A STUDY OF EDUCATIONAL TECHNOLOGY AS PERCEIVED BY ADMINISTRATORS AND INSTRUCTORS IN SELECTED TECHNICAL INSTITUTES IN THAILAND

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CHAPTER I

INTRODUCTION

There is a growing need in the field of high technology for a skilled labor force in business and industry. Thailand has a shortage of skilled workers and technicians in the high technology field and is not meeting the needs of students, business, and industry in the country. Vocational and technical education is becoming increasingly more important and the national government is making an active effort to strengthen technological innovation through its economic, social and educational policies.

A survey was conducted by Setamanit, Bovornsiri, and Shenoy (1981), about the needs for manpower development in vocational and technical education in Thailand. The results of the survey were reported to the government:

> The investment in education is essential to economic development and increased productivity of the country. The support for vocational and technical education is seen as part of national socio-economic planning and is being integrated with social and political development policies (p. 1).

Changing technology dictates changing educational direction, according to the statement of Dean (1983) and his associates:

> Social and technological change over the last decade has led to an increased variety of vocational/technical/occupational programs in our

> educational system as well as to an increase in the number and size of vocational and technical programs (p. 111).

Statement of the Problem

Some countries have populations that have not been vocationally and technically trained. These countries not only lack competent technical and professional personnel, but they are also without the educated and responsible citizenry to provide the necessary framework within which technological development can take place.

For a developing country, such as Thailand, to make continued educational progress, it is essential that the education and training of its people be based on a firm and forward projected policy. This is essential in the industrial fields where a continuous supply of skilled workers, technicians, and professionals are required to maintain maximum industrial progress. The training of a skilled labor force can be accomplished by technical institutes with a faculty who have been educated and trained in the latest methods of teaching including the proper utilization of instructional aids to assist students learn. Each instructor in the Thai technical institutes, therefore, should know how to select, develop, utilize, and manage audiovisual materials and equipment.

From research work conducted by Boonprasert (1971), who mailed questionnaires to lecturers of many universities in Thailand, the following was found:

1. There is the need for an improvement in the quality and quantity of audiovisual materials and equipment.
2. Most lecturers in each university lack training in the use of audiovisual equipment and materials.
3. There is a lack of suitable rooms and facilities in which audiovisual aids can be used effectively.

If universities have problems with regard to audiovisual aids, then other types of educational institutions, such as vocational schools and technical institutes, may also have needs in audiovisual aids.

Purposes of the Study

The purpose of this study was to determine the availability, utilization, in-service training, and projected needs of audiovisual aids as perceived by administrators and vocational technical instructors of the Institute of Technology and Vocational Education.

Hypotheses

To achieve the purpose of this study, answers to the following hypotheses were tested in order to determine the needs and uses of audiovisual aids as perceived by the administrators and instructors of the Institute of Technology and Vocational Education:

HO_1: There are no significant differences between the perceptions of the administrators and instructors concerning possible problems regarding the use of audiovisual aids in their institutions.

HO_2: There are no significant differences between the perceptions of the administrators and instructors concerning the frequency of use of audiovisual equipment and materials in their institutions.

HO_3: There are no significant differences between the perceptions of the administrators and instructors concerning the needs for audio-visual aid in-service training.

HO_4: There are no significant differences between the perceptions of the administrators and instructors in regard to the future needs for audiovisual equipment.

HO_5: There are no significant differences between the perceptions of the administrators and instructors concerning the organization of audiovisual aid centers in their institutions.

Limitation of the Study

The population of this study was limited to those administrators and instructors who are directly involved with technician education. The investigator randomly selected the population for this study from nine engineering techology campuses of the Institute of Technology and Vocational Education (ITVE) which are located in the four different geographic regions of Thailand. Each engineering technology campus offers several technician programs, such as: mechanical power, sheet metal and welding, electrical power, electronics, and machine tools. Five of the nine engineering technology campuses also offer programs in secretarial training, and/or home economics. The names of the five are Northern Technical Campus, Tak Technical Campus, Northeast Technical Campus, Bangkok Technical Campus, and

Southern Technical Campus. A map showing the location of the nine engineering technology campuses in Thailand is shown in Appendix A.

Definition of Terms

The following definitions were developed to help clarify how these terms are used in this study.

Administrators: Those persons who are in administrative positions ranging from division head, department head, dean, to director of the institute.

Audiovisual media: The term "audiovisual media" in this study refers to information that is presented to students through the senses of sight and sound, and to devices used to present this information.

Educational technology: A combination of the teaching-learning process and educational support 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.

General education courses: Subjects such as mathematics, science, English, and human relations.

Instructors: A person employed by the Institute of Technology and Vocational Education and who conducts classes and laboratories for individuals preparing to be employed as skilled workers or technicians in government agencies, businesses, and industries.

Media technician: A member of the audiovisual staff with technical skills in such specialized areas as operations and maintenance of audiovisual equipment, and installation of systems components.

Media training specialist: A person with appropriate certification and broad professional preparation both in education and media with competencies to conduct a media training program. The media specialist is the basic media professional in the school program.

School media center: An area or areas in a school where information sources associated with equipment and services of the media staff are accessible to students, school personnel, and the school community.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

Rapid changes in every facet of human endeavor are demanding marked changes in the programs and activities of our various social institutions. Because education is, in part, a reason for the rapid changes and also is the major agency which enables humans to adjust themselves to present society, static curricula and traditional experiences no longer sufficiently meet the new demands being made on education. The necessity, therefore, for new approaches and conceptions of communication and information services have been brought about by the nature of the world in which we live.

According to Andrews and Ericson (1976), the role of the industrial instructor is to be a facilitator of learning. It is important, therefore, that he or she plan and provide opportunities and activities relevant to student learning. It is possible to increase the effectiveness of teaching and learning through the use of educational technology.

The term "educational technology" began to be used in Japan in the early 1960's. Sakamoto (1980), a professor of

educational methods at Tokyo Institute of Technology, stated,

> There are three major concepts in terms of the definition of educational technology. The first is to pursue the optimal combination of the components of teaching/learning and educational support systems. The second is to develop and use the technologies, devices, and the systems applicable for the implementation of the optimal combinations. The third is to organize the technologies into a systematic science of instruction and learning (p. 27).

Sakamoto further stated that at the present time, educational technology is understood to mean the integration of all three concepts. Moreover, an English professor defined the term "educational technology" as: "The various methods and techniques that have been evolved for the transmission of information from person to person, in particular from a teacher to a student" (Wyant, 1978, p. 2).

The term "educational technology" in this study means a combination of the teaching-learning process and educational support involving people, techniques, procedures, ideas, devices, organization, and the problems of using audiovisual aids. The investigator used this definition of educational technology from the Association of Educational Communications and Technology (1977, p. 1).

Very little reserach has been conducted and literature generated on the use of audiovisual aids in the classroom in Thailand. Therefore, a large percentage of the studies referred to in this chapter will be from the United States of America and discussed under the following categories:

1. Requirements for Audiovisual Personnel.

2. Physical Facilities for Audiovisual Aids.
3. Budgeting for Audiovisual Aids.
4. Selection and Utilization of Audiovisual Aids.
5. Audiovisual Aids In-service Training.

Requirements for Audiovisual Personnel

In order to use audiovisual materials and equipment effectively in the classroom, an instructor needs several kinds of services from audiovisual personnel, such as specialists, technicians, and aides. A well organized audiovisual center and high quality audiovisual personnel can support the instructor to meet his/her teaching goal:

> Effective services from media center requires a special kind of professional and supporting staff. In order to assist teacher in curriculum planning and implementation, professional media specialists, whose training differ significantly from that of traditional librarian or audiovisual coordinator . . . . The media center staff should include generalists who know all media, as well as specialists in the different media and subject specialists who know the range of media as they relate to a subject discipline (Wiman and Meierhenry, 1969, p. 260).

Another approach to the audiovisual personnel was suggested by Erickson (1959) in which he suggested that the audiovisual director and his professional assistants should be responsible for or share leadership in the following areas:

1. Evaluation and selection of materials and equipment.
2. Supervision of all aspects of utilization within the schools.

3. Consultation services to teachers, administrators, supervisors, audiovisual co-ordinators, architects, and outside agencies on problems and activities in audiovisual education.
4. In-service education programs for school personnel.
5. Experimentation and research on evaluation, uses of materials, and needs for future production.
6. Interpretation of the school's program, including audiovisual education, to the school personnel and to the public.
7. Production of special curriculum materials.

The Joint Committee of the American Library Association (1969) developed the following list of duties and responsibilities of media specialists and their professional staffs:

1. Serving as instructional resource consultants and materials specialists to teachers and students.
2. Selecting materials for the media center and its program.
3. Making all materials easily accessible to students and teachers.
4. Assisting teachers, students, and technicians to produce materials which supplement those available through other channels.
5. Working with teachers to design instructional experiences.
6. Working with teachers in curriculum planning.
7. Teaching the effective use of media to members of the faculty.

8. Assuming responsibility for providing instruction in the use of the media center and its resources that is correlated with the curriculum and that is educationally sound. Although most of this instruction will be done with individual students in the media center, some can be presented by teachers and media specialists in the center or in the classroom, with the size of the group to be instructed determined by teaching and learning needs.
9. Assisting children and young people to develop competency in listening, viewing, and reading skills.
10. Helping students to develop good study habits, to acquire independence in learning, and to gain skill in the techniques of inquiry and critical evaluation.
11. Guiding students to develop desirable reading, viewing, and listening patterns, attitudes, and appreciations.
12. Providing teachers with pertinent information regarding students' progress, problems, and achievements, as observed in the media center.
13. Acting as resource persons in the classrooms when requested by the teachers.
14. Serving on teaching teams. The activities of the media specialist include acting as a resource

consultant for teachers, designing media, and working directly with the students in their selection and evaluation of materials and in their research and other learning activities. Where the size of the media staff permits, the media specialist would be a full-time member of the teaching team.

