2.17	2.73	4.04	1.79	2.47	3.00	1.63
18. Audio Recording	3.11	3.00	3.31	3.33	2.56	3.55	2.83	3.09	2.33	4.42	2.80	3.00	2.75
19. Video Recording (off-air recording)	3.43	3.08	2.23	3.75	3.00	3.55	2.83	3.27	2.88	4.26	3.73	3.80	3.50
20. Video Programming (Producing own programs)	3.27	3.00	2.77	3.50	2.67	3.55	2.83	3.18	2.92	3.84	4.00	3.60	2.75

Table 4.20 **Low Media Value** - Means Table: Instructional Media Competencies by Teaching Disciplines (cont.)

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/Computer Science	Music	Physical Education	Science	Social Science
Production Competencies (Cont.):													
21. Still photography	2.34	3.69	2.62	2.08	1.67	3.00	1.50	2.46	1.96	1.84	2.67	2.80	1.63
22. Slide/tape programs	2.59	3.54	2.85	2.42	2.56	3.46	1.67	2.18	2.08	2.26	2.80	3.20	2.13
23. Computer Assisted Instruction	4.03	4.00	4.46	4.08	3.22	4.18	3.33	3.73	4.42	4.11	3.73	4.50	3.63
24. Computer Programming	3.46	3.46	3.77	3.25	3.33	3.82	2.17	3.00	3.46	3.58	3.73	3.90	3.25
25. Computer Graphics	3.74	4.46	4.23	3.42	3.33	3.82	2.67	3.45	3.96	3.32	3.87	4.30	3.13
26. Games, simulations and media kits	3.19	2.77	3.16	4.00	3.78	4.27	1.67	2.73	3.00	2.68	3.60	3.40	3.00
Utilization Competencies:													
27. Non-projected visuals	3.03	2.69	2.39	3.92	2.89	3.55	2.83	3.00	3.17	2.63	3.20	3.20	2.88
28. Overhead Transparencies	3.51	3.46	3.85	3.58	3.11	3.55	2.83	3.45	4.08	3.11	3.40	3.60	3.25
29. Display Boards (Bulletin Boards, etc.)	3.51	3.92	3.69	3.42	3.67	3.27	2.67	3.36	3.54	3.47	4.13	2.90	3.25
30. Flip Charts	2.61	2.62	2.08	2.25	3.33	2.64	2.17	2.73	2.58	2.37	3.40	2.30	2.88
31. Chalkboards	3.54	3.16	3.62	3.58	3.67	3.46	3.00	3.46	3.83	3.63	3.40	3.70	3.38
32. Duplicated Materials (Dittos, Xerox, etc.)	3.52	2.77	4.00	3.58	3.11	3.55	3.00	3.55	3.79	3.74	3.40	3.60	3.38
33. Manipulatives (Mathematics materials, etc.)	2.72	2.46	2.31	1.83	2.22	3.18	2.33	2.73	3.88	1.79	2.73	3.30	3.25
34. Audio Recordings	3.15	2.62	3.23	3.58	3.33	3.27	2.17	3.18	2.21	4.42	3.33	2.80	3.38
35. Instructional Films and Videos (tape & disc)	3.59	3.62	3.77	3.58	4.33	3.18	2.50	3.82	2.96	3.74	3.87	4.10	3.88
36. Broadcast Television	3.04	3.00	2.77	3.25	3.22	3.36	1.83	3.09	2.79	3.11	3.33	3.30	3.13
37. Slides	2.80	3.92	2.46	3.00	3.22	3.09	2.33	2.46	2.21	2.26	3.13	3.30	3.00
38. Filmstrips	2.78	3.69	2.62	2.58	3.44	3.18	2.33	2.18	2.21	2.63	3.20	2.70	3.13
39. Computer Assisted Instruction	4.01	3.85	4.08	4.42	3.44	4.55	3.33	3.64	4.29	3.84	3.93	4.30	3.75
40. Computer Interactive Video Programs	3.72	3.77	3.62	4.33	3.67	3.82	2.83	3.55	3.71	3.11	4.00	4.40	3.75

Table 4.20 **Low Media Value** - Means Table: Instructional Media Competencies by Teaching Disciplines (cont.)

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/Computer Science	Music	Physical Education	Science	Social Science
Utilization Competencies (Cont.):													
41. Games and Simulations	3.19	2.62	3.00	3.83	4.00	3.73	1.83	2.73	3.08	2.63	3.80	3.80	3.25
42. Free and Inexpensive Materials	3.93	4.46	4.31	4.33	4.33	4.27	3.67	3.36	3.71	3.79	4.20	3.20	3.25
43. Field Trips and Community Resources	3.86	4.23	3.85	4.00	3.89	4.00	3.67	3.73	3.46	4.42	3.73	3.90	3.25
Operation Competencies:													
44. Overhead Projectors	3.52	3.54	3.62	2.83	3.33	4.00	2.50	3.46	4.21	3.16	3.73	3.10	3.63
45. Spirit Duplicators (Ditto)	3.17	3.15	2.77	2.50	3.22	3.91	1.67	2.82	3.88	2.90	3.53	2.60	3.88
46. Opaque Projectors	2.85	3.39	2.00	2.08	3.11	4.00	2.00	2.91	3.13	2.63	3.33	2.10	3.00
47. Cassette Tape Recorders	3.23	3.31	3.08	2.83	2.88	3.46	2.67	3.00	2.92	3.79	3.87	2.70	3.88
48. Record Players	2.80	3.00	2.23	2.25	2.89	3.36	1.50	2.73	2.54	3.58	3.07	2.20	3.63
49. Video Tape Recorders	3.93	3.92	3.92	4.00	3.89	4.27	3.50	3.82	3.58	4.32	4.27	3.60	3.88
50. Video Camcorder Systems	3.90	3.92	3.85	4.00	4.11	4.00	4.00	3.46	3.33	4.32	4.13	4.20	3.88
51. Video Editing Systems	3.44	3.77	3.31	3.83	3.89	3.82	3.00	2.55	3.00	3.21	3.87	4.00	3.38
52. 16mm Motion Picture Projectors	2.93	3.23	2.31	2.92	3.67	3.36	1.83	2.55	2.75	2.58	3.60	3.00	3.50
53. 2X2 Slide Projectors	2.66	3.46	2.31	2.75	2.78	2.82	2.33	1.46	2.79	2.16	3.40	2.30	3.25
54. Filmstrip Projectors	2.83	3.46	2.62	2.58	2.89	3.46	2.17	1.91	2.88	2.53	3.47	3.20	3.63
55. Computer Interactive Video Systems	3.80	4.08	3.77	4.08	3.78	4.00	3.33	3.27	3.67	3.63	3.93	4.40	3.63
56. Microcomputer Overhead Proj. LCD Systems	3.74	4.08	4.23	3.58	3.44	3.64	2.83	3.18	4.25	3.00	4.20	4.20	3.38

Table 4.21 **Medium Media Value** - Means Table: Instructional Media Competencies by Teaching Disciplines

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Foundation and Theory Competencies:													
1. Communication Theory	3.17	3.44	3.33	2.62	3.00	3.00	2.88	3.24	3.54	3.00	4.20	2.80	3.33
2. Design and Layout of Visual Materials	3.64	4.00	3.58	3.31	3.71	3.86	4.00	3.71	3.58	3.67	4.20	3.13	3.67
3. Instructional Design Theory and Practice	3.25	3.44	3.42	3.00	3.07	3.43	3.25	3.35	3.17	3.67	4.00	3.00	3.00
4. Media Selection and Evaluation Criteria	3.69	3.78	4.08	3.69	3.71	3.71	3.63	3.71	3.46	3.00	4.20	3.80	3.33
5. Impact of Technology on Education	3.59	4.44	3.83	3.39	3.29	3.29	4.38	3.35	3.75	3.00	4.20	3.27	3.33
6. Implications of Inst. Media Research	3.05	3.33	3.50	2.46	3.14	2.57	3.25	3.18	2.96	3.33	3.80	3.00	3.00
7. Future Trends of Media and Tech. in Educ	3.77	4.11	3.92	3.69	3.71	3.43	3.75	3.94	4.00	3.33	4.40	3.40	3.33
8. Copyright Laws and Education	3.61	3.56	3.50	3.46	3.21	3.64	4.00	3.82	3.75	3.67	4.00	3.47	3.50
Production Competencies:													
9. Lettering for Instructional Materials	3.44	3.56	3.58	3.31	3.36	4.14	3.63	4.00	2.83	3.33	4.60	2.47	4.00
10. Mounting Visuals	3.48	3.44	3.33	3.39	3.07	4.29	3.50	3.94	2.96	3.00	4.60	3.13	4.00
11. Laminating Visuals	3.54	3.56	3.33	3.62	3.64	4.14	3.25	4.00	2.92	3.00	4.60	3.00	4.33
12. Machine Prod. Transparencies	3.95	3.89	3.67	4.23	3.93	4.29	3.50	4.29	3.75	3.67	4.40	3.80	3.83
13. Handmade Transparencies	3.77	3.33	3.25	3.92	3.86	4.29	3.50	4.12	3.58	3.33	4.20	3.73	3.83
14. Display Boards (B.B., etc.)	3.71	3.78	3.58	3.85	3.86	4.36	3.25	4.06	3.42	3.00	4.20	3.20	3.67
15. Duplicating Inst. Materials (Dittos, Xerox, etc.)	3.97	3.22	3.67	4.08	3.93	4.43	3.63	4.18	3.92	4.33	4.20	3.87	4.50
16. Illustration and Enlargement Techniques	3.60	3.67	3.50	3.85	3.36	4.29	3.25	3.65	3.08	4.00	4.20	3.53	4.00
17. Manipulatives (Mathematics materials, etc.)	3.24	2.56	2.67	2.54	3.14	3.21	2.75	3.06	4.38	2.67	4.40	3.20	3.33
18. Audio Recording	3.08	2.78	2.75	3.39	3.00	3.29	2.88	3.77	2.46	4.67	3.40	2.87	3.50
19. Video Recording (off-air recording)	3.61	3.44	3.58	3.62	3.71	3.29	3.75	4.12	3.21	4.33	4.40	3.53	3.67
20. Video Programming (Producing own programs)	3.46	3.44	3.17	4.23	3.29	3.36	3.88	4.29	2.67	4.33	4.40	2.87	3.67

Table 4.21 **Medim Media Value** - Means Table: Instructional Media Competencies by Teaching Disciplines (cont.)