15. Making available to the faculty, through the resources of the professional collection, information about recent developments in curricular subject areas and in the general field of education.
16. Supplying information to teachers on available in-service workshops and courses, professional meetings, and educational resources of the communitiy.

In a study conducted by Beatty (1976) 50 media specialists were asked which of the 11 tasks (see Figure 1) they performed most of their time per week on each task. The media specialists' ranking of the tasks in order of importance was as follows:

1. Curriculum Development.
2. Utilization.
3. Selection.
4. Supervision.
5. Equipment Operation.
6. Production.
7. Budget Planning.
8. Information Processing.
9. Research.

1. Supervision	Determine staff requirements and participate in the selection, training, and supervision of paraprofessional, professional, clerical, or technical personnel.
2. Selection	Coordinate selection and evaluation of instructional materials to be used in the curriculum of the school.
3. Utilization	Conduct workshops and other inservice education activities for teachers, supervisors, and administrators in the use of technology to improve the methodology of instruction.
4. Curriculum Development	Work with teachers, students, administrators, curriculum specialists in the design, selection, utilization, and evaluation of teaching materials to be used in the curriculum of the school.
5. Research	Conduct experimentation and evaluation of media programs and projects within the school or school district.
6. Community Resources	Provide a resource and consultant center for the community. Center will include community inservice programs, special presentations to service or church groups, etc.
7. Equipment Operation, Distribution, & Maintenance	Manage the organization, distribution, and maintenance of instructional materials and equipment, including the training of students and teachers in operation and use of equipment.
8. Production Services	Work with teachers, students, administrators, curriculum specialists in the production of teaching materials (may include television, photography, duplication, and graphic arts production) to supplement those commercially available.
9. Budget & Facilities Planning	Develop the media budget; monitor its expenditures. Plan for space and facilities required to house media services; include these needs in the budget.
10. Information Processing	Maintain liaison and coordination with district-level media services. Keep school administrators and teachers informed of new technology developments related to teaching and instructional communication.
11. Professional Association Activities	Belong to and actively support professional associations such as UEMA, AECT, ALA, etc. Attend meetings, conventions, serve on committees, read papers, or write articles for publication in professional journals.

Source: Beatty, Lamond F. "Do Media Specialists See Themselves As Others See Them?" Audio-visual Instruction, Vol. 21, No. 9 (November, 1976), p. 45.

Figure 1. Task Performance of Media Specialists

10. Professional Activities.

11. Community Resources.

From the above study one may see that the media specialists consider curriculum development as the most important duty, and community resources as the least important duty. When selecting audiovisual personnel, the director of the audiovisual center should make use of every available device and technique to be sure that each person selected is suited to the work assigned. Job descriptions or specifications are an absolute necessity in hiring media personnel. If the job requires a particular personality or set of psychological traits, such factors must be considered during selection (Wyant, 1978).

Physical Facilities for Audiovisual Aids

According to de Kieffer and Cochran (1962), the audiovisual center is a service center to provide help to teachers so that they can do a better job in the classroom. Both writers also stated the major functions of the audiovisual center as follows:

1. To assist subject matter specialists with the selection and evaluation of materials.
2. To purchase or produce materials recommended.
3. To catalog all materials and issue lists of available materials.
4. To purchase, repair, and maintain all equipment.
5. To distribute materials and equipment.

6. To inspect, repair, and maintain instructional materials.
7. To conduct in-service programs on the improved use of all materials.

In setting up the audiovisual center, the school administrator and the director of the audiovisual center must be able to provide professional, clerical, and technical services, and must, therefore, bring to his job a thorough understanding of appropriate physical arrangements, of adequate technical control of materials and equipment, and of adequate inventory controls and must possess the ability to build an effective staff organization.

Vandergrift (1976) stated that any physical facility for a classroom or school media center represents the planner's thoughts and beliefs about students, about education, and about the goals of the school. Moreover, she pointed out that a physical facility for a classroom or school media center is constructed or installed to make it easier to achieve specific functional ends. An environment goes beyond facilities and actual physical space to those affective qualities of that space which influence persons within. It is composed of all the equipment, supplies, color, space, heating, lighting, and ventilation as well as the activities that take place therein.

To plan and develop a physical facility in school, Hoffman (1974) suggested that the school administrator and director of the audiovisual center should consider the

following guidelines:

1. Program Predetermines Plan: The designers of media centers must be familiar with the present and future district educational program. Provision for a wide variety of media in teaching is necessary for schools that help students translate information into knowledge. The number and size of classrooms or teaching stations to be supported must be determined. Projected plans for curricular changed should be evaluated.
2. Form Follows Function: Naturally the topography of the land on which the school is to be built partially determines the physical form and location of the building and its interior facilities. Then other factors must be considered. Will the proposed location of the media center be easily accessible from all school plant divisions and study centers? Is it removed from school noise, heavy traffic, odors (from shops and cafeterias), and sun glare? Occasionally such a location is necessary because of building renovation, but to not plan for it in a new facility is to ignore function. Lighting, acoustics, temperature, and ventilation, as well as the decoration of the suite, need to be planned so that their contribution supports the role of the media center in serving students.

3. Pragmatics Supersedes Aesthetics: Audiovisual centers should be attractive, interesting, and inviting places. However, architects and others interested in the appearance of the facility may plan for areas that invite problems. For example, multilevel media centers, whether the difference is a few inches or feet or an entire floor, create their own difficulties. Color and lighting can affect the function of the media center while they add to the attractiveness of the place. Consider clear story windows for indirect lighting. When possible, avoid exterior window walls and reflection glare. Outlets for audiovisual equipment and lighting switches should be readily accessible.
4. Quality is True Economy: As readers of consumer reports and similar periodicals know, price is not an index of quality. Examination of furniture and equipment prior to purchase is the best way to determine what you desire. Media centers are not outfitted frequently, so initial furnishings should be carefully selected. Minimal maintenance care should be required. Consider movable screens for variety in furniture arrangement. Avoid patterned multicolor furniture. Be sure that what is selected is suitable for use in the area in which it is intended.
5. Users Participate in Planning: Only on quiz shows

and in give away games to people accept expensive items without examining them. Media specialists and administrators should always be included in the planning sessions for a good media center.

6. Maximum Control with Minimum Supervision Determines Component Pattern: Good education practice and union contracts limit the number of students, a classroom teacher may work with at one time. But in the media center the professional staff may at a given moment be responsible for many times that number. Therefore, visual supervision is essential for study and recreational reading, viewing, and listening areas.
7. Accessibility Invites Use: The audiovisual center should be located at a spot so that it has its own outside exit or is near a general one. Extended daily hours and summer hours make this essential.
8. Multiple Use Avoids Space Abuse: There are five generally accepted areas in audiovisual center suite design: (1) reception or circulation, (2) general use, (3) work/storage, (4) special use, and (5) production. These represent a wide range of activities which relate to each other in many cases. By arranging these areas so that similar activities can be grouped near each other, activities using the same equipment can be scheduled into the same area.

9. Shelving Outranks Windows: This is one of the most abused areas in media center design. Some designers apparently believe that the more windows a media center has, the more successful it will be.
10. One Wall Leads to the Future: This commandment is the one most frequently ignored. No matter where the audiovisual center is located, one wall should be removable so that future growth and expansion will be possible without complete relocation of the facility.

From the suggestions of Hoffman we can conclude that school administrators, instructors, directors of audiovisual centers and media specialists should be responsible for the audiovisual center in their school. A well-planned, organization and aesthetic audiovisual center serviced by a competent staff can improve the quality of an entire school program.

However, Hoffman also said most school administrators and directors of media centers must realize that the facilities of media centers must be carefully planned to accommodate its program. Space and equipment should provide for the collections of materials and their related service, the media programs (television and radio, production of materials, microcomputer and electronic systems), administrative and technical services, and staff activities.

Budgeting for Audiovisual Aids

With the great growth in the production of instructional materials in recent years, the director of a media center should prepare budget reports and guidelines for developing the media program to inform the school administrators and the general public.

The director of the audiovisual center needs to keep in mind the obvious fundamental relationship between educational needs, costs involved in meeting needs, and financing. If, for example, teachers desire to include in the curriculum the learning experiences involving the producton of models, slides and motion pictures, or if teachers themselves feel that they need to make graphic transparancies to communicate more effectively with their students, then the director must proceed to estimate the cost for the needed supplies and equipment (Brown, Norberg, and Srygley, 1972).

According to Erickson (1959):

> Every budget request submitted by a director of audiovisual services ought to be, for any given year, the widest possible financial plan for the contribution of audiovisual services to instructional needs. Actually, as will be made clear later, the budget for any fiscal year ought to be only an annual segment of a long-term operational plan designed to reach goals of service which have been ascertained through painstaking cooperative study and analysis in terms of a local situation (p. 322).

Brown, Norberg, and Srygley (1972) suggested that the basic elements of budget planning must include (1) determining the nature of the tasks to be performed, (2) ascertaining the tools and services required, (3) determining

what resources are already on hand to assist with those tasks, and (4) deciding what additional resources (costing what amounts of money) will be required, taking into account their relative effectiveness and the feasibility of assembling, managing, and paying for them. Budgeting will vary with changing goals and plans for achieving them.

The American Library Association (1969) suggested that annual appropriations should be budgeted for the acquisition of materials for the collections of the system media center. The amount appropriated should be large enough to meet the current needs of the program of the system media center. Funds, beyond those provided for materials, must be available for materials and equipment, communication services, postage and shipping, delivery services, and offset printing.

de Kieffer and Cochran (1962) suggest one document as essential to the budgeting processes. It should include the following: (1) purchase of the necessary equipment; (2) purchase and/or rent of materials, depending on the size of the school system; and (3) provision of adequate facilities for projecton pictures or for using sound equipment in the individual classroom.

Hicks and Tillin (1977) has also suggested the budget preparation procedure include the following six steps: (1) determination of objectives, (2) determination of a course of action, (3) design of a program to achieve the objectives, (4) development of fiscal estimates based on the

program, (5) review and modification of fiscal estimates, and (6) integration of all steps and preparation of a budget statement.

In order to have an effective budget plan, a long-range audiovisual plan should be made for buying or replacing audiovisual equipment and materials. In writing a yearly budget, it is essential to recommend that the director of the audiovisual center utilize all the information which has become available in the budget development process.

Selection and Utilization of Audiovisual Aids

Meeting standards for the selection of audiovisual aids and making the resources of teaching and learning easily accessible are necessary for a good quality of instruction in school. Media specialists and instructors need to become more aware of selecting and utilizing an appropriate media strategy in classroom setting.

The importance of selecting audiovisual aids, according to Sleeman, Cobun, and Rockwell (1979):

> . . . has been the improvement of the selection process involves many interacting criteria. Criteria vary with the curricular decision analyses of learners, conditions arising from planning, and even the variables of professional preference. Environment, conditions, and time also provide criteria that influence selection (p. 94).

Heinich, Molenda, and Russell (1982) stated that media specialists and instructors need to become more aware of selecting an appropriate media strategy in classroom

settings. Media selection should be related to learner characteristics, the nature of objectives, the instructional approach and the constraints of the instructional situation. Brown, Norberg, and Srygley (1972) also stated that determining criteria to guide the selection of education media begins with definition and classification of the goals of the particular instructional program to which they relate. The following is a quotation from the Journal of Audiovisual Communication article, "A.V. Production: Selecting Strategies":

> Selecting an appropriate media strategy is not always easy, but it is an important part of the planning process which, if done properly, can result in the production of audiovisual materials that will enhance and increase learning effectiveness (Bank and Pett, 1982, p. 20).

Media selection and utilization reflect current trends in education and communications. Such developments as the multimedia approach to materials, the widespread use of individualized instruction, and the emergence of computerized programs of learning and instruction have had a marked influence on the scope and use of instructional materials in the school and in the audiovisual center. The findings of research in teaching-learning processes, the increased sophistication of youth, the rising expectation of deprived young people, the important emphasis on high technology, the crisis of the central city, and curricular innovations influence the selection of audiovisual materials and equipment.

One of the earliest models for media selection is

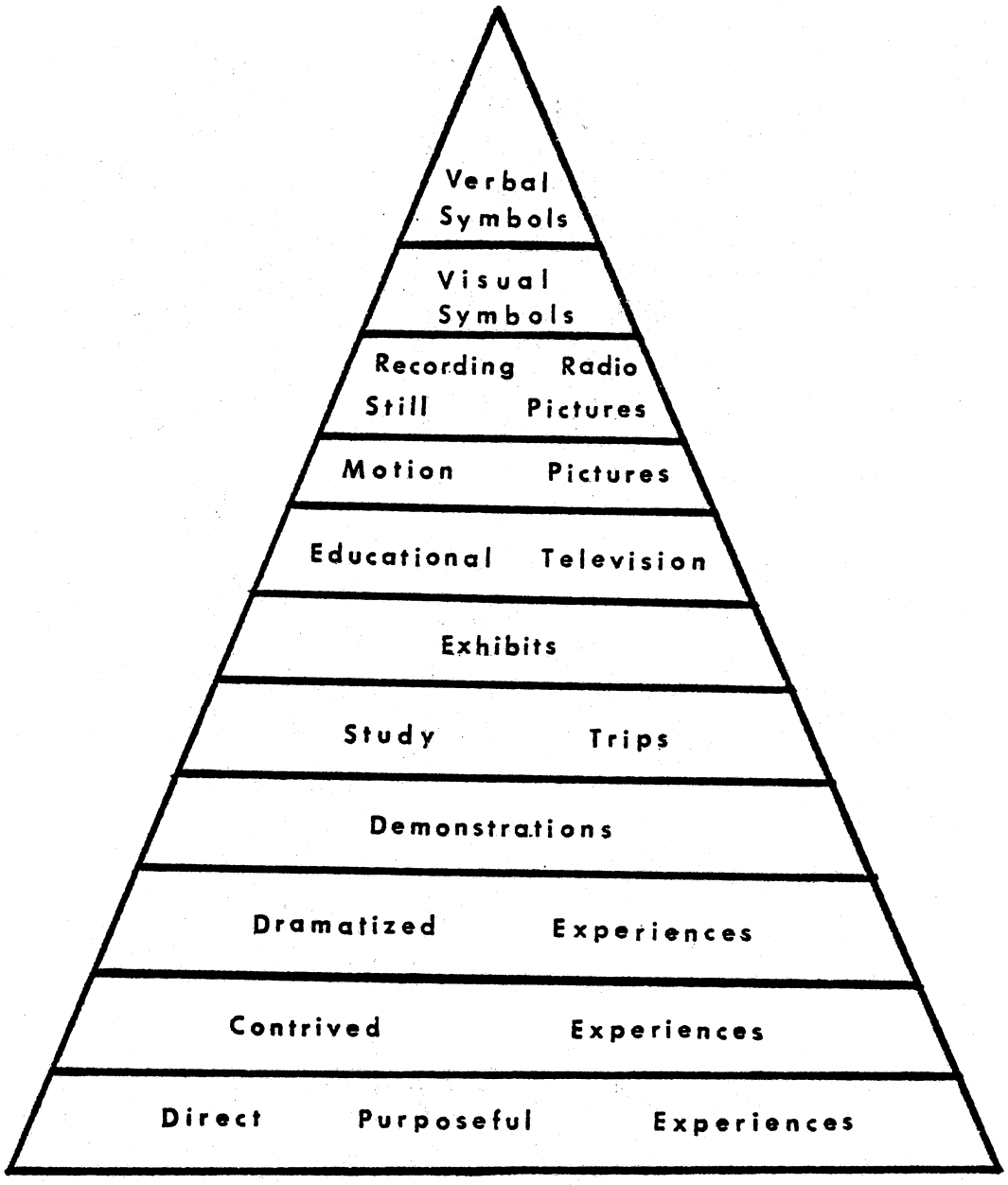
Dale's Cone of Experience as shown in Figure 2. Dale's Cone classifies instructional media according to how concrete or abstract are the experiences they provide for the learner. The base of the cone represents experiences which help organize instructional materials for students. As we move from the base of concrete experience, toward the apex, the principal tool of instruction, verbal symbols or words are the most difficult teaching tool of all (Dale, 1969).

In Modern Practices of Adult Education, Knowles (1980) identified Dale's Cone of Experience for selection and use of materials and devices with the special reference to the principles of andragogy (see Figure 3). As this adapted version indicated, some media are inclined toward abstractions, concepts, and generalities, others toward concrete experience. The continuum between these two points represents the "scale of sensory experience" for the learner.

The study of media selection was conducted by Chisholm and Ely (1979); a four step process was recommended:

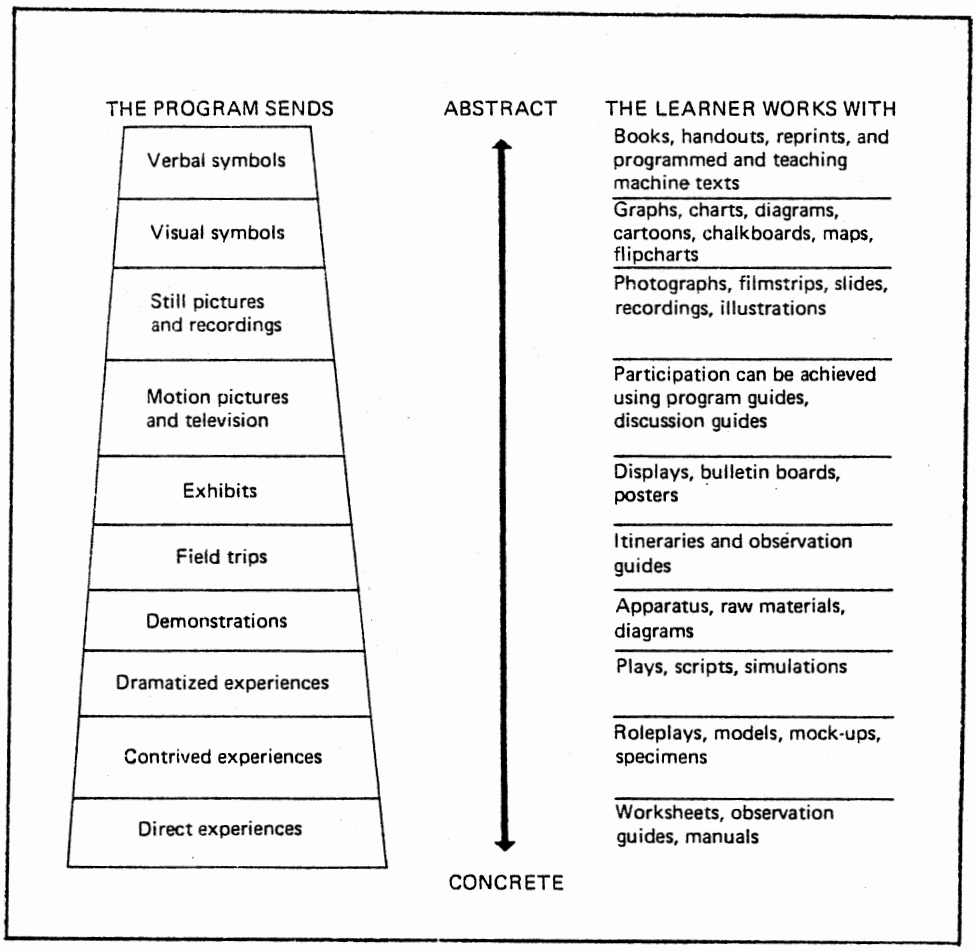
1. Write an objective.
2. Determine the domain in which the objective can be classified: cognitive, affective, psychomotor.
3. Select an appropriate strategy within the domain.
4. Select appropriate media.