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/Computer Science	Music	Physical Education	Science	Social Science
Production Competencies (Cont.):													
21. Still photography	2.84	3.44	2.50	2.77	2.43	2.93	3.38	3.53	2.00	3.00	3.20	3.13	3.00
22. Slide/tape programs	3.20	3.56	2.83	3.39	2.79	3.36	3.00	4.12	2.33	3.33	4.00	3.47	3.33
23. Computer Assisted Instruction	4.26	3.78	4.42	4.46	4.00	4.21	4.50	4.41	4.13	4.67	4.40	4.13	4.83
24. Computer Programming	3.50	3.56	3.25	3.77	3.14	3.57	3.88	3.47	3.54	4.33	4.00	3.20	3.33
25. Computer Graphics	3.87	4.00	3.75	3.62	3.79	3.71	4.50	3.83	4.00	4.00	4.20	3.87	3.50
26. Games, simulations and media kits	3.60	2.89	3.92	3.69	3.43	4.00	2.75	3.77	3.71	3.67	3.80	3.20	4.33
Utilization Competencies:													
27. Non-projected visuals	3.20	3.44	3.17	3.23	2.36	3.64	2.62	3.53	3.04	3.33	3.60	3.27	3.67
28. Overhead Transparencies	3.94	3.33	4.42	4.00	3.79	4.21	3.38	4.29	3.96	3.00	4.00	3.87	3.83
29. Display Boards (Bulletin Boards, etc.)	3.74	3.67	4.25	3.69	4.07	4.21	3.63	4.06	3.29	3.33	4.00	3.27	3.17
30. Flip Charts	2.93	2.44	3.42	3.00	3.21	3.71	2.00	3.29	2.29	2.67	3.60	2.47	3.50
31. Chalkboards	3.53	3.33	4.00	3.00	3.64	3.71	3.13	3.35	3.75	3.33	4.20	3.33	3.50
32. Duplicated Materials (Dittos, Xerox, etc.)	3.86	3.22	4.25	3.54	3.79	4.21	4.13	3.88	3.79	3.33	4.00	3.67	4.50
33. Manipulatives (Mathematics materials, etc.)	3.29	2.56	3.58	3.23	3.21	3.21	2.38	2.83	4.25	2.67	3.60	3.13	3.50
34. Audio Recordings	3.12	3.44	3.25	4.15	2.43	3.21	2.63	3.65	2.21	4.33	3.20	3.20	3.50
35. Instructional Films and Videos (tape & disc)	3.91	3.67	4.00	4.39	3.93	4.07	4.00	4.06	3.25	4.00	4.40	4.13	3.67
36. Broadcast Television	3.42	3.56	3.25	3.85	3.00	3.36	3.50	4.00	2.79	3.33	4.20	3.20	4.50
37. Slides	3.19	3.44	3.08	3.46	2.93	3.50	3.75	3.65	2.33	3.00	3.40	3.40	3.17
38. Filmstrips	3.16	3.67	2.93	3.08	2.79	3.93	4.00	3.71	3.29	3.00	3.40	2.93	3.33
39. Computer Assisted Instruction	4.14	4.00	4.42	4.15	3.71	4.36	4.63	4.24	4.21	4.00	3.80	3.80	4.33
40. Computer Interactive Video Programs	3.96	4.11	4.08	4.15	4.07	4.07	4.13	4.00	3.67	4.00	3.80	3.93	3.67

Table 4.21 **Medium Media Value** - Means Table: Instructional Media Competencies by Teaching Disciplines (cont.)

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/Computer Science	Music	Physical Education	Science	Social Science
Utilization Competencies (Cont.):													
41. Games and Simulations	3.73	3.56	4.08	3.77	3.79	3.93	2.63	3.94	3.92	3.67	3.80	3.13	4.17
42. Free and Inexpensive Materials	3.97	3.89	4.08	4.23	3.93	4.14	4.25	4.35	3.88	3.67	3.60	3.20	4.33
43. Field Trips and Community Resources	3.95	3.78	4.50	3.92	3.50	4.14	4.00	4.12	3.58	3.67	4.40	3.93	4.50
Operation Competencies:													
44. Overhead Projectors	3.92	3.11	4.33	3.77	4.14	3.93	3.75	4.18	3.92	3.00	3.80	3.87	4.33
45. Spirit Duplicators (Ditto)	3.49	2.44	2.67	3.62	4.00	3.36	3.38	3.65	3.46	4.00	3.80	3.67	4.50
46. Opaque Projectors	3.25	2.78	2.42	3.31	3.36	3.57	3.25	3.53	3.17	3.33	3.60	3.20	3.83
47. Cassette Tape Recorders	3.36	3.22	3.25	3.69	3.36	3.21	3.75	3.59	2.75	4.00	3.20	3.33	4.50
48. Record Players	2.93	2.22	2.67	2.92	3.14	3.07	3.63	3.12	2.33	4.00	3.20	2.93	3.83
49. Video Tape Recorders	4.05	3.78	4.58	4.39	4.36	3.71	4.38	4.12	3.25	3.67	4.20	4.40	4.50
50. Video Camcorder Systems	4.03	3.44	4.50	4.39	3.57	3.50	4.63	4.35	3.71	4.00	4.60	4.20	4.17
51. Video Editing Systems	3.67	3.67	4.00	3.92	3.36	3.57	4.25	4.06	3.21	4.00	4.60	3.00	4.17
52. 16mm Motion Picture Projectors	3.37	2.56	3.33	3.00	3.79	3.79	3.38	3.29	2.83	3.67	3.60	3.93	4.17
53. 2X2 Slide Projectors	3.04	3.11	3.00	2.69	3.21	3.07	2.38	3.24	2.54	3.33	3.40	3.60	3.67
54. Filmstrip Projectors	3.21	3.33	3.25	2.85	3.57	3.57	3.75	3.35	2.58	3.33	3.20	3.07	3.67
55. Computer Interactive Video Systems	4.01	4.00	4.17	4.23	3.50	3.71	4.13	3.82	4.08	3.67	4.00	4.40	4.33
56. Microcomputer Overhead Proj. LCD Systems	3.90	3.78	4.42	3.69	3.21	3.79	4.50	3.77	4.25	4.00	3.00	3.93	4.17

Table 4.22 **High Media Value** - Means Table: Instructional Media Competencies by Teaching Disciplines

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Foundation and Theory Competencies:													
1. Communication Theory	3.20	3.29	3.38	2.79	3.20	3.94	3.50	3.75	3.60	4.17	3.20	2.39	3.25
2. Design and Layout of Visual Materials	3.86	4.43	3.00	3.93	3.67	4.13	4.70	4.13	3.90	4.00	3.20	3.69	3.63
3. Instructional Design Theory and Practice	3.32	4.57	2.50	3.14	2.73	3.75	3.80	3.75	3.70	3.33	3.10	3.00	2.88
4. Media Selection and Evaluation Criteria	3.76	4.29	3.25	3.50	3.27	4.38	3.40	4.38	4.00	3.83	3.50	3.77	3.75
5. Impact of Technology on Education	3.92	4.14	4.25	3.57	3.80	3.88	4.50	4.00	3.80	4.33	4.30	3.54	3.50
6. Implications of Inst. Media Research	2.99	3.14	2.13	3.00	2.53	3.44	3.20	3.25	3.60	3.33	3.00	2.39	3.13
7. Future Trends of Media and Tech. in Educ	3.72	3.57	3.75	3.71	3.33	3.88	3.90	3.75	4.20	4.50	3.50	3.46	3.50
8. Copyright Laws and Education	3.67	4.00	3.63	3.71	3.53	3.88	3.50	3.63	3.90	4.33	3.90	3.23	3.13
Production Competencies:													
9. Lettering for Instructional Materials	3.64	3.71	3.13	3.57	3.73	3.69	3.70	4.25	3.40	3.83	3.50	4.08	2.88
10. Mounting Visuals	3.67	4.57	3.00	3.64	3.73	3.88	3.70	3.75	3.30	3.67	3.70	3.92	3.00
11. Laminating Visuals	3.73	4.57	3.25	3.79	4.20	3.44	4.00	3.75	3.40	3.67	3.70	3.85	3.00
12. Machine Prod. Transparencies	4.12	4.29	4.13	4.21	4.27	3.94	4.10	4.13	4.00	4.17	4.20	4.15	3.88
13. Handmade Transparencies	4.00	4.57	3.75	4.21	4.00	4.00	3.60	4.25	3.70	3.83	3.50	4.46	4.00
14. Display Boards (B.B., etc.)	4.02	4.71	4.38	3.93	4.13	4.38	3.40	4.00	3.80	3.67	4.20	3.92	3.63
15. Duplicating Inst. Materials (Dittos, Xerox, etc.)	4.22	5.00	4.13	4.29	4.33	4.00	3.90	3.88	4.20	4.33	4.50	4.39	3.75
16. Illustration and Enlargement Techniques	4.05	4.71	3.75	4.21	3.87	4.19	3.90	4.00	3.50	3.67	4.30	4.39	3.88
17. Manipulatives (Mathematics materials, etc.)	3.20	3.43	2.63	2.79	3.00	2.69	3.10	2.38	4.10	2.83	3.90	4.31	3.13
18. Audio Recording	3.74	3.43	3.25	4.14	3.80	3.31	3.90	3.75	3.30	4.83	4.30	3.32	3.50
19. Video Recording (off-air recording)	4.17	4.29	3.13	4.50	4.07	4.06	4.70	4.13	3.60	4.67	4.50	4.15	4.25
20. Video Programming (Producing own programs)	3.90	4.00	3.00	4.64	3.53	3.69	4.00	4.38	3.30	4.17	4.20	3.92	4.13

Table 4.22 **High Media Value** - Means Table: Instructional Media Competencies by Teaching Disciplines (cont.)