Both Chisholm and Ely also stated that selection of instructional media can not be made without a view to the use which this media will have. Therefore, selection must be based on a consideration of how media will be used in actual instruction.



Source: Dale, Edgar. Audio-Visual Methods in Teaching. New York: Holt, Rinehart and Winton, Inc., 1969.

Figure 2. Dale's Cone of Experience



Source: Knowles, Malcolm. Modern Practices of Adult Education. Chicago: Follett Publishing Company, 1980.

Figure 3. Continuum of Audiovisual Experience

In judging the value of audiovisual equipment to be used in the classroom, Erickson (1959) suggested ten criteria for selections regarding their purpose and location for service:

1. Portability. Audiovisual equipment must be easy to handle and move around and be light in weight.
2. Ruggedness. Audiovisual equipment must give good operating service with a minimum of trouble, be free of vibration, and have good electrical connections.
3. Cost. Audiovisual equipment must be a reasonable cost in comparison with other expenses.
4. Ease of Operation. Teachers and students can operate the equipment effectively.
5. Quality of Performance. The equipment must meet desirable performance standards.
6. Effective Design. The equipment is designed attractively.
7. Ease of Maintenance and Repair. The necessary minor adjustment of audiovisual equipment can be made easily and quickly.
8. Reputation of Manufacturer. The company must have a good development record and continue the supply of parts of audiovisual equipment.
9. Local Equipment Status. Quality of the equipment must be commensurated.
10. Available Service. Repair and emergency service facilities of the company's dealers should be located near the school (pp. 166-188).

Erickson's statement was supported by Brown, Norberg, and Srygley (1972). The media selectors should consider appropriateness, authenticity, interest, organization and balance, technical quality and cost. The teachers and learners will have new roles and changed activities as a result of technology change. A new kind of professional will be required to provide leadership in design, implementation, and evaluation of educational programs which make the fullest use of new audiovisual aids.

A major problem which audiovisual specialists and

teachers have is how to use audiovisual aids imaginatively in the classroom. A study conducted by Wendt (1957) concerned factors affecting the value of audiovisual instruction; he found that a film can teach without a teacher present, but good utilization greatly increases its effectiveness. Shortly after World War II one experiment showed that the value of a film is enhanced as much as 100 percent (as measured in achievement) if the teacher prepares the class for the film showing, discusses it immediately after the showing, and even repeats the showing. In other words, just showing the film does not get the best results. Also, the film is most effective if it fills an expressed need; for example, when in the process of pursuing a subject, the questions that arise are promptly and fully answered by a film. In other cases, the classroom teacher by discussion may guide the class to the point where the film can make a valuable contribution.

A similar study conducted by Roberts (1979) stated that the effective use of visual aids by a speaker is vital for the success of any presentation. Research in sensory reception has repeatedly shown that material that is seen is remembered 55 percent better than material that is only heard. Visual aids enhance audience understanding of ideas, heighten audience interest in a subject, and increase audience retention of material. The value of other audiovisual material is much enhanced by proper use in the classroom. Merely hanging a chart on the classroom wall cannot be

expected to produce much learning. Working the chart into instruction as an integral part of a unit multiplies its effect on learning.

Baird (1972) stated that the proper use of any instructional media makes the actual teaching job easier, saves time, and helps students learn better. He also stated that the major part of teaching responsibility is to make proper selection of instructional media for any teaching situation. Some devices are appropriate and some are not. They do not replace good technical teaching; they make it better when selected and used properly.

A complete analysis of the character and the use of such media was suggested by Haney and Ullmer (1980):

> 1. Develop a utilization plan. Preview audio-visual materials, listening to them carefully and critically and identify the learning outcomes for which they are appropriate.
> 2. Prepare the students for listening. Try to stimulate interest in the program by making introductory comment. Explain the program and the reason for using it.
> 3. Play the program. Encourage students to listen quietly and carefully.
> 4. Engage in follow-up activity. Some types of activities such as panel discussion, student reports, a game, or simulation should be organized to ensure that learning has taken place.
> 5. Evaluate learning from the listening experience. Evaluation of the outcomes of a media event is to confirm that desired learning has taken place and that the teacher's utilization strategy has been effective (p. 76).

A study was carried out by Hortin (1982) on innovative approaches to using media in the classroom:

> Media specialists and teachers need to become more aware of how useful the visual rehearsing of future experience can be . . . media specialists

> and teachers must turn to more innovative approaches (p. 18).

The use of audiovisual instruction is relatively new when compared to other types of learning theory or teaching methods. The media specialists and instructors must turn to more innovative approaches in order to use the most effective audiovisual aids in teaching and learning processes. However, a classroom instructor should consider the problems of the physical facilities that might prohibit him/her from using various audiovisual aids.

Audioviaual Aids In-Service Training

Training vocational and technical instructors in the use of audiovisual media and educational technology has experienced considerable expansion and change over the last few years. The major element continues to be a retraining program for in-service instructors through classroom use of media.

According to Harris (1980) the term "In-service Training" is used to mean any planned program of learning opportunities afforded staff members of schools, colleges, or other educational agencies for purposes of improving the performance of the individual in already assigned position. This statement was supported by Rubin (1978) who identified "In-service Training" as the program that provided teachers with an opportunity to explore new teaching methods and strategies to improve equipment for the classroom and exchange ideas in a workshop situation.

Powell's study (1982) of media management stated that in a period of extremely tight budgets, faculty development or in-service training can mean encouraging instructors to retrain in new fields to meet heavy student demand while critically examining those areas considered as non-essential or where student demand is light. This situation encourages a broader look at the whole matter of teaching effectiveness, and at this point, classroom use of media becomes relevant.

A study conducted by Witt (1982) stated that media psychology, how people learn and remember mass-media information, is built on a century-old foundation of learning and memory research. Witt also suggested that the psychology of using audiovisual media can be broken into six guidelines for memorable training:

1. Tailor your media session to its audience.
2. Tell the audience what is important and why.
3. Use the mental imagery to promote memory.
4. Don't overload your audience with information.
5. Relate new facts and ideas to things the audience already knows.
6. Close with an integrated summary of the major facts.

There are many components which must be included in designing effective training programs. According to Cochran (1980), an effective training program should provide specific details about (1) specific goals and objectives;

(2) design activities; (3) resource available; (4) participant awareness and readiness; and (5) evaluation.

Survey research completed by Ingham (1969) about media training programs, suggested four objectives for pre-service teachers:

1. Knowledge of the value of good educational communication.
2. Competency in the selection, utilization and evaluation of instructional media.
3. Experience in the production of simple-to-make audiovisual materials; and
4. Skill in the operation of audiovisual devices (p. 63).

Moreover, the important steps in designing an effective training aid program was suggested by Exton (1947) as follows:

1. The exact information that is desired to convey.
2. The conditions under which this information is to be conveyed.
3. The average or minimum intelligence, preparation, and background of the trainees.
4. The status of the training aid's function with respect to what has gone before and what follows in the course of instruction.

Exton also suggested other factors that need to be considered if the design is to be practical are size, cost, quantity and additional applications of the training aid development.

The differences between result-oriented training and a typical training program were elaborated by Rakow (1981). There are seven criteria that can help developers design

training programs:

1. Systems focus. The focus of a result-oriented training program is presented in the context of the host organization's business goal . . . In contrast most training programs are presented in the context of what subject-matter experts believe trainees should know. Such programs provide trainee with background information, history, or the host organization's overall hopes and expectations.
2. Performance objectives. Result-oriented training is based on the skills that trainees need to apply on the job in order to succeed . . . . In contrast, most training programs identify objectives that state the activities and content to be covered during the training.
3. Media selection. Result-oriented instruction incorporates the selection and use of specific media to teach specific skills . . . . In contrast, a typical training program employs a particular medium of presentation (film, book, or lecture), and this medium conveys the bulk of the training.
4. Skill transfer. Result-oriented training materials direct the transfer of skills learned during the training experience to actual job situation. . . . In contrast, typical training programs provide information that the trainees must try to apply to their own job sitution.
5. Training validation. Result-oriented training programs are validated against three types of populations: (1) technical experts who can say the program is accurate and complete; (2) successful performers who can say that the program teaches the same procedure used by those who perform successfully; and (3) naive individuals from the target audience who are able to master the program's objectives in a developmental test. In contrast, training programs typically will be validated only by subject-matter experts for the accuracy of the content and for general organization.
6. Performance implementation. Result-oriented training programs assure that the training administrator or facilitator conducts the training effectively . . . . In contrast, typical training programs address only the trainees, not the supervisors and management.
7. Performance evaluation. Result-oriented training is evaluated by actual attainment of the business goal . . . . In contrast, typical training programs are evaluated either by trainee reactions to the course or by

> training administrators according to the total number of enrolled trainees (pp. 29-32).

Long (1978) stated that in-service training in audiovisual education would be most suitable and effective for improving the learning situation; the trainer should always make quite sure that the objectives of the training and the training methods are all suited to the trainees. For more than two decades, instructional technologists have promoted a system approach to the development of audiovisual aids in-service training programs (Willis, 1981). Laird (1982) stated that the organization's total budget for the complete training program must consider several cost categories, such as program production, training cost, conducting the program, and evaluation costs. A checklist documenting all the costs of training is shown in Figure 4.

Summary

Changing technology dictates that we change vocational and technical education's direction. The teachers and learners will have new roles and changed activities as a result of technology change. A new kind of professional will be required to provide leadership in design, implementation, and evaluation of educational programs which make the fullest use of educational technology.

This chapter has reviewed the concepts of audiovisual communication and instruction that are applied to educational technology. A consideration of what communication has to do with instruction must properly begin with a

A Formula for Computing Training Production Costs

Item	*Formula*	*Total*
Staff Costs:		
Salaries: Consulting, Designing, Conducting, Evaluating	Number of people times Median salary times Number of hours on the project	_____
Fees: Outside designers and consultants	Total fees and expenses paid out	_____
Travel: Tickets	Total from expense reports	_____
Other expenses	Total from expense reports, *or* per diem times number of days	_____
Overhead	Use standard organization figures; if none exist, use 100 percent of base salary	_____
Materials		
Film	Actual costs if purchased; $1650 to $3000 per minute to produce; $45 to $120 per ten minutes for prints	_____
Videotape	Prorated overhead from own studio, *or* Rental rate plus operator salary, *or* Staff salary median times number of hours	_____
Audiotapes	$50 to $200 per minute to produce $2.50 per print to duplicate $5 to $10 for commercial products	_____
35 mm slides	$15 to $50 per slide to produce 45¢ per print to duplicate	_____
Overhead transparencies	$30 to $100 to produce (includes artwork) 45¢ to $15 per print	_____
Artwork	Minimum of $1.50 per square inch to create	_____
Manuals and materials	Local figures; public or in-house printshop quotations	_____
Announcements	Local figures needed here	_____
Special equipment	Total purchase price; normally amortized over 10 years.	_____
	Total cost to produce the training program:	_____

Source: Laird, Dugan. Approaches to Training and Development. Reading, Massachusetts: Addison-Wisley Publishing Company, 1982.

Figure 4. A Checklist Documenting All the Cost of Audiovisual Training

description of the process of instruction itself. Particularly one must consider what happens to the student, or learner, during the events of instruction.

This chapter also has reviewed the management of the audiovisual center in the school, such as personnel requirements, physical facilities, budgeting, selecting, utilizing, and in-service training. The duties performed by the audiovisual personnel and the instructors will determine the success or failure in tomorrow's school.

Since Thailand has very little research and literature concerning audiovisual aids in classroom teaching, the investigator believed that the review of related literature presented in Chapter II would be useful in the development of the research design and instruments for the study.

CHAPTER III

METHODOLOGY

This study was designed to identify the perceptions of administrators and vocational-technical instructors in the Institute of Technology and Vocational Education regarding the availability, utilization, in-service training, and projected needs of audiovisual aids in their educational institutions. This chapter states how the survey instrument was developed and validated, how the population was selected, and how the data was treated.

Development of the Instrument

A survey questionnaire was designed to obtain the data needed to achieve the purpose of the study. The questionnaire was developed with the specific objective of determining the utilization and needs of audiovisual aids for effective teaching in the Institute of Technology and Vocational Education. The questionnaire was designed for administrators and vocational-technical instructors to determine ages, teaching experience, knowledge of how to operate and use audiovisual equipment and materials and the need for audiovisual media in-service training. A copy of the questionnaire in English is presented in Appendix B.

Validating the Instrument

The questionnaire was designed by the researcher and the first draft was submitted to the doctoral graduate study commmittee for their evaluation and recommendations. After the recommendations were received and revisions made, the questionnaire was translated into the Thai language. A copy of the Thai version is presented in Appendix C.

Selecting the Population

The subjects selected (sample) for this study were administrators and instructors of nine engineering technology campuses of the Institute of Technology and Vocational Education. The subjects studied were selected from the following campuses: Thewes Campus, Bangkok Technical Campus, Northern Bangkok Technical Campus, Nonthaburi Technical Campus, Northern Technical Campus, Tak Technical Campus, Northeast Technical Campus, Khon-Kean Technical Campus, and Southern Technical Campus.

The names of administrators and instructors from each participating campus were obtained by the investigator visiting each personnel office. A random sampling technique was utilized to determine both administrators and instructors to participate in this study. The names of all administrators at each participating campus were placed in a box and fifteen names were drawn and recorded. Likewise, the names of all instructors were placed in the box and fifteen names were drawn and recorded. The sample was composed of

135 administrators from the total population of 281 and 135 instructors from the total population of 1189. The questionnaire was then distributed to each of the participants by the academic office of each participating campus.

Two letters accompanied each of the questionnaires. One was a letter of authorization and support from the Rector of the Institute of Technology and Vocational Education (ITVE) and the other letter was written by the investigator. Both letters explained the purpose of the study, asking for the administrators' and instructors' cooperation in the research effort. The authorized letter from the Rector of ITVE translated into English is presented in Appendix D and a copy of the original Thai authorized letter is presented in Appendix E. A copy of the researcher's original Thai letter is presented in Appendix F.

Treatment of the Data

The treatment of the data in this study consisted of frequency distribution, mean scores, and rank order scales to determine the differences in perception of administrators and instructors regarding the availability, utilization, in-service training, and projected needs of audiovisual aids for their institutions.

A three-point rating scale was used to assess the perceived significant differences between the two groups of participants. Administrators and instructors ranked the types of audiovisual materials and equipment according to a

rank order scale. Each scale included a choice of No Need (Have Enough), Present Need, and Future Need which were assigned whole number values of (1), (2) and (3) in that order. The administrators and instructors also ranked the degree of seriousness of each problem in utilizing audiovisual aids as (3) Extreme Problem, (2) Moderate Problem, and (1) Slight Problem.

Another rank order scale was used in this questionnaire to determine the opinions of administrators and instructors with regard to the needs for audiovisual media in-service training. Each scale included the choice of "Never Used," "Seldom Used," "Often Used," and "Frequently Used" which were assigned whole number values of (1), (2), (3) and (4) respectively.

In order to determine the results of this study, the investigator used frequency, percentage, and the Chi-square test (χ^2) to analyze the data. Mean scores and rank order for each of the items were used to determine the perceptions of the administrators and instructors in regard to the needs, the frequency of use, and the problems of using audiovisual media in their institutions.

The five percent level of significance (0.05) was used to assess the perceived significant differences between these two groups. The asterisk appearing in the tabulated form in conjunction with the statistical values indicated a rejection of the null hypothesis. If the statistical values appeared in the tabulated form without asterisks, these statistical values were not significant at the 0.05 level.

CHAPTER IV

ANALYSIS AND PRESENTATION OF DATA

This study was designed to identify perceptions of administrators and instructors of the Institute of Technology and Vocational Education in regard to the availability, utilization, in-service training, and projected needs of audiovisual media. The sample population for this study was 135 administrators and 135 instructors; the investigator received 135 completed and returned administrators' questionnaires and 135 completed and returned instructors' questionnaires, which constitutes 100 percent response to this survey.

The purpose of this chapter is to present data collected for this study relating to the research questions presented in Chapter I. The accumulated data in this study is based on the respondent's answers, which were classified into two parts: the descriptive information and research questions.

Descriptive Information

This descriptive information consists of personal data, sources of audiovisual experience, and administrators' and instructors' knowledge of using audiovisual equipment.

Personal Data of the Respondents

Information presented in the first three tables of this study are personal data of the respondents. These data show the age, years of teaching and administrative experience, roles of work, and formal education background of the administrators and instructors.

The ages of the administrators are shown in Table I. The youngest administrator was 32, the oldest was 56, and the median age was 42. Concerning the administrators' years of teaching experience, the category with the fewest responses was three years, the most responses were from 24 years, and the median number of years was 15. According to the administrative experience, the category with the fewest responses was two years, the category with the most responses was 15 years, and the median number of years was nine.

The ages of the instructors are also shown in Table I. The youngest instructor was 22, the oldest was 48, and the median age was 31. Concerning the instructors' years of teaching experience, the category with the fewest responses was one year, the most responses were from 23 years, and the median number of years was ten. It was interesting to note that none of the instructors indicated that they had administrative experience.

The data in Table II shows the distribution of the administrators and instructors in regard to their roles of work: teaching technical education courses, teaching

TABLE I

ADMINISTRATORS' AND INSTRUCTORS' WORK EXPERIENCES IN YEARS

Characteristics	Mean Levels in Years					
	Administrators N = 135			Instructors N = 135		
	Fewest	Most	Mean	Fewest	Most	Mean
Age	32	56	42	22	48	31
Teaching Experience	3	24	15	1	23	10
Administrative Experience	2	15	9	0	0	0

TABLE II

ADMINISTRATORS' AND INSTRUCTORS' ROLES OF WORK

	Administrators N = 135		Instructors N = 135		Total Respondents N = 270	
	No.	%	No.	%	No.	%
Teaching Technical Education Courses	92	68.15	119	88.06	211	78.10
Teaching General Education Courses	12	8.89	2	1.49	14	5.19
Teaching Both of the Above	19	14.07	14	10.45	33	12.27
Administrative Work Only	12	8.89	0	0.00	12	4.44
Total	135	100.00	135	100.00	270	100.00

general education courses, teaching both techinical and general education courses, and administrative work only.