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Production Competencies (Cont.):													
21. Still photography	3.02	4.14	2.38	3.07	2.87	2.69	3.80	2.25	2.50	3.00	3.30	3.46	3.00
22. Slide/tape programs	3.44	4.29	2.63	3.50	3.47	3.25	3.50	3.25	2.90	4.00	3.70	3.62	3.50
23. Computer Assisted Instruction	4.49	4.43	4.75	4.50	4.47	4.44	4.80	4.25	4.70	4.67	4.30	4.46	4.13
24. Computer Programming	3.66	3.86	3.38	3.71	4.27	3.44	3.30	2.75	3.80	4.17	3.90	3.62	3.63
25. Computer Graphics	4.16	4.86	4.63	3.71	4.53	4.00	4.60	3.50	4.50	3.83	4.10	4.00	3.75
26. Games, simulations and media kits	3.82	3.57	3.25	4.64	3.93	4.19	3.50	3.25	3.70	3.17	4.00	3.77	3.75
Utilization Competencies:													
27. Non-projected visuals	3.38	3.71	2.75	4.00	2.87	3.38	3.70	2.75	3.30	3.83	2.60	4.08	3.38
28. Overhead Transparencies	4.01	4.29	4.38	4.36	3.80	4.06	3.50	4.13	4.50	4.17	3.30	4.00	3.75
29. Display Boards (Bulletin Boards, etc.)	3.62	4.29	4.13	3.86	3.20	4.25	3.30	3.63	3.30	3.00	3.30	3.31	3.75
30. Flip Charts	2.93	3.14	3.50	3.00	2.67	3.38	2.80	2.75	2.70	3.00	2.70	2.77	2.75
31. Chalkboards	3.53	3.86	3.63	3.86	2.93	3.81	4.20	3.25	3.60	3.50	2.90	3.46	3.38
32. Duplicated Materials (Dittos, Xerox, etc.)	4.06	4.57	4.25	4.57	3.87	4.19	4.00	3.50	4.00	4.83	3.60	3.85	3.75
33. Manipulatives (Mathematics materials, etc.)	3.07	3.29	2.50	2.43	2.93	3.00	3.10	2.88	4.00	2.50	3.20	3.77	3.13
34. Audio Recordings	3.48	3.57	3.25	4.00	3.47	3.13	3.10	3.75	3.20	5.00	3.20	3.46	3.25
35. Instructional Films and Videos (tape & disc)	4.33	4.71	3.63	4.50	4.13	4.56	4.50	4.25	3.50	5.00	4.60	4.46	4.13
36. Broadcast Television	3.66	4.00	2.88	3.64	3.47	3.38	3.90	3.88	3.70	3.33	3.70	4.15	3.88
37. Slides	3.35	4.57	2.50	3.86	2.93	3.69	3.20	3.25	3.00	3.00	2.90	3.69	3.38
38. Filmstrips	3.41	4.43	2.75	3.64	3.67	3.88	3.40	3.25	2.70	3.17	3.40	2.77	3.63
39. Computer Assisted Instruction	4.38	4.14	4.63	4.43	4.60	4.50	4.70	4.25	4.70	4.00	4.10	4.08	4.00
40. Computer Interactive Video Programs	4.14	4.29	4.50	4.36	3.80	4.31	4.40	3.75	4.70	3.33	3.60	4.23	4.13

Table 4.22 **High Media Value** - Means Table: Instructional Media Competencies by Teaching Disciplines (cont.)

	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/Computer Science	Music	Physical Education	Science	Social Science
Utilization Competencies (Cont.):													
41. Games and Simulations	3.86	3.71	3.63	4.64	3.87	4.25	3.30	3.50	4.10	3.00	3.60	3.69	4.00
42. Free and Inexpensive Materials	4.35	4.43	3.63	4.79	4.47	4.56	4.10	3.88	4.10	5.00	4.50	4.31	4.13
43. Field Trips and Community Resources	4.14	4.43	4.25	4.36	3.80	4.25	4.10	3.63	4.00	5.00	4.30	4.08	3.88
Operation Competencies:													
44. Overhead Projectors	4.20	4.86	4.00	4.50	3.80	4.44	3.70	4.00	4.40	4.33	3.80	4.15	4.63
45. Spirit Duplicators (Ditto)	3.53	4.71	3.00	3.79	3.20	3.63	2.70	3.25	3.60	3.83	3.40	3.39	4.38
46. Opaque Projectors	3.46	4.86	2.75	3.86	3.20	3.53	3.10	3.25	2.90	3.50	3.40	3.31	4.13
47. Cassette Tape Recorders	3.64	4.86	3.50	3.86	3.53	3.81	3.40	3.25	3.50	4.67	3.30	2.92	3.88
48. Record Players	3.18	4.43	2.75	3.00	2.93	3.31	2.80	3.13	2.90	4.67	3.20	2.54	3.75
49. Video Tape Recorders	4.50	5.00	3.63	4.36	4.40	4.69	4.80	4.13	4.30	5.00	4.60	4.46	4.88
50. Video Camcorder Systems	4.41	4.14	3.88	4.50	4.33	4.38	4.80	4.50	4.10	4.83	4.70	4.08	4.88
51. Video Editing Systems	3.94	4.57	3.13	4.00	3.80	3.44	4.50	3.63	3.70	4.67	4.30	3.77	4.50
52. 16mm Motion Picture Projectors	3.55	4.14	3.50	3.71	3.60	3.81	2.80	3.00	3.20	4.00	3.70	3.15	4.25
53. 2X2 Slide Projectors	3.26	4.86	2.38	3.71	3.13	3.31	2.60	3.00	3.00	3.83	3.20	2.77	3.88
54. Filmstrip Projectors	3.38	4.43	2.63	3.57	3.40	3.94	3.00	3.13	2.80	4.16	3.40	2.39	4.25
55. Computer Interactive Video Systems	4.40	4.29	4.50	4.57	4.53	4.31	4.10	4.38	4.80	4.00	4.50	4.00	4.75
56. Microcomputer Overhead Proj. LCD Systems	4.11	4.00	4.50	4.07	4.13	3.56	4.60	3.88	4.70	3.17	4.10	4.00	4.75

Table 4.23 Breakdown of Recommendation Scale by Percentile

Percentiles	95th	4.75	Recommendation Scale Range
	90th	4.50	
	85th	4.25	
	80th	4.00	
	75th	3.75	
	70th	3.50	
	65th	3.25	
	60th	3.00	
	55th	2.75	
	50th	2.50	
	45th	2.25	
	40th	2.00	
	35th	1.75	
	30th	1.50	
	25th	1.25	
	20th	1.00	
	15th	0.75	
	10th	0.50	
	5th	0.25	

Table 4.24 Summary: Selection of Instructional Media Competencies

<p>** = At or above 80th percentile. * = Between 70th and 79th percentile.</p>	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/ Computer Science	Music	Physical Education	Science	Social Science
Foundation and Theory Competencies:													
1. Communication Theory		*	*			*							
2. Design and Layout of Visual Materials	*	**		*	*	*	**	*		*			
3. Instructional Design Theory and Practice		*					*						*
4. Media Selection and Evaluation Criteria	*	*	*			*		*				*	*
5. Impact of Technology on Education		**	**	*			**		*		*	*	
6. Implications of Inst. Media Research													
7. Future Trends of Media and Tech. in Educ	*	*	*	*	*	*	*	*	*		*	*	
8. Copyright Laws and Education	*	*	*	*	*	*	*	*	*	**	*		
Production Competencies:													
9. Lettering for Instructional Materials		*				*		*			*		
10. Mounting Visuals		*				*		*			*		
11. Laminating Visuals		*		*	*	*		*			*		
12. Machine Prod. Transparencies	*	*	**	*	*	*	*	*	*		*	*	*
13. Handmade Transparencies	*		*	*	*	*	*	*	*		*	*	*
14. Display Boards (B.B., etc.)		*	*	*	*	**		*	*	*	**		*
15. Duplicating Inst. Materials (Dittos, Xerox, etc.)	*	*	*	*	**	*	*	*	*	*	**	*	**
16. Illustration and Enlargement Techniques		*	*	*	*	**	*	*			*	*	*
17. Manipulatives (Mathematics materials, etc.)									**			*	
18. Audio Recording				*				*		**			
19. Video Recording (off-air recording)				*	*	*	*	*		**	**	*	*
20. Video Programming (Producing own programs)				**		*	*	*		*	**		*

Table 4.24 Summary: Selection of Instructional Media Competencies (cont.)

	** = At or above 80th percentile. * = Between 70th and 79th percentile.												
	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/Computer Science	Music	Physical Education	Science	Social Science
Production Competencies (Cont.):													
21. Still photography		*											
22. Slide/tape programs		*											
23. Computer Assisted Instruction	**	**	**	**	**	**	**	**	**	**	**	**	**
24. Computer Programming	*	*		*	*	*			*	*	*	*	
25. Computer Graphics		**	**	*	*	*	**	*	**	*	**	**	
26. Games, simulations and media kits				**	*	**					*		*
Utilization Competencies:													
27. Non-projected visuals				*		*						*	
28. Overhead Transparencies		*	**	**	*	*		**	**			*	*
29. Display Boards (Bulletin Boards, etc.)		*	**	*	*	*		*			*		
30. Flip Charts													
31. Chalkboards	*		*			*	*		*	*			
32. Duplicated Materials (Dittos, Xerox, etc.)	*		**	*	*	**	*	*	*	*	*	*	*
33. Manipulatives (Mathematics materials, etc.)									**				
34. Audio Recordings				*				*		**			
35. Instructional Films and Videos (tape & disc)		*	*	**	**	**	*	**		**	**	**	*
36. Broadcast Television				*				*			*	*	*
37. Slides		*											
38. Filmstrips		*				*							
39. Computer Assisted Instruction	**	*	**	**	**	**	**	**	**	*	*	**	**
40. Computer Interactive Video Programs	*	**	**	**	*	**	*	*	*		*	**	*

Table 4.24 Summary: Selection of Instructional Media Competencies (cont.)

** = At or above 80th percentile. * = Between 70th and 79th percentile. *** = Selected because all disciplines recommended inclusion.	Total Population	Art	Business	Foreign Language	Health	Home Economics	Industrial Arts	Language Arts	Math/Computer Science	Music	Physical Education	Science	Social Science
Utilization Competencies (Cont.):													
41. Games and Simulations			*	**	*	**			*		*	*	*
42. Free and Inexpensive Materials	***	**	**	**	**	**	**	*	*	**	**	*	*
43. Field Trips and Community Resources	***	**	**	**	*	**	*	*	*	**	**	*	*
Operation Competencies:													
44. Overhead Projectors	*	*	*	*	*	**		*	**		*	*	**
45. Spirit Duplicators (Ditto)					*	*			*		*		**
46. Opaque Projectors		*				*							*
47. Cassette Tape Recorders		*				*				**	*		**
48. Record Players										*			*
49. Video Tape Recorders	***	**	**	**	**	**	**	**	*	**	**	**	**
50. Video Camcorder Systems	***	*	**	**	**	*	**	**	*	**	**	**	**
51. Video Editing Systems		*	*	*	*	*	**	*		*	**	*	**
52. 16mm Motion Picture Projectors					*	*					*		*
53. 2X2 Slide Projectors		*											*
54. Filmstrip Projectors		*				*							*
55. Computer Interactive Video Systems	**	**	**	**	*	**	*	*	**	*	**	**	**
56. Microcomputer Overhead Proj. LCD Systems		*	*	*	*	*	**	*	**		*	**	**

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

This study was an investigation to determine the instructional media competencies that inservice teachers of secondary education teaching disciplines recommend for pre-service teachers in their discipline. The primary purpose of this study was to identify the instructional media competencies common to all teaching disciplines. In addition, the media competencies unique to each discipline were identified. Consideration was also given to the perceived value of instructional media use in the classroom, length of tenure as a teacher and the teaching location namely Hawaii, Oregon and Utah . Recommendations were studied relative to an instructional approach for teaching instructional media competencies in a pre-service teacher education program.