Of the administrators surveyed, 68.15 percent indicated that they had taught technical education, 8.89 percent had taught general education courses, 14.07 percent had taught both technical and general education courses, and 8.89 percent of the administrators reported that they had done administrative work only.

Of the instructors surveyed, 88.06 percent had taught technical education courses, 1.49 percent had taught general education courses, 10.45 percent taught both technical and general education courses, and none of the instructors had worked as an administrator. These percentages are shown in Table II.

An examination of the data presented in Table III indicated that 83.70 percent of the administrators had earned a baccalaureate degree, and 16.30 percent had earned a Masters' degreee. None of the administrators had a formal education less than a baccalaureate degree.

Of the instructors surveyed, 2.22 percent had a technical certificate, 15.56 percent held an associate degree, and 79.26 percent the baccalaureate. Only 2.96 percent had earned a Masters' degree. These percentages are shown in Table III.

TABLE III

ADMINISTRATORS' AND INSTRUCTORS' FORMAL EDUCATION BACKGROUND

Formal Education	Administrators N = 135		Instructors N = 135		Total Respondents N = 270	
	No.	%	No.	%	No.	%
Vocational Certificate	0	0.00	3	2.22	3	1.14
Associate Degree	0	0.00	21	15.56	21	7.78
Baccalaureate Degree	113	83.70	107	79.26	220	81.48
Masters' Degree	22	16.30	4	2.96	26	9.63

Administrators' and Instructors' Sources of Audiovisual Experience

As revealed in Table IV, 57.78 percent of the administrators had audiovisual experience through formal education, 22.96 percent had audiovisual experience from in-service training, and 25.93 percent showed hobbies as the source of their audiovisual experience.

Information in Table IV also shows that 59.26 percent of the instructors had audiovisual experience through formal education, 20.74 percent from in-service training, and 16.30 percent showed hobbies as the source of their audiovisual experience.

The primary source of the administrators' audiovisual experience, as the data in Table IV shows, was formal education. The greatest percentage of the instructors also derived their audiovisual experience from this source. The smallest percentage of the administrators gained their audiovisual experience from in-service training, but the smallest percentage of the instructors gained their audiovisual experience from their hobbies.

Administrators' and Instructors' Knowledge of Using Audiovisual Equipment

One may note from the data presented in Table V that the administrators' and instructors' knowledge using the various kinds of audiovisual equipment varies greatly; only 3.70 percent of the respondents indicated that they know how to use microfiche readers as compared to 90.74 percent of

TABLE IV

NUMBER AND PERCENTAGE OF ADMINISTRATORS AND INSTRUCTORS WITH AUDIOVISUAL AIDS EXPERIENCE BY SOURCE

Source of A-V Experience	Administrators N = 135		Instructors N = 135		Total Respondents* N = 270	
	No.	%	No.	%	No.	%
Formal Education	78	57.78	80	59.26	158	58.52
In-service training	31	22.96	28	20.74	59	21.85
Hobbies	35	25.93	22	16.30	57	21.11

*Total percentage of respondents exceeds 100 percent because of multiple responses.

TABLE V

NUMBERS AND PERCENT OF ADMINISTRATORS AND INSTRUCTORS POSSESSING KNOWLEDGE OF USING AUDIOVISUAL EQUIPMENT

	Item	Administrators N = 135			Instructors N = 135			Total Respondents N = 270		
		No.	%	Rank	No.	%	Rank	No.	%	Rank
1.	Overhead projector	123	91.11	1	122	90.37	1	245	90.74	1
2.	Slide projector	120	88.89	2	109	80.74	2	229	84.81	2
3.	Filmstrip projector	61	45.19	7	38	28.15	9	99	36.67	7
4.	16 m.m. movie projector	53	39.26	8	40	29.63	7	93	34.44	8
5.	Duplicating machine for transparencies	71	52.59	6	60	44.44	6	131	48.52	6
6.	Video camera and recorder	47	34.81	9	39	28.89	8	86	31.85	9
7.	Tape recorder (cassette)	110	81.48	3	106	78.52	3	216	80.00	3
8.	Tape recorder (reel to reel)	86	63.70	5	64	47.41	5	150	55.56	5
9.	Camera	96	71.11	4	88	65.19	4	184	68.15	4
10.	Movie camera	29	21.48	10	17	12.59	10	46	17.04	10
11.	Microfilm projector	17	12.59	11	4	2.96	12	21	7.78	11
12.	Microfiche reader	8	5.93	13	2	1.48	13	10	3.70	13
13.	Microcomputer	10	7.41	12	6	4.44	11	16	5.93	12

respondents who know how to use overhead projectors. More than 50 percent of the respondents do not know how to use filmstrip projectors, 16 m.m. movie projectors, transparency duplicating machines, video cameras and recorders, movie cameras, microfilm projectors, microfiche readers, or microcomputers. The highest percentages of both administrators and instructors who know how to use the overhead projectors (90.74%), slide projectors (84.81%), and cassette tape recorders (80.00%). Both administrators and instructors indicated that they know least about microfiche readers (3.70%), microcomputers (5.93%), and microfilm projectors (7.78%).

Analysis of the Data

This study was designed to answer five hypotheses. Data received from the respondents are presented in tabular form in subsequent tables.

HO_1: There are no significant differences between the perceptions of the administrators and instructors concerning possible problems regarding the use of audiovisual aids in their institutions.

The data in Tables VI through XIV indicate there are eight problems of using audiovisual aids as perceived by administrators and instructors. The narrative description of responses to each item was presented by the mean percentage of the total response, the mean score, and its rank order. Chi-square values were also presented in order to determine the significance for each item.

TABLE VI

MEAN SCORE, RANK ORDER, AND CHI-SQUARE VALUES OF ADMINISTRATORS' AND INSTRUCTORS' PERCEPTIONS OF PROBLEMS CONCERNING AUDIOVISUAL AIDS

Item	Problems	Administrators Mean	Administrators Rank	Instructors Mean	Instructors Rank	Total Mean	Total Rank	Chi-square Values
1.	Classroom is not equipped for the use of audio-visual aids	2.34	3	2.16	6	2.25	5	5.62
2.	Lack of audiovisual materials (software)	2.30	5	2.30	4	2.30	4	0.29
3.	Lack of audiovisual equipment	2.45	2	2.35	2	2.40	2	2.71
4.	Lack of audiovisual storage spaces	2.28	7	2.12	8	2.20	7	4.80
5.	Lack of service personnel	2.34	3	2.32	3	2.33	3	0.79
6.	Lack of maintenance and repair technicians	2.29	6	2.20	5	2.24	6	1.09
7.	Lack of audiovisual media training specialists	2.23	8	2.14	7	2.18	8	1.81
8.	Lack of budget	2.71	1	2.61	1	2.66	1	4.01

Rank Number One: Item Number Eight
Item 8: Lack of budget -

A study of the responses of item number eight indicated that the respondents perceived this item as the most serious problem. As shown in Table VII, 104 of 135 (77.04%) administrators agreed that this item was considered an extreme problem; whereas among instructors, 99 of 135 (73.33%) respondents rated this item as an extreme problem. Moreover, only 7 of 135 (5.19%) administrators and 16 of 135 (11.85%) instructors rated this item as a slight problem. Both administrators and instructors ranked this item as the first and most important problem. The overall rank according to the average score was one. There was no significant difference between the perceptions of the administrators and instructors concerning problems of budget as indicated by a Chi-square value of 4.01, $p = 0.13$.

Rank Number Two: Item Number Three
Item 3: Lack of audiovisual equipment -

The responses to this item, as shown in Table VIII indicated that 72 of 135 (53.33%) of the administrators rated this item as an extreme problem while 65 of 135 (48.15%) instructors did so. To the contrary, 10 of 135 (7.41%) administrators compared to 17 of 135 (12.59%) instructors rated this item as a slight problem. Both administrators and instructors perceived that the lack of audiovisual equipment was the second most important problem. There was no significant difference between the perceptions of the administrator group and the instructor group

TABLE VII

DISTRIBUTION OF RESPONDENTS AND CHI-SQUARE VALUES CONCERNING THE LACK OF BUDGET

Item 8: Lack of budget

	Total Number and Percent of Responses by Each Category								
	Slight Problem 1		Moderate Problem 2		Extreme Problem 3		Total		Chi-square Value (χ^2)
	No.	%	No.	%	No.	%	No.	Mean	
Administrators	7	5.19	24	17.78	104	77.04	135	2.71	
Instructors	16	11.85	20	14.81	99	73.33	135	2.61	4.01
Total	23	8.52	44	16.30	203	75.18	270	2.66	

χ^2 .05, df 2, Chi-square value is 5.99.

No significant difference at the 0.05 level.

TABLE VIII

DISTRIBUTION OF RESPONDENTS AND CHI-SQUARE VALUES CONCERNING THE LACK OF AUDIOVISUAL EQUIPMENT

Item 3: Lack of audiovisual equipment (hardware)

	Total Number and Percent of Responses by Each Category								
	Slight Problem 1		Moderate Problem 2		Extreme Problem 3		Total		Chi-square Value (χ^2)
	No.	%	No.	%	No.	%	No.	Mean	
Administrators	10	7.41	53	39.26	72	53.33	135	2.45	
Instructors	17	12.59	53	39.26	65	48.15	135	2.35	2.17
Total	27	10.00	106	39.26	137	50.74	270	2.40	

χ^2 .05, df 2, Chi-square value is 5.99.