A review of the literature available indicates a large amount of descriptive research and study has been conducted to determine what kind of instructional media is used in the classroom, a large number of comparative studies have attempted to determine which media provide what benefits and which do the better job. While there are no absolute conclusions, the findings seem to be somewhat contradictory with the comparative studies indicating considerable contribution and benefit from the use of instructional media, but the descriptive studies indicating that there is relatively little media actually being used in the classroom.

Much effort has been expended to determine what competencies are significant for pre-service teachers to learn and

which of these competencies are being taught in teacher education programs. Four general categories of instructional media competencies have been agreed upon, namely: Principles of Communication, Selection, Evaluation and Research; How to Produce Instructional Media; How to Utilize Instructional Media; and How to Operate Media Equipment. Several lists of over sixty individual instructional media competencies have been developed for these categories. These instructional media competencies are reflected in the introductory media courses and the textbooks being used in them.

The appropriate instructional approach has also been the topic of research or a component of course content studies. From the literature review, four general approaches were identified. The formal instructional media course; integration of media competencies in methods courses combined with laboratory assignments; integration of media competencies in all education courses; and a combination of the above along with experiences in a well designed, staffed and supplied instructional media laboratory. Of significance is the finding that role modeling in the pre-service methods courses by the professional faculty in teacher education programs has a direct influence on whether beginning teachers will use media in that subject area.

The literature identifies several sources for determining what should be taught in an introductory instructional media course. Studies were conducted to gather information from media instructors, methods course instructors, public school administrators, etc. There were no studies located that did anything more than ask inservice teachers what media they used in the

classroom. The assumption made is that if they use it, it must be important enough to teach it to others. Nearly all of the studies reviewed seem to consider media or media competencies as being general in nature, therefore, applicable to all teaching situations or disciplines. No study was found that asked inservice teachers which instructional media competencies they considered important to them on the basis of their teaching discipline.

This study was designed to collect data regarding recommendations of instructional media competencies by teachers of secondary education teaching disciplines. Secondary education teachers of thirteen different teaching disciplines were randomly selected from schools in three states, namely Hawaii, Oregon and Utah. Four hundred and sixteen (416) responded to a mail administered questionnaire requesting recommendations of instructional media competencies to be included in a pre-service teacher education program for teachers in their discipline. They were asked to respond to a six point scale with a low of "0" to a high of "5" for their recommendations as well as their perceived value of media use in the classroom. They were also asked to rank from 1 to 5, four (4) instructional approaches for teaching instructional media competencies in a pre-service teacher education program. Prior to data analysis it was determined that two teaching disciplines, "computer science" and "mathematics" should be collapsed into one discipline. A series of one-way analysis of variance with Duncan Multiple Range Tests, t-Tests, cross tabulations and means tables were computed to determine any significant differences in the recommendations of fifty-six (56) instructional media competencies among teachers in secondary education teaching disciplines.

Of the fifty-six (56) instructional media competencies studied there were significant differences found among teachers of secondary education teaching disciplines for recommendations of thirty-six (36) competencies. Significant differences were also found among teachers of secondary education teaching disciplines regarding their perceived value of media use in the classroom. Music teachers had the lowest mean value of 2.90, while Industrial Arts teachers had the highest mean value of 4.17. Of the four instructional approaches studied only one, “Combination of formal courses and an integration of media competencies within the teaching methods courses.” indicated any significant differences in rankings among teachers of secondary education teaching disciplines. Home Economic teachers gave this approach the highest ranking of 1.93, while the Business teachers ranked it at 2.97. By controlling for teaching location, level of media value and years of experience, additional information was developed that indicated that all three factors have some influence on recommendations of instructional media competencies among teachers of secondary education teaching disciplines.

Information was compiled relative to the factors contributing to the non-use of media in the classroom. Seven (7) statements were presented and the respondents asked to indicate which were significant to them. Of the the seven (7) presented, two (2), “Arranging to use media is too great a hassle” and “Media materials in the school are outdated”, produced the greatest number of responses.

Conclusions

The analysis of the data collected presents evidence to support several conclusions regarding teaching disciplines, instructional media competencies, perceived value of media use in the classroom and instructional approaches for teaching instructional media competencies in pre-service teacher education programs. The first hypothesis focused on the significant differences among the teachers of secondary education teaching disciplines and their recommendations of instructional media competencies to be taught to pre-service teacher education students in their disciplines. Tables 4.2 and 4.3 (pp. 84-104) indicate that for thirty-six (36) of the fifty-six (56) competencies studied there was a significant difference among teachers of secondary education teaching disciplines regarding their recommendations of instructional media competencies to be taught to pre-service teacher education students in their discipline. While the data does not indicate differences for the total set of media competencies there is enough evidence to make a general conclusion.

Conclusion 1

The teaching discipline influences recommendations by inservice teachers of secondary education for instructional media competencies to be included in a pre-service teacher education program.

Research question one, ("Is there a difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on the state in which they are teaching?"), and two, ("Is there any difference in instructional media competency recommendations among all teachers in Hawaii Oregon or Utah?"), are concerned with the teaching location namely Hawaii,

Oregon and Utah and the recommendations of instructional media competencies. A review of Table 4.8 (pp. 116-118) indicates a significant difference exists among teachers of secondary education teaching disciplines in the states of Hawaii, Oregon and Utah regarding their recommendations of instructional media competencies to be included in a pre-service teacher education program. For Hawaii and Utah there were eleven (11) competencies indicating significant difference, while in Oregon there were twenty-two (22). Careful review of Tables 4.8.1, 4.8.2 and 4.8.3 (pp. 119-142) indicates no evidence to suggest any similarities among teaching disciplines from the different states. Table 4.9 (pp. 143-149) presents the findings regarding recommendations of instructional media competencies by all teachers in Hawaii, Oregon and Utah. Careful review of these data indicates that of the nineteen (19) media competencies indicating a significant difference, teachers from Hawaii have the highest recommendation means for all nineteen (19) with Oregon teachers having the lowest recommendation means for eighteen (18) of the nineteen (19) competencies presented. As was discussed in chapter one, one of the reasons these three states were selected was the slightly different set of standards for state approval of teacher education institutions. This is not to suggest that the state approval standards produce any cause and effect relationship regarding the differences in the recommendations of instructional media competencies discussed above, but does suggest opportunity for further study.

The second hypothesis focused on the significant differences among teachers of secondary education teaching disciplines and their perceived value of instructional media use in the classroom.

Table 4.4 (p. 106) indicates a significant difference among teachers of secondary education teaching disciplines regarding their perceived value of instructional media use in the classroom. Table 4.5 (p. 107) provides a ranking of teaching disciplines from high to low of perceived value of instructional media use in the classroom. The hypothesis was rejected at the .0002 level of confidence which gives strong evidence for a second conclusion from this study.

Conclusion 2

The teaching discipline influences the perceived value of instructional media use in the classroom of inservice teachers of secondary education.

As was the case for research questions one and two as described above, research question three, (“Is there a difference in the perceived value of instructional media use in the classroom among teachers in secondary education teaching disciplines based on the state in which they are teaching?”), focused on the consideration of teaching location. Table 4.10 (pp. 150-151) indicates that there were no differences among teachers in Hawaii or Oregon regarding perceived value of instructional media use in the classroom. However, there is a significant difference in the perceived value of instructional media use in the classroom among teachers of secondary education teaching disciplines in Utah at the .01 level of confidence. Music teachers, with a value mean of 2.25, have the lowest perceived value of instructional media use in the classroom while science teachers, with a value mean of 4.40, have the highest perceived value. Again, no conclusions are being suggested, only a recognition that differences exist among teachers in Utah that were not evidenced in either Hawaii or Oregon.

Additional information was developed relative to the consideration of perceived value of instructional media use in the classroom by research question four; “Is there any difference in instructional media competency recommendations based on perceived value of instructional media use in the classroom.” By recoding the perceived value of instructional media data into categorical levels of low, medium and high it was possible to further analyze the teachers recommendations of instructional media competencies to be included in a pre-service teacher education program. Table 4.11 (pp. 153-155) indicates that there is significant difference among teachers having low, medium and high perceived value of instructional media use in the classroom regarding recommendations of forty-one (41) of the fifty-six (56) instructional media competencies studied. Careful review of Table 4.12 (pp. 156-169) shows that with the exception of one competency, number 18. “producing audio recordings,” all recommendations from teachers having a “high” perceived value of instructional media use in the classroom had a higher mean than either of the other two categories. These data provides evidence to support the following conclusion.

Conclusion 3

The perceived value of instructional media use in the classroom by secondary education teachers influences their recommendations of instructional media competencies to be included in a pre-service teacher education program.

The data collected and analyzed regarding research question five, (“Is there any difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on perceived value of instructional media use in the

classroom?”), also support conclusion 3 regarding the influence of perceived value of instructional media use in the classroom on media competency recommendations. Review of Tables 4.13, 4.13.1, 4.13.2 and 4.13.3 (pp. 172-195) show that by controlling for levels of media value it was found that there were twenty-two (22) media competencies which indicate significant differences among teachers having a low perceived value of instructional media use in the classroom. For teachers with a medium perceived value of instructional media use in the classroom there were sixteen (16) media competencies indicating a significant difference. There were only three media competencies indicating significant differences among secondary education teachers having a high perceived value of instructional media use in the classroom. This set of data suggests that the higher the perceived value of instructional media use in the classroom the fewer differences there are among teachers of secondary education teaching disciplines for instructional media competencies to be included in a pre-service teacher education program.

Research question six, (“Is there any difference in instructional media competency recommendations by teachers in secondary education teaching disciplines based on years of teaching experience?”), focuses on the influence of years of teaching experience and teaching disciplines on recommendations of instructional media competencies to be included in a pre-service teacher education program. Out of a total of six-hundred and seventy-two (672) individual t-Tests computed there were only seventy-three (73) that indicated any significant difference even by extending the alpha level to .10. A review of Table 4.14 (pp. 197-207)

indicates that of the seventy-three (73), fifty-three (53) of the combinations of teaching disciplines and media competencies had a higher recommendation mean from those teachers in the low teaching experience category. There is not enough evidence to draw any conclusions from this data.

The third hypothesis of this study focused on the recommended instructional approach for teaching instructional media competencies and teaching disciplines. Review of Table 4.6 (pp. 109-110) indicates that there is no significant difference among teachers of secondary education teaching disciplines regarding the first three suggested instructional approaches. However, the fourth approach, “Combination of Formal Courses and an Integration of Media Competencies with the Teaching Methods Courses.” indicated a difference among the teachers. Business teachers ranked this approach low with a ranking of 2.97 while Home Economic teachers gave it a high ranking of 1.93. Review of Tables 4.6 and 4.7 (pp. 109-110, 112-113) indicate that there is relatively little difference among the instructional approaches as ranked by the teachers of secondary education teaching disciplines. The means of the four instructional approaches indicate a difference of only .02 between the first and second ranking and a difference of only .68 between the first and last ranked approach. There is not enough evidence in these data to support a conclusion regarding recommendation of one instructional approach over another, however, there is enough evidence to support a conclusion regarding the role of the methods courses.

Conclusion 4

Teachers of secondary education teaching disciplines recommend that instructional media competencies be taught as a part of the methods

courses within their disciplines as well as being taught in separate instructional media courses.

The last research question, ("Is there any difference in the factors for media non-use among teachers in secondary education teaching disciplines?"), attempts to determine a few of the reasons why instructional media is not used in the classroom. Review of Table 4.15 (p. 209) indicates that of the seven non-use factors presented in the questionnaire, two had significant responses from teachers in all teaching disciplines. Based on this data a general conclusion can be stated regarding non-use factors of instructional media and teachers of secondary education teaching disciplines.

Conclusion 5

There are two major factors affecting the non-use of instructional media by teachers of secondary education teaching disciplines are that they perceive:

1. "Arranging to use media is too great a hassle."
2. "Media materials in the school are outdated."

As was stated above, the intent of this study was to determine the instructional media competencies that inservice teachers of secondary education teaching disciplines recommend for pre-service teachers in their discipline. The primary purpose was to identify the instructional media competencies common to all teaching disciplines and in addition, the media competencies unique to each discipline individually. The final conclusion is in response to the original objectives as stated in chapter one. After reviewing Tables 4.16 (pp. 211-213) and 4.24 (pp. 233-235), lists were developed which present the instructional media competencies that are recommended by all teachers of secondary education teaching disciplines and those unique to specific teaching disciplines. These are presented in

support of the following general conclusion about instructional media competencies significant to teachers of secondary education teaching disciplines.

Conclusion 6

There are instructional media competencies that are common to all secondary education teaching disciplines as well as instructional media competencies that are unique to each of twelve secondary education teaching disciplines.

Tables 4.17 through 4.22 (pp. 214-231) have been provided for informational purposes. There is no intent to draw conclusions regarding the instructional media competencies recommended for individual states or by level of perceived value of media use in the classroom. Review of them, however, does provide additional support for one or more of conclusions above.

Tables 5.1 through 5.1.12 list the instructional media competencies that were selected using the information from Tables 4.16 (pp. 211-213) and 4.24 (pp. 233-235). As indicated, the first set of media competencies was selected from those recommended by inservice secondary education teachers at or above the 80th percentile or with a mean at or above 4.00. The second set of media competencies was selected from those recommended between the 70th and 79th percentile or with a mean between 3.50 and 3.95. These criteria were used in order to provide sets of competencies that teachers of secondary education teaching disciplines strongly suggest are significant to them in their particular discipline. Additional competencies could be added by selecting means that are at a lower percentile ranking.

Table 5.1 **Total Population:** Recommended Instructional Media Competency List

Competencies from 80th percentile or above	
Competencies	Mean
Producing Computer Assisted Instruction	4.25
Utilizing Computer Assisted Instruction	4.16
Utilizing Free and Inexpensive Materials	4.07
Operating Video Tape Recorders	4.14
Operating Video Camcorder Systems	4.10
Operating Computer Interactive Video Systems	4.05

Competencies between 70th and 79th percentile	
Competencies	Mean
Design and Layout of Visual Materials	3.63
Media Selection and Evaluation Criteria	3.55
Future Trends of Media and Tech. In Educ.	3.65
Copyright Laws and Education	3.63
Producing Machine Produced Transparencies	3.79
Producing Handmade Transparencies	3.70
Producing Duplicated Instructional Materials	3.89
Producing Computer Programming	3.54
Utilizing Chalkboards	3.53
Utilizing Duplicated Instructional Materials	3.80
Utilizing Computer Interactive Video Programs	3.93
Operating Overhead Projectors	3.86

Table 5.1.1 **Art:** Recommended Instructional Media Competency List

Competencies from 80th percentile or above	
Competencies	Mean
Impact of Technology on Education	4.07
Producing Computer Graphics	4.41

Competencies between 70th and 79th percentile	
Competencies	Mean
Communication Theory	3.52
Instructional Design Theory and Practice	3.90
Producing Lettering for Instructional Materials	3.62
Mounting Visuals	3.86
Laminating Visuals	3.93
Producing Display Boards	3.79
Illustration and Enlargement Techniques	3.93
Producing Still Photography	3.72
Producing Slide/tape Programs	3.72
Utilizing Overhead Transparencies	3.62
Utilizing Display Boards	3.93
Utilizing Instructional Films and Videos	3.90
Utilizing Slides	3.93
Utilizing Filmstrips	3.86
Operating Opaque Projectors	3.55
Operating Cassette Tape Recorders	3.66
Operating Video Editing Systems	3.93
Operating 2x2 Slide Projectors	3.69
Operating Filmstrip Projectors	3.66
Operating Microcomputer Overhead Proj. LCD Systems	3.97

Table 5.1.2 **Business:** Recommended
Instructional Media Competency List

Competencies from 80th percentile or above	
Competencies	Mean
Impact of Technology on Education	4.07
Producing Computer Graphics	4.41
Utilizing Overhead Transparencies	4.18
Utilizing Display Boards	4.00
Operating Microcomputer Overhead Proj. LCD Systems	4.36

Competencies between 70th and 79th percentile	
Competencies	Mean
Communication Theory	3.64
Producing Display Boards	3.64
Illustration and Enlargement Techniques	3.73
Utilizing Instructional Films and Videos	3.82
Utilizing Games and Simulations	3.55
Operating Video Editing Systems	3.52

Table 5.1.3 **Foreign Language:** Recommended Instructional Media Competency List

Competencies from 80th percentile or above	
Competencies	Mean
Video Programming (Producing own programs)	4.15
Producing Games, Simulations and Media Kits	4.13
Utilizing Overhead Transparencies	4.00
Utilizing Instructional Films and Videos	4.18
Utilizing Games and Simulations	4.10

Competencies between 70th and 79th percentile	
Competencies	Mean
Impact of Technology on Education	3.64
Laminating Visuals	3.54
Producing Display Boards	3.64
Illustration and Enlargement Techniques	3.74
Producing Audio Recordings	3.64
Video Recording (off-air recording)	3.97
Producing Computer Graphics	3.59
Utilizing Non-projected Visuals	3.72
Utilizing Display Boards	3.67
Utilizing Audio Recordings	3.92
Utilizing Broadcast Television	3.59
Operating Video Editing Systems	3.92
Operating Microcomputer Overhead Proj. LCD Systems	3.80

Table 5.1.4 **Health:** Recommended
Instructional Media Competency List

Competencies from 80th percentile or above	
Competencies	Mean
Utilizing Instructional Films and Videos	4.11

Competencies between 70th and 79th percentile	
Competencies	Mean
Laminating Visuals	3.76
Producing Display Boards	3.95
Illustration and Enlargement Techniques	3.61
Video Recording (off-air recording)	3.68
Producing Computer Graphics	3.97
Producing Games, Simulations and Media Kits	3.71
Utilizing Overhead Transparencies	3.63
Utilizing Display Boards	3.63
Utilizing Games and Simulations	3.87
Operating Spirit Duplicators (Ditto)	3.50
Operating Video Editing Systems	3.66
Operating 16mm Motion Picture Projectors	3.68
Operating Microcomputer Overhead Proj. LCD Systems	3.63

Table 5.1.5 **Home Economics:** Recommended Instructional Media Competency List

Competencies from 80th percentile or above	
Competencies	Mean
Producing Display Boards	4.17
Illustration and Enlargement Techniques	4.17
Producing Games, Simulations and Media Kits	4.15
Utilizing Instructional Films and Videos	4.02
Utilizing Games and Simulations	4.00

Competencies between 70th and 79th percentile	
Competencies	Mean
Communication Theory	3.68
Producing Lettering for Instructional Materials	3.83
Mounting Visuals	3.95
Laminating Visuals	3.71
Video Recording (off-air recording)	3.66
Video Programming (Producing own programs)	3.54
Producing Computer Graphics	3.85
Utilizing Non-projected Visuals	3.51
Utilizing Overhead Transparencies	3.98
Utilizing Display Boards	3.98
Utilizing Filmstrips	3.71
Operating Spirit Duplicators (Ditto)	3.61
Operating Opaque Projectors	3.68
Operating Cassette Tape Recorders	3.51
Operating Video Editing Systems	3.59
Operating 16mm Motion Picture Projectors	3.68
Operating Filmstrip Projectors	3.68
Operating Microcomputer Overhead Proj. LCD Systems	3.66

Table 5.1.6 **Industrial Arts:** Recommended
Instructional Media Competency List

Competencies from 80th percentile or above	
Competencies	Mean
Impact of Technology on Education	4.42
Producing Computer Graphics	4.08
Operating Video Editing Systems	4.04
Operating Microcomputer Overhead Proj. LCD Systems	4.13

Competencies between 70th and 79th percentile	
Competencies	Mean
Instructional Design Theory and Practice	3.50
Illustration and Enlargement Techniques	3.50
Video Recording (off-air recording)	3.92
Video Programming (Producing own programs)	3.67
Utilizing Instructional Films and Videos	3.83

Table 5.1.7 **Language Arts:** Recommended
Instructional Media Competency List

Competencies from 80th percentile or above	
Competencies	Mean
Utilizing Overhead Transparencies	4.00
Utilizing Instructional Films and Videos	4.03

Competencies between 70th and 79th percentile	
Competencies	Mean
Producing Lettering for Instructional Materials	3.81
Mounting Visuals	3.67
Laminating Visuals	3.67
Producing Display Boards	3.78
Illustration and Enlargement Techniques	3.53
Producing Audio Recordings	3.56
Video Recording (off-air recording)	3.86
Video Programming (Producing own programs)	3.97
Producing Computer Graphics	3.64
Utilizing Display Boards	3.75
Utilizing Audio Recordings	3.53
Utilizing Broadcast Television	3.69
Operating Video Editing Systems	3.50
Operating Microcomputer Overhead Proj. LCD Systems	3.61

Table 5.1.8 **Math/Computer Science:** Recommended Instructional Media Competency List

Competencies from 80th percentile or above	
Competencies	Mean
Producing Manipulatives (Mathematics Mat., etc)	4.19
Producing Computer Graphics	4.07
Utilizing Overhead Transparencies	4.10
Utilizing Manipulatives (Mathematics Mat., etc)	4.05
Operating Microcomputer Overhead Proj. LCD Systems	4.33

Competencies between 70th and 79th percentile	
Competencies	Mean
Impact of Technology on Education	3.55
Producing Display Boards	3.52
Utilizing Games and Simulations	3.60
Operating Spirit Duplicators (Ditto)	3.66

Table 5.1.9 **Music:** Recommended Instructional Media Competency List

Competencies from 80th percentile or above	
Competencies	Mean
Producing Audio Recordings	4.54
Video Recording (off-air recording)	4.36
Utilizing Audio Recordings	4.54
Utilizing Instructional Films and Videos	4.04
Operating Cassette Tape Recorders	4.00