No significant difference at the 0.05 level.

concerning the lack of audiovisual equipment as indicated by a Chi-square value of 2.17, p = 0.33.

Rank Number Three: Item Number Five
Item 5: Lack of service personnel -

Information in Table IX reveals that 67 of 135 (49.63%) administrators rated this item as an extreme problem, while 69 of 135 (51.11%) instructors rated this item as an extreme problem. Both groups ranked this item of equal importance as third, even though the group mean scores are slightly different. The overall rank was third with the mean score of 2.33. There was no significant difference between the perceptions of the administrators and instructors concerning lack of service personnel as indicated by a Chi-square value of 0.79, p = 0.67.

Rank Number Four: Item Number Two
Item 2: Lack of audiovisual materials -

The pattern of responses shown in Table X revealed that 58 of 135 (42.96%) administrators and 56 of 135 (41.48%) instructors rated this item as an extreme problem. The administrators ranked this problem fifth with a group mean score of 2.30; while the instructors ranked this problem as fourth with a group mean score of 2.30. The overall rank was fourth with a mean score of 2.30. There was no significant difference between the perceptions of the administrators and instructors concerning the lack of audiovisual materials as indicated by a Chi-square value of 0.29, p = 0.86.

TABLE IX

DISTRIBUTION OF RESPONDENTS AND CHI-SQUARE VALUES CONCERNING THE LACK OF SERVICE PERSONNEL

Item 5: Lack of service personnel

	Total Number and Percent of Responses by Each Category								
	Slight Problem 1		Moderate Problem 2		Extreme Problem 3		Total		Chi-square Value (χ^2)
	No.	%	No.	%	No.	%	No.	Mean	
Administrators	21	15.56	47	34.81	67	49.63	135	2.34	
Instructors	25	18.52	41	30.37	69	51.11	135	2.32	0.79
Total	46	17.04	88	32.59	136	50.37	270	2.33	

χ^2 .05, df 2, Chi-square value is 5.99.

No significant difference at the 0.05 level.

TABLE X

DISTRIBUTION OF RESPONDENTS AND CHI-SQUARE VALUES CONCERNING THE LACK OF AUDIOVISUAL MATERIALS

Item 2: Lack of audiovisual materials (software)

	Total Number and Percent of Responses by Each Category								
	Slight Problem 1		Moderate Problem 2		Extreme Problem 3		Total		Chi-square Value (χ^2)
	No.	%	No.	%	No.	%	No.	Mean	
Administrators	17	12.59	60	44.44	58	42.96	135	2.30	
Instructors	15	11.11	64	47.41	56	41.48	135	2.30	0.29
Total	32	11.85	124	45.93	114	42.22	270	2.30	

χ^2 .05, df 2, Chi-square value is 5.99.

No significant difference at the 0.05 level.

Rank Number Five: Item Number One
Item 1: Classroom is not equipped for the use of audiovisual aids -

The data in Table XI indicated that 59 of 135 (43.70%) administrators rated this item as an extreme problem, whereas 46 of 135 (34.07%) instructors also rated it as an extreme problem. According to the group mean score, administrators tended to perceive this item as being more important than did instructors. The administrators ranked this problem as third with a group mean score of 2.35, while the instructors ranked this problem as sixth with a group mean score of 2.16. The overall rank was fifth with the aggregate mean score of 2.25. There was no significant difference between the perception of the two groups concerning the classroom being equipped for the use of audiovisual aids as indicated by a Chi-square value of 5.62, p. 0.06.

Ranked Number Six: Item Number Six
Item 6: Lack of maintenance and repair technicians -

The data show in Table XII indicated that 64 of 135 (47.41%) administrators and 56 of 135 (41.48%) instructors rated this item as an extreme problem. The administrators perceived this item as sixth in rank, while the instructors perceived this item as fifteenth in rank. The mean scores of both groups was 2.24, and the item was ranked as sixth. There was no significant difference between the perceptions of the administrators and instructors concerning the lack of maintenance and repair technicians as indicated by a Chi-square value of 1.09, $p = 0.58$.

TABLE XI

DISTRIBUTION OF RESPONDENTS AND CHI-SQUARE VALUES CONCERNING CLASSROOMS NOT EQUIPPED FOR AUDIOVISUAL AIDS USE

Item 1: Classrooms are not equipped for the use of audiovisual aids

	Total Number and Percent of Responses by Each Category								
	Slight Problem 1		Moderate Problem 2		Extreme Problem 3		Total		Chi-square Value (χ^2)
	No.	%	No.	%	No.	%	No.	Mean	
Administrators	12	8.89	64	47.41	59	43.70	135	2.35	
Instructors	24	17.78	65	48.15	46	34.07	135	2.16	5.62
Total	36	13.33	129	47.78	105	38.89	270	2.25	

χ^2 .05, df 2, Chi-square value is 5.99.

No significant difference at the 0.05 level.

TABLE XII

DISTRIBUTION OF RESPONDENTS AND CHI-SQUARE VALUES CONCERNING THE LACK OF MAINTENENCE AND REPAIR TECHNICIANS

Item 6: Lack of maintenance and repair technicians

	Total Number and Percent of Responses by Each Category								
	Slight Problem 1		Moderate Problem 2		Extreme Problem 3		Total		Chi-square Value (χ^2)
	No.	%	No.	%	No.	%	No.	Mean	
Administrators	24	17.78	47	34.81	64	47.41	135	2.29	
Instructors	29	21.48	50	37.04	56	41.48	135	2.20	1.09
Total	53	19.63	97	35.93	120	44.44	270	2.24	

χ^2 .05, df 2, Chi-square value is 5.99.

No significant difference at the 0.05 level.

Rank Number Seven: Item Number Four
Item 4: Lack of audiovisual storage space -

The data presented in Table XIII indicated that 62 of 135 (45.93%) administrators and 55 of 135 (40.74%) instructors rated this item as an extreme problem. The item received the rank of seventh by the administrators with a mean score of 2.28 and received the rank of eighth by the instructors with a mean score of 2.20. There was no significant difference between the perceptions of the administrators and instructors concerning the lack of audiovisual storage space as indicated in a Chi-square value of 4.87, $p = 0.09$.

Rank Number Eight: Item Number Seven
Item 7: Lack of audiovisual media training specialists -

The data in Table XIV indicated that 57 of 135 (42.22%) administrators and 54 of 135 (40.00%) rated this item as an extreme problem. The administrators ranked this problem as eighth with a group mean score of 2.23, while the instructors ranked this problem as seventh with a group mean score of 2.14. The overall rank for this item was eighth with a mean score of 2.18. There was no significant difference between the perception of the administrator group and the instructor group concerning the lack of audiovisual media training specialists as indicated by a Chi-square value of 1.81, $p = 0.40$.

TABLE XIII

DISTRIBUTION OF RESPONDENTS AND CHI-SQUARE VALUES CONCERNING THE LACK OF AUDIOVISUAL STORAGE SPACES

Item 4: Lack of audiovisual storage spaces

	Total Number and Percent of Responses by Each Category								
	Slight Problem 1		Moderate Problem 2		Extreme Problem 3		Total		Chi-square Value (χ^2)
	No.	%	No.	%	No.	%	No.	Mean	
Administrators	23	17.04	50	37.04	62	45.93	135	2.28	
Instructors	38	28.15	42	31.11	55	40.74	135	2.12	4.87
Total	61	22.59	92	34.07	117	43.33	270	2.20	

χ^2 .05, df 2, Chi-square value is 5.99.

No significant difference at the 0.05 level.

TABLE XIV

DISTRIBUTION OF RESPONDENTS AND CHI-SQUARE VALUES CONCERNING THE LACK OF AUDIOVISUAL MEDIA TRAINING SPECIALISTS

Item 7: Lack of audiovisual media training specialists

	Total Number and Percent of Responses by Each Category								
	Slight Problem 1		Moderate Problem 2		Extreme Problem 3		Total		Chi-square Value (χ^2)
	No.	%	No.	%	No.	%	No.	Mean	
Administrators	25	18.52	53	39.26	57	42.22	135	2.23	
Instructors	34	25.19	47	34.81	54	40.00	135	2.14	1.81
Total	59	21.85	100	37.04	111	41.11	270	2.18	

χ^2 .05, df 2, Chi-square value is 5.99.

No significant difference at the 0.05 level.

HO_2: There are no significant differences between the perceptions of the administrators and instructors concerning the frequency of use of audiovisual equipment and materials in their institutions.

The findings indicated that only on item 3 "exercises or worksheets" and on item 8 "simulation" were there significant differences between the perceptions of the administrator and instructor groups concerning frequency of use.

Table XV illustrated the distribution of the respondents concerning the use of various audiovisual aids as perceived by the administrators and instructors of the Institute of Technology and Vocational Education. Responses to this question were treated by means of percentage and the mean score of all responses; these were computed to determine the rank order for each item of the audiovisual aids used by the respondents. A Chi-square Test was used to analyze the differences of the perceptions in regard to this question.

Of all the audiovisual aids used by the administrators and instructors, the nine most frequently used, ranked in order, were exercises or worksheets, simulation, drawings, charts, pictures, transparencies, models, slide projectors, and self-learning packages.