Competencies between 70th and 79th percentile	
Competencies	Mean
Producing Display Boards	3.61
Video Programming (Producing own programs)	3.96
Producing Computer Graphics	3.50
Operating Record Players	3.86
Operating Video Editing Systems	3.61

Table 5.1.10 **Physical Education:** Recommended Instructional Media Competency List

Competencies from 80th percentile or above	
Competencies	Mean
Producing Display Boards	4.17
Video Recording (off-air recording)	4.10
Video Programming (Producing own programs)	4.13
Producing Computer Graphics	4.00
Utilizing Instructional Films and Videos	4.20
Operating Video Editing Systems	4.13

Competencies between 70th and 79th percentile	
Competencies	Mean
Impact of Technology on Education	3.93
Producing Lettering for Instructional Materials	3.63
Mounting Visuals	3.73
Laminating Visuals	3.60
Illustration and Enlargement Techniques	3.93
Producing Games, Simulations and Media Kits	3.77
Utilizing Display Boards	3.83
Utilizing Broadcast Television	3.60
Utilizing Games and Simulations	3.73
Operating Spirit Duplicators (Ditto)	3.53
Operating Cassette Tape Recorders	3.57
Operating 16mm Motion Picture Projectors	3.63
Operating Microcomputer Overhead Proj. LCD Systems	3.97

Table 5.1.11 **Science:** Recommended
Instructional Media Competency List

Competencies from 80th percentile or above	
Competencies	Mean
Producing Computer Graphics	4.03
Utilizing Instructional Films and Videos	4.24
Operating Microcomputer Overhead Proj. LCD Systems	4.03

Competencies between 70th and 79th percentile	
Competencies	Mean
Impact of Technology on Education	3.55
Illustration and Enlargement Techniques	3.68
Producing Manipulatives (Mathematics Mat. etc)	3.53
Video Recording (off-air recording)	3.82
Utilizing Non-projected Visuals	3.53
Utilizing Overhead Transparencies	3.84
Utilizing Broadcast Television	3.55
Utilizing Games and Simulations	3.50
Operating Video Editing Systems	3.53

Table 5.1.12 **Social Science:** Recommended
Instructional Media Competency List

Competencies from 80th percentile or above	
Competencies	Mean
Operating Spirit Duplicators (Ditto)	4.23
Operating Cassette Tape Recorders	4.05
Operating Video Editing Systems	4.00
Operating Microcomputer Overhead Proj. LCD Systems	4.09

Competencies between 70th and 79th percentile	
Competencies	Mean
Instructional Design Theory and Practice	3.77
Producing Display Boards	3.64
Illustration and Enlargement Techniques	3.59
Video Recording (off-air recording)	3.82
Video Programming (Producing own programs)	3.50
Producing Games, Simulations and Media Kits	3.64
Utilizing Overhead Transparencies	3.59
Utilizing Instructional Films and Videos	3.91
Utilizing Broadcast Television	3.77
Utilizing Games and Simulations	3.77
Operating Opaque Projectors	3.64
Operating Record Players	3.73
Operating 16mm Motion Picture Projectors	3.96
Operating 2x2 Slide Projectors	3.59
Operating Filmstrip Projectors	3.86

Additional review of Tables 4.16 (pp. 21-213) and 4.24 (pp. 233-235) suggests the supposition that teachers of secondary education teaching disciplines are cognizant of technological advances that can affect the teaching process. This is evidenced by the consistently high recommendation scores for those competencies that are dependent upon computer and video technology. This pattern would suggest an interest or at least an awareness of the trends toward high technology applications to the teaching/learning process.

Recommendations

The recommendations set forth in this study are based on two assumptions. According to the literature reviewed in Chapter 2, instructional media, if properly used can enhance the teaching/learning process by increasing the amount of learning or reducing the amount of time necessary to accomplish the desired outcome. Second, inservice teachers of secondary education teaching disciplines have knowledge and experience that can provide a better understanding of the needs of pre-service teachers as they are preparing to enter the schools, as indicated by research reviewed and the findings of this study. Given these assumptions, the following recommendations are derived from the results of this study.

Recommendation 1

Instructors of secondary education teaching discipline methods courses and instructors of instructional media in institutions of higher education offering teacher education programs should jointly design and develop learning activities that will provide pre-service teacher education students in specific teaching disciplines the instructional media competencies identified as necessary for their discipline.

The recommendation described above could be accomplished by carefully selecting those instructional media competencies that are best developed in a formal instructional media course and those that could best be presented in the methods courses. Each should reinforce and support the other. It is important to recognize that one of the significant components of these courses and activities must be effective and appropriate modeling of these skills and competencies by the instructors involved. Learning about something is not the same as having a continuous example of its application in a realistic setting that represents the environment in which pre-service teacher education students will be working.

Recommendation 2

Specific learning activities should be developed that will enhance the pre-service teacher education students perception of the value of the use of instructional media in the classroom.

This recommendation could be accomplished by instructional media instructors and methods instructors providing their students opportunities to be directly involved in educational innovation projects. These could focus on the application of computer or video technology to the teaching/learning process or in the design and delivery of instruction via telecommunication technology. The benefits of this type activity would be two fold. First, the students would have opportunity to see technology being applied to the teaching/learning process in a "real" setting. Second, by being involved on a participatory/contributive basis, the students will develop a better understanding of the benefits of such programs in terms of direct learner improvement. By being involved they can develop, to a degree, a sense of ownership in the outcomes and ideas

of the project. It should be pointed out that such projects do not necessarily have to be high technology based. Providing pre-service teacher education students opportunity to develop and apply new applications of older and more simple technology in the delivery of instructional activities can be just as rewarding.

Recommendation 3

State Teaching Certification Requirements should be written to require evidence that secondary education teachers have both general instructional media competencies as well as specific skills that are significant to their teaching discipline.

The implementation of this recommendation would encourage schools and colleges of education to provide programs that offer courses in instructional media as well as methods courses for each teaching discipline. It would also encourage cross-departmental cooperation in the development and offering of learning activities designed to provide pre-service teacher education students the skills and knowledge necessary to meet the challenges of today's teaching profession.

Implications for Further Research

The findings of this study suggest additional research relating to instructional media and specific secondary education teaching disciplines.

1. This study should be replicated with a similar population from different states to determine if the results would be the same.
2. A similar study should be completed using teachers in the elementary schools by grade level.

3. Similar studies could be designed as follow-up from various institutions offering teacher education programs with comparisons being made among students from each institution.

4. Additional study should be conducted that focuses on the uniqueness of each teaching discipline in terms of teaching model, learning style and learning style preferences and the attributes of each instructional medium that supports particular models or styles.

5. An experimental competency based program could be jointly developed by instructional media and methods instructors that focused on specific instructional media competencies per teaching discipline. A longitudinal follow-up study could be conducted to determine continued use and value of the competencies being studied.

6. Inservice training programs could be developed that focus on specific instructional media competencies by teaching discipline with a study to determine increased application and use of those competencies.

7. This study could be replicated with a population drawn from methods instructors in teacher education programs to compare the results with the findings of this study.

8. Additional study should be conducted that focuses on the factors that produce the significant differences in perceived value of instructional media use in the classroom among the teachers from different states.

9. Additional study should be conducted that focuses on the factors that produce the differences in the levels of perceived value of instructional media use in the classroom.

A Final Note

This study attempted to provide information regarding instructional media competencies and specific secondary education teaching disciplines, their perceived value of instructional media use in the classroom and the appropriate instructional approach for teaching instructional media competencies in a pre-service teacher education program. Findings showed that the teaching discipline does influence inservice secondary education teachers recommendations regarding which instructional media competencies are significant. It was also found that the teaching discipline influences the secondary education teachers perceived value of the use of instructional media in the classroom. Conclusions were drawn and recommendations made based on these findings. However, this information, in no way, is to be considered a conclusive or final statement on the relationship of teaching discipline and instructional media competencies. The complexity of the teaching/learning process requires constant study to determine the best approaches and resources to meet the needs of the students.

A Personal Note

Considering the complexity of the teaching/learning process, it would seem that serious energy and thought should be expended on behalf of reform of pre-service teacher education programs. Teachers today are facing the challenge of preparing their students for a world that none of them can even begin to envision. This requires a level of preparation and skill that has not been demanded in the past. In order for teacher education programs to meet their responsibility to prepare future teachers, it is necessary to develop a

greater sense of and commitment to, cooperative efforts among departments and faculty. Effort needs to be made that will breakdown the departmentalization and compartmentalizing of the various components within the university that make up a typical teacher education program. Pre-service teacher education students need to experience an integrated, cooperative program where each contributor is seen as professional and integral to the total educational system. Subject matter specialists, methods instructors, classroom management specialists, media specialists and the other applications specialists must work together to provide the student with an understanding of how each adds to the success of system.

A final observation from this research would be that inservice teachers place value on the skills and instructional media competencies that they use in their classrooms. They also seem to be saying that one of the ways they developed a sense of value for their use was through example (or non-example) presented by their methods instructors. The methods teacher, working in cooperation with the instructional media/technology information specialist has a unique opportunity to present methods, instructional approaches and media utilization in a way that can not be duplicated elsewhere. When the pre-service teacher of a particular discipline can see methods and materials being used in the context of the subject of interest, they are more likely to attempt to utilize or replicate that in their own classroom when the time comes.

The preparation of tomorrows teachers is a serious challenge. With the application of effective research, technology and an ever increasing understanding of the process of learning the task will be accomplished. Teacher education has never before been presented

with such an opportunity to make a life altering contribution to the students of tomorrow. Pre-service teachers today must be given the tools and knowledges necessary to provide learning experiences for the students of tomorrow. Those students will be required to do more than rote recitation; they will need to function in a technological/information based society that demands high level thinking skills. The traditional textbook and lecture bound teacher preparation program does not provide the level of skills and knowledge required. A change is required for the teacher education program of tomorrow. Cooperation and integration among all faculty within the teacher education program will lead to a far better prepared teacher of tomorrow.

BIBLIOGRAPHY

1. AECT. 1982. A Survey of Media Instruction in Undergraduate Teacher Education. Instructional Innovator. Sept. 27(6). 32-34.
2. AECT. 1977. The Definition of Educational Technology. Association for Educational Communications and Technology. Washington D.C.
3. Allen, William H. 1973. What Do Fifty Years of Media Research Tell Us? Audiovisual Instruction. March. 18(3). 48-49.
4. Beckett, Alvin C. 1968. Instructional Media and Educational Preparation for Business and Industry. In the Instructional Process and Media Innovation. Rand McNally & Comp., Chicago.
5. Bellamy, R., Whitaker, H. & White, R. 1978. Teacher Attitudes Toward Non-Print Media. ERIC. Dec. ED174197. 1-33.
6. Blythe, Hal & Sweet, Charlie. 1983. Using Media to Teach English. Instructional Innovator. Sept. 22-24.
7. Caffarella, Edward P. and Sachs, Steven G. 1988. Doctoral Research in Instructional Design and Technology: A directory of Dissertations 1977-1986. 310. Association for Educational Communications and Technology: Washington D.C.
8. Carter, Alex & Schmidt, Kenneth C. 1985. An Assessment of the Production and Utilization of Instructional Media by Student Teachers. Educational Technology. Nov. 25(11). 30-32.
9. Carter, Alex & Wedman, John. 1984. A Survey of Classroom Media Use. Instructional Innovator. Sept/Oct. 29(6). 36-8.
10. Clark, Richard E. and Salomon, Gavriel. 1985. Media in Teaching. In the Handbook of Research on Teaching, 3rd Edition. MacMillan Publishing Company: New York.
11. Cochran, Lee W. 1973. In the Beginning...it was DVI. Audiovisual Instruction. March. 18(3). 42-43.
12. Courtney, Wayne E. 1984. Analysis. Oregon State University: Corvallis, Oregon.
13. Dale, Edgar. 1953. What Does it Mean to Communicate. AV Communication Review. Winter. 1(1). 3-5.

14. de Kieffer, Robert E. 1948. The Status of Teacher Training in Audiovisual Education in the Forty-Eight States. Doctoral Dissertation. State University of Iowa.
15. de Kieffer, Robert E. 1959. AV activities of Colleges and Universities in Teacher Education. Audio-Visual Communication Review. Feb. 7(2). 122-137.
16. de Kieffer, Robert E., De Kieffer, Melissa H. 1970. Media Milestones in Teacher Training. ERIC. ED035318. 1-80.
17. de Kieffer, Robert E., de Kieffer, Melissa H. 1977. Media Milestones in Teacher Training Revisited. Research Report (Private Publication). Information Futures, Pulman, Washington.
18. deBernardis, Amo and Brown, James W. 1946. A Study of Teacher Skills and Knowledges Necessary for the Use of Audio-Visual Aids. Elementary School Journal. June. 46(10). 550-556.
19. Dillman, Don A. 1978. Mail and Telephone Surveys. John Wiley and Sons., New York.
20. Dyrenfurth, Michael J., Miller, Milton F. 1984. Media Use in Vocational/Technical Education. Media & Methods. Oct. 21(2). 10-13.
21. Elliott, Peggy G., Ingersoll, Gary M., Smith, Carl B. 1984. Trends and Attitudes in the Use of Educational Media and Materials. Educational Technology. April. 24(4). 19-24.
22. Ely, Donald P. 1984/85. A Pathfinder to the Literature of Educational Technology. International Yearbook of Educational and Instructional Technology. 63-66. Nichols Publishing Comp., New York.
23. Ely, Donald P. 1973. Defining the Field of Educational Technology. Audiovisual Instruction. March, 18(3). 52-53.
24. Finn, James D. 1967. In The Teacher and Technology. 16mm film, sound, bw. Columbus, Ohio: Motion Picture Division; Ohio State University.
25. Fulton, W. R. and White, Frederick A. 1959. What Constitutes Teacher Competence in Audio-Visual Communication? Phi Delta Kappan. January. 40. 158-160.
26. Fulton, W.R. 1960. Audio-Visual Competence and Teacher Preparation. Journal of Teacher Education. December. 11(4). 492-496.

27. Goodlad, John. 1983. A Study of Schooling: Some Findings and Hypotheses. Phi Delta Kappan. 7. 465-470.
28. Hansen, Viggo. 1983. Using Media to Teach Math. Instructional Innovator. Sept. 25-6.
29. Harrod, Norma M. 1977. Use Media? Me? I'd like to, but... Audiovisual Instruction. Oct. 22(8). 53.
30. Heinich, Robert; Molenda, Michael; and Russell, James D. 1989. Instructional Media and the New Technologies of Instruction. 3rd Ed. NacMillan Publishing Comp., New York.
31. Hoban, Charles F. 1965. From Theory to Policy Decisions. AV Communications Review. Summer. 13(2). 121-139.
32. Jamison, Dean; Suppes, Patrick; Wells, Stuart. 1974. The Effectiveness of Alternative Instructional Media: A Survey. Review of Educational Research. Winter. 44(1). 1-68.
33. Jensen, Edward A. 1986. Course Content and Textbook Selection. Conference presentation: AECT. 1-7. Association For Educational Educational Communications and Technology: Washington, D.C.
34. Jones, Gay N. 1982. The Relationship of Media Training and Media Use by Student Teachers and First Year Teachers. Doctoral Dissertation. Dec. University of Toledo.
35. Kemp, Jerrold E. 1989. Planning and Producing Audiovisual Materials, 6th edition. Thomas Y. Crowell: New York.
36. Knirk, Frederick G. and Gustafson, Kent L. 1986. Instructional Technology: A Systematic Approach to Education. Holt, Rinehart and Winston: New York.
37. Laird, Nicola R. 1978. Which Media Do Teachers Use Most? Audiovisual Instruction. Sept. 23(6). 23-25.
38. Lare, Gary A. 1974. Media Education in Elementary Teacher Programs at Selected Teacher-Education Institutions. Doctoral Dissertation. Aug. Kent State University, Graduate School.
39. Levie, W. Howard & Dickie, Kenneth E. 1973. The Analysis and Application of Media. In the Second Handbook of Research on Teaching. 858-882. Chicago: Rand McNally College Publishing Co.

40. Lumsdaine, A. A. 1963. Instruments and Media in Instruction. In the Handbook of Research on Teaching. 583-682. Chicago: Rand McNally & Co.
41. McCutcheon, John Walter. 1984. Factors Influencing the Content of Introductory Educational Media Courses. Doctoral Dissertation. Aug. Indiana University.
42. Meierhenry, W. C. 1966. Media Competencies for Teachers, a Project to Identify Competencies needed by Teachers in the use of the newer media and various approaches to achieving them. ERIC. March, ED012713. 1-237.
43. Meierhenry, Wesley C. 1967. Teacher Competencies Project. Audiovisual Instruction. Dec. 12(10). 1030-31.
44. Moldstad, John A. 1974. Selective Review of Research Studies Showing Media Effectiveness: A Primer for Media Directors. A V Communication Review. Winter. 22(4). 387-407.
45. National Association of State Directors of Teacher Education and Certification. 1988. Manual on Certification and Preparation of Educational Personnel in the United States. National Association of State Directors of Teacher Education and Certification: Sacramento, CA.
46. Okoboji. 1959. The Okoboji Report. Audio-Visual Instruction. January. 4. 4-6.
47. Osguthorpe, Russell T. and Zhou, Lian. 1989. Instructional Science: What is It and Where Did It Come From?. Educational Technology. June. 29(6). 7-17.
48. Ott, Lyman. 1977. An Introduction to Statistical Methods and Data Analysis. Duxbury Press: Massachusetts.
49. Proctor, Leonard F. 1983. Student Teacher Utilization of Instructional Media. Doctoral Dissertation. June. Indiana University.
50. Rasmussen, Warren I. 1968. Instructional Porcess and Media Integration in the Creative Arts. In the Instructional Process and Media Innovation. Rand McNally & Comp., Chicago.
51. Rome, S.F. 1973. The Relationship Between suggested Media Competencies and Those Recommended by Audiovisual Instructors, Methods Instructors, and High School Principals. Doctoral Dissertation. Indiana University.

52. Saettler, Paul. 1968. A History of Instructional Technology. McGraw-Hill Book Comp., New York.
53. Schramm, Wilbur. 1977. Big Media, Little Media: Tools and Technologies for Instruction. 12-58. Sage Publications.
54. Seidman, Steven A. 1986. A Survey of Schoolteacher's Utilization of Media. Educational Technology. Oct, 26(10). 19-23.
55. Shure, Alexander. 1968. Science Education and Instructional Systems. In the Instructional Process and Media Innovation. Rand McNally & Comp., Chicago.
56. Sibalwa, David M. 1982. A Descriptive Study to Determine the Effect that Training, Experience and Availability Have on Use of Instructional Media in the Classroom by Preservice Teachers. Doctoral Dissertation. Michigan State University.
57. Sigda, Robert B. 1983. Using Media to Teach Science. Instructional Innovator. Sept. 27-29.
58. Silber, Kenneth. 1970. What Field Are We In Anyhow? Audiovisual Instruction. May. 15(5). 21-24.
59. Smith, William R. . 1969. A Study of Audiovisual Utilization in Elementary Social Studies Methods Course in the Pennsylvania State Colleges. Doctoral Dissertation. Pennsylvania State University.
60. Starnes, W. Gayle. 1937-38. Present Status of Teacher Training in the Use of Visual Aids. bibliog. Ed. Screen. Dec. & Jan. 16&17. 315-16+; 12-14+.
61. Stracke, George A. 1932. What is being taught in Courses in Visual Instruction? Ed. Screen. Sept. 11. 204.
62. Streeter, C. Edward. 1969. Teacher Competency and Classroom Use of Educational Media. Audiovisual Instruction. Jan. 14(1). 60-62.
63. Taylor, J.W. 1942. Preparation of Teachers in Training and Teachers in Service for the More Effective Use of Visual Aids. Masters Thesis. University of Nebraska, Graduate College.
64. Thomas, James L. (Ed.). 1982. Nonprint in the Secondary Curriculum. Libraries Unlimited: Colorado.
65. Thomas, James. E. (Ed.). 1982. Nonprint in the Elementary Curriculum. Libraries Unlimited: Colorado.

66. Trow, William Clark. 1968. Social Studies and Humanities. In the Instructional Process and Media Innovation. Rand McNally & Comp., Chicago.
67. Wallington, Clinton James. 1974. A Theoretical Construct for the Application of the Concept of New Careers to Instructional Technology. Doctoral Dissertation. University of Southern California.
68. Wilcock, Arlen D. 1986. A Set of Self-Instructional Manuals for Audiovisual Equipment Operation. Masters Thesis. Brigham Young University: Provo, Utah.
69. Wilkinson, Gene L. 1980. Media in Instruction: 60 Years of Research. Association for Educational Communications and Technology.

APPENDICES

Appendix A
Jury Panel of Experts

JURY PANEL OF EXPERTS

Dr. Arnie Abrams
2100 Valley View Rd.
Ashland, OR 97520

Dr. Curtis Fawson
207 MCKB
Brigham Young University
Provo, Utah 84602

Dr. Edward Green
110 MCKB
Brigham Young University
Provo, Utah 84602

Dr. Curtis Ho
Wist 105
University of Hawaii
Honolulu, Hawaii 96822

Dr. Michael Molenda
Instructional Systems
Technology
Indiana University
Education 210
Bloomington, IN 47405

Dr. Bruce Barker
Division of Education
Brigham Young University-
Hawaii
Laie, Hawaii 96762

Dr. James Russell
3581 Creek Ridge
Lafayette, IN 47905

Dr. Don Smellie
1055 Thrushwood Dr.
Logan, Utah 84321

Dr. Rich Sudweeks
201 MCKB
Brigham Young University
Provo, Utah 84602

Dr. John Wedman
1110 Parkridge Dr.
Columbia, MO 65203

Dr. Catherine Whyte
P.O. Box 426
Monmouth, OR
97361-0426

Appendix B
Questionnaire

MEDIA COMPETENCY RECOMMENDATION SURVEY

INSTRUCTIONS

The purpose of this survey is to determine instructional media competencies to be included in a pre-service teacher education program as recommended by inservice secondary teachers. Please respond to items as indicated, using the scale described for each category.

Your responses should be based on your experience as a teacher in your current teaching discipline. It would be helpful if you thought in terms of how you would structure an introductory instructional media course for pre-service teachers preparing to teach in your teaching discipline. If you are teaching in more than one discipline please respond based on your university major.

LOCATION : (Check one)

HAWAII ☐

OREGON ☐

UTAH ☐

SCHOOL TYPE: (Check one)

HIGH SCHOOL (9-12) ☐

JR. HIGH SCHOOL (7-8) ☐

COMBINED 7-12 ☐

YEARS TEACHING

NUMBER OF YEARS
TEACHING FULL
TIME?

SCHOOL ENROLLMENT

APPROXIMATE
SCHOOL
ENROLLMENT?

MEDIA COURSES

NUMBER OF CREDIT HOURS COMPLETED IN
INSTRUCTIONAL MEDIA?

Sem. ☐

Qtr. ☐

TEACHING DISCIPLINE: (Check the **one** that best describes your assignment.)

ART ☐

BUSINESS ☐

COMPUTER SCIENCE ☐

FOREIGN LANGUAGE ☐

HEALTH ☐

HOME ECONOMICS ☐

INDUSTRIAL ARTS ☐

LANGUAGE ARTS ☐

MATHEMATICS ☐

MUSIC ☐

PHYSICAL EDUCATION ☐

SCIENCE ☐

SOCIAL SCIENCE ☐

OTHER _____ ☐

Are you the building media specialist?
yes ☐ no ☐

Value of Media

In General How Would You Rank
the **Value** of Instructional Media/Technology
in your Classroom?

Not
Valued
0

1

2

3

4

Highly
Valued
5

The following instructional media competencies are found in most introductory media courses. Using the scale to the right, please indicate your recommendation for their continued inclusion in a pre-service teacher education program based on your experience in your particular teaching discipline.

Not Recommended				Highly Recommended	
0	1	2	3	4	5

I. Principles of Communication, Selection, Evaluation and Research

	Not Recommended				Highly Recommended	
	0	1	2	3	4	5
1. Communication Theory	0	1	2	3	4	5
2. Design and Layout of Visual Materials	0	1	2	3	4	5
3. Instructional Design Theory and Practice	0	1	2	3	4	5
4. Media Selection and Evaluation Criteria	0	1	2	3	4	5
5. Impact of Technology on Education	0	1	2	3	4	5
6. Implications of Instructional Media Research	0	1	2	3	4	5
7. Future Trends of Media and Technology in Education	0	1	2	3	4	5
8. Copyright Laws and Education	0	1	2	3	4	5
9. Other _____	0	1	2	3	4	5

II. How to PRODUCE Instructional Media Materials

	Not Recommended				Highly Recommended	
	0	1	2	3	4	5
10. Lettering for Instructional Materials	0	1	2	3	4	5
11. Mounting Visuals	0	1	2	3	4	5
12. Laminating Visuals	0	1	2	3	4	5
13. Machine Produced Overhead Transparencies	0	1	2	3	4	5
14. Handmade Overhead Transparencies	0	1	2	3	4	5
15. Display Boards (Bulletin Boards, Displays, etc.)	0	1	2	3	4	5
16. Duplicating Inst. Materials (Dittos, Xerox, etc.)	0	1	2	3	4	5
17. Illustration and Enlargement Techniques	0	1	2	3	4	5
18. Manipulatives (Mathematic materials, etc.)	0	1	2	3	4	5
19. Audio Recording	0	1	2	3	4	5
20. Video Recording (off-air recording)	0	1	2	3	4	5
21. Video Programming (Producing own programs)	0	1	2	3	4	5
22. Still photography	0	1	2	3	4	5
23. Slide/tape programs	0	1	2	3	4	5
24. Computer Assisted Instruction	0	1	2	3	4	5
25. Computer Programming	0	1	2	3	4	5
26. Computer Graphics	0	1	2	3	4	5
27. Games, simulations and media kits	0	1	2	3	4	5
28. Other _____	0	1	2	3	4	5

III. How to UTILIZE Instructional Media Materials (apply media in the teaching/learning process)

	Not Recommended				Highly Recommended	
29. Non-projected visuals	0	1	2	3	4	5
30. Overhead Transparencies	0	1	2	3	4	5
31. Display Boards (Bulletin Boards, etc.)	0	1	2	3	4	5
32. Flip Charts	0	1	2	3	4	5
33. Chalkboards	0	1	2	3	4	5
34. Duplicated Materials (Dittos, Xerox, etc.)	0	1	2	3	4	5
35. Manipulatives (Mathematic materials, etc.)	0	1	2	3	4	5
36. Audio Recordings	0	1	2	3	4	5
37. Instructional Films and Videos (tape & disc)	0	1	2	3	4	5
38. Broadcast Television	0	1	2	3	4	5
39. Slides	0	1	2	3	4	5
40. Filmstrips	0	1	2	3	4	5
41. Computer Assisted Instruction	0	1	2	3	4	5
42. Computer Interactive Video Programs	0	1	2	3	4	5
43. Games and Simulations	0	1	2	3	4	5
44. Free and Inexpensive Materials	0	1	2	3	4	5
45. Field Trips and Community Resources	0	1	2	3	4	5
46. Other_____	0	1	2	3	4	5

IV. How to OPERATE Instructional Media Equipment

	Not Recommended				Highly Recommended	
47. Overhead Projectors	0	1	2	3	4	5
48. Spirit Duplicators (Ditto)	0	1	2	3	4	5
49. Opaque Projectors	0	1	2	3	4	5
50. Cassette Tape Recorders	0	1	2	3	4	5
51. Record Players	0	1	2	3	4	5
52. Video Tape Recorders	0	1	2	3	4	5
53. Video Camcorder Systems	0	1	2	3	4	5
54. Video Editing Systems	0	1	2	3	4	5
55. 16mm Motion Picture Projectors	0	1	2	3	4	5
56. 2X2 Slide Projectors	0	1	2	3	4	5
57. Filmstrip Projectors	0	1	2	3	4	5
58. Computer Interactive Video Systems	0	1	2	3	4	5
59. Microcomputer Overhead Projector LCD Systems	0	1	2	3	4	5
60. Other_____	0	1	2	3	4	5

Instructional Approach

Please rank the following approaches for teaching instructional media competencies in the order you would recommend based on your experience in your particular teaching discipline. Ranking (1st-5th)

1. Formal Courses in Instructional Media.
2. Media Competencies Integrated within the Teaching Methods Courses.
3. Media Competencies Integrated within all Education Courses.
4. Combination of Formal Courses and an Integration of Media Competencies within the Teaching Methods Courses.
5. Other

Course Emphasis

The following categories of instructional media competencies constitute the curriculum in an introductory instructional media course. Indicate the percentage of emphasis that you would recommend for each category. (see pages 2 and 3 for reference)

- | | | |
|--|----------------------|------|
| I. Principles of Communication, Selection, Evaluation and Research. (see page 2) | <input type="text"/> | % |
| II. How to Produce Instructional Media Materials. (see page 2) | <input type="text"/> | % |
| III. How to Utilize Instructional Media Materials. (see page 3) | <input type="text"/> | % |
| IV. How to Operate Instructional Media Equipment. (see page 3) | <input type="text"/> | % |
| | <hr/> | 100% |

Non-Use Factors Check all the factors that most frequently contribute to your decision not to use instructional media in the classroom.

1. Textbook materials are adequate. ☐
2. Do not believe media would help. ☐
3. Media is too time consuming. ☐
4. Arranging to use media is too great a hassle. ☐
5. Media hardware are too difficult to operate. ☐
6. Media materials in the school are outdated. ☐
7. No administrative support for using media. ☐
8. Other

Thank you for your help. Please place your completed questionnaire in the self addressed prepaid mailer and return it to the researcher at your earliest convenience. If you would like to review the results of the study please include your name and address.

Appendix C
Cover Letter for Questionnaire Mailing

April 23, 1990

Dear Colleague:

As a professional classroom educator you have experience that is valuable in helping to improve teacher education programs. More specifically I am interested in your recommendations of instructional media skills that teachers in your discipline should develop as they complete their teacher education program. The information that you provide will be used to help improve instructional media courses for pre-service teachers.

You and some of your colleagues are among a small number of professional educators being surveyed for their recommendations of skills and competencies to be included in an introductory instructional media course. You have been selected as a part of a random sample of the entire state. In order that the results will truly represent the thinking of those within your discipline it is important that all the questionnaires be completed and returned. It is expected that you are teaching in more than one discipline area, however, it is requested that you respond on the basis of the discipline represented by your major as an undergraduate. The data gathered will be analyzed by teaching discipline so it would be especially helpful if you focus on the needs and instructional approaches you use to teach the selected discipline.

You may be assured of complete confidentiality. The questionnaire has an identification number for mailing purposes only. This is so that we may check you off of the mailing list when your questionnaire is returned.

The results of this research will be made available to schools and colleges of education throughout the states of Hawaii, Oregon and Utah. Your input will be of benefit to a large number of pre-service teachers in these programs. You may receive a summary of results by writing "copy of results requested" on the back of the return envelope, and printing your name and address below it. Please do not put this information on the questionnaire itself.

I would be most happy to answer any questions you might have. Please write or call. The telephone number is (808) 293-3853.

Thank you for your assistance.

Sincerely,

Edward A. Jensen
Researcher

Appendix D
Postcard for Reminder Mailing

May 1, 1990

Last week a questionnaire seeking your recommendations of instructional media competencies for teachers in your teaching discipline was mailed to you. You were drawn in a random sample of secondary schools in your state.

If you have already completed and returned it please accept my sincere thanks. If not, please do so today. Because it has been sent to only a small, but representative, sample of professional educators it is extremely important that yours also be included in the study if the results are to accurately represent the recommendations of teachers in your discipline.

It is possible that a colleague teaching in the same discipline received the questionnaire instead of you. If so, please pass this card on to them. Thank you for your assistance.

Sincerely,

Edward A. Jensen
Researcher