Rank Number One: Item Number Three
Item 3: Exercises or Worksheets -

Data presented in Table XV reveal that the perceptions of the administrators and instructors differ significantly concerning the use of "Exercises or Worksheets" in their classroom teaching. Of the 135 administrators, 68.89

TABLE XV

DISTRIBUTION OF RESPONDENTS, MEAN SCORE, RANK ORDER, AND CHI-SQUARE VALUES CONCERNING THE FREQUENCY OF USE OF AUDIOVISUAL AIDS

Item		Administrators N = 135 No.	Administrators N = 135 %	Instructors N = 135 No.	Instructors N = 135 %	Total Mean	Total Rank	Chi-square values (χ^2)
1. Charts:								
never used	= 1	15	11.11	15	11.11	3.05	4	2.41
seldom used	= 2	16	11.85	25	18.52			
often used	= 3	45	33.33	40	29.63			
frequently used	= 4	59	43.71	55	40.74			
2. Drawings:								
	= 1	19	14.07	12	8.89	3.13	3	5.77
	= 2	13	9.63	22	16.30			
	= 3	41	30.37	31	22.96			
	= 4	62	45.93	70	51.85			
3. Exercises or Worksheets:								
	= 1	12	8.89	7	5.19	3.47	1	14.46*
	= 2	15	11.11	4	2.96			
	= 3	15	11.11	33	24.44			
	= 4	93	68.89	91	67.41			
4. Pictures:								
	= 1	16	11.85	11	8.15	2.99	5	1.47
	= 2	22	16.30	24	17.78			
	= 3	46	34.07	52	38.52			
	= 4	51	37.78	48	35.56			

TABLE XV (Continued)

Item		Administrators N = 135 No.	Administrators N = 135 %	Instructors N = 135 No.	Instructors N = 135 %	Total Mean	Total Rank	Chi-square values (χ^2)
5. Self-learning packages:								
never used	= 1	49	36.30	57	42.23	2.12	9	2.39
seldom used	= 2	43	31.85	32	23.70			
often used	= 3	19	14.07	19	14.07			
frequently used	= 4	24	17.78	27	20.00			
6. Transparencies:								
	= 1	25	18.52	35	25.93	2.53	6	5.42
	= 2	33	24.44	41	30.37			
	= 3	37	27.41	32	23.70			
	= 4	40	29.63	27	20.00			
7. Models:								
	= 1	32	23.70	32	23.70	2.35	7	0.54
	= 2	47	34.81	43	31.85			
	= 3	34	25.19	39	28.89			
	= 4	22	16.30	21	15.56			
8. Simulation:								
	= 1	18	13.33	8	5.93	3.21	2	8.40*
	= 2	21	15.55	12	8.89			
	= 3	34	25.19	36	26.67			
	= 4	62	45.93	79	58.52			
9. Filmstrip projectors:								
	= 1	81	60.00	93	68.89	1.52	12	3.71
	= 2	31	22.96	29	21.48			
	= 3	17	12.59	10	7.41			
	= 4	6	4.45	3	2.22			

TABLE XV (Continued)

Item		Administrators N = 135 No.	Administrators N = 135 %	Instructors N = 135 No.	Instructors N = 135 %	Total Mean	Total Rank	Chi-square values (χ^2)
10. Cassette tape recorders:								
never used	= 1	67	49.63	86	63.70	1.66	10	6.64
seldom used	= 2	42	31.11	31	22.96			
often used	= 3	13	9.63	12	8.89			
frequently used	= 4	13	9.63	6	4.44			
11. Reel-to-reel tape recorders:								
	= 1	84	66.22	97	71.85	1.48	13	4.79
	= 2	33	24.44	29	21.48			
	= 3	11	8.15	4	2.96			
	= 4	7	5.19	5	3.70			
12. Closed circuit television set:								
	= 1	114	84.44	116	85.93	1.20	15	1.82
	= 2	16	11.86	14	10.37			
	= 3	4	2.96	2	1.48			
	= 4	1	0.74	3	2.22			
13. Slide projectors:								
	= 1	40	29.63	54	40.00	2.16	8	5.97
	= 2	36	26.67	38	28.15			
	= 3	36	26.67	31	22.96			
	= 4	23	17.03	12	8.89			

TABLE XV (Continued)

Item		Administrators N = 135 No.	%	Instructors N = 135 No.	%	Total Mean	Rank	Chi-square values (χ^2)
14. Cameras:								
never used	= 1	79	58.52	80	59.26	1.65	11	3.52
seldom used	= 2	29	21.48	31	22.96			
often used	= 3	22	16.30	14	10.37			
frequently used	= 4	5	3.70	10	7.41			
15. Movie Cameras:								
	= 1	116	85.92	116	85.93	1.19	16	1.24
	= 2	11	8.15	13	9.63			
	= 3	7	5.19	6	4.44			
	= 4	1	0.74	0	0.00			
16. 16 m.m. movie projectors:								
	= 1	96	71.11	97	71.85	1.41	14	3.50
	= 2	21	15.56	25	18.52			
	= 3	15	11.11	13	9.63			
	= 4	3	2.22	0	0.00			
17. Microprojectors:								
	= 1	125	92.59	123	91.11	1.10	17	0.23
	= 2	7	5.19	8	5.93			
	= 3	3	2.22	4	2.96			
	= 4	0	0.00	0	0.00			
18. Microfilm projectors:								
	= 1	126	93.33	126	93.33	1.07	19	0.00
	= 2	8	5.93	8	5.93			
	= 3	1	0.74	1	0.74			
	= 4	0	0.00	0	0.00			

TABLE XV (Continued)

Item		Administrators N = 135 No.	Administrators N = 135 %	Instructors N = 135 No.	Instructors N = 135 %	Total Mean	Total Rank	Chi-square values (χ^2)
19. Microfiche readers:								
never used	= 1	126	93.33	128	94.81	1.06	20	2.02
seldom used	= 2	7	5.19	7	5.19			
often used	= 3	2	1.48	0	0.00			
frequently used	= 4	0	0.00	0	0.00			
20. Microcomputers:								
	= 1	124	91.85	124	91.85	1.09	18	0.26
	= 2	8	5.93	9	6.67			
	= 3	3	2.22	2	1.48			
	= 4	0	0.00	0	0.00			

χ^2 .05, df 3, Chi-square value = 7.82.
*Significant difference at the 0.05 level.

percent rated this item as "frequently used" as compared with 67.41 percent of the instructors. In contrast, it is interesting to note that the instructor group (11.11%) rated this item greater than the administrator group (24.44%) in "often used" category. The overall rank was first with the mean score of 3.47. A Chi-square value of 14.46, p = 0.002 reveals significant difference between the perceptions of the administrators and instructors.

Rank Number Two: Item Number Eight
Item 8: Simulation -

The perceptions of the administrators and instructors differ significantly concerning the use of "Simulation." The data shown in Table XV indicated that 58.52 percent of the instructors, as compared to 45.93 percent of the administrators, rated this item as "frequently used." This difference produced a Chi-square value of 8.40, p = 0.03. There was a statistically significant difference between the perceptions of the administrators and instructors concerning the use of "simulation" in classroom teaching.

Rank Number Three: Item Number Two
Item 2: Drawings -

The data presented in Table XV indicated that 45.93 percent of the administrators rated this item as "frequently used" as compared with 51.85 percent of the instructors. In contrast, 30.37 percent of the administrators indicated that they often used drawings, whereas the 135 instructors, 22.96 percent rated this item as "often used." The item received the overall rank of third with the mean score of 3.13.

There was no significant difference between the perceptions of the administrator and instructor groups as indicated by a Chi-square value of 5.77, p = 0.12.

Rank Number Four: Item Number One
Item 1: Charts -

From the data shown in Table XV, the administrator group rated this item higher than the instructor group in "frequently used" and "often used" categories. Of the 135 administrators, 43.71 percent rated this item as "frequently used" as compared with 40.74 percent of the instructors. The data also indicated that 33.33 percent of the administrators rated this item as "often used" compared with 29.63 percent of the instructors. There was no significant difference between the perceptions of the administrators and instructors as indicated by a Chi-square value of 2.41, p = 0.49.

Rank Number Five: Item Number Four
Item 4: Pictures -

The results presented in Table XV indicated that administrator and instructor groups tended to rate this item slightly different in "frequently used" and "often used" categories. The item received a rank of fifth with a mean score of 2.99. There was no significant difference between the perceptions of administrators and instructors as indicated by a Chi-square value of 1.47, p = 0.68.

Rank Number Six: Item Number Six
Item 6: Transparencies -

Concerning the use of "Transparencies" in classroom teaching, as the data in Table XV shows, the administrator

group rated this item greater than the instructor group in "frequently used" and "often used" categories. This difference produced a Chi-square value of 5.42, p = 0.14. However, there was no significant difference between the perceptions of the administrators and instructors concerning the frequency of use of transparencies in the classroom.

Rank Number Seven: Item Number Seven
Item 7: Models -

The opinions of the administrators and instructors, as shown in Table XV, differ little in the "frequently used," "often used" and "seldom used" categories. It is interesting to note that 32 of 135, or 23.70 percent, of the administrators and 32 of 135 or 23.70 percent of the instructors have never used models in their classroom teaching. There was no significant difference between the perceptions of the administrators and instructors concerning the frequency of use of "models" in their classroom teaching.

Rank Number Eight: Item Number Thirteen
Item 13: Slide projectors -

The data presented in Table XV indicates that the administrator group used "slide projectors" in classrooms twice as often as the instructor group in the "frequently used" category. Data in the table also shows that 29.63 percent of the administrators and 40.00 percent of the instructors have never used this item in the classroom. The item received an overall rank as eighth with a mean score of 5.97, p = 0.11. However, there was a significant difference between the perceptions of the administrator group and

instructor group concerning the frequency of use of slide projectors in the classroom.

Rank Number Nine: Item Number Five
Item 5: Self-learning packages -

The findings of the data shown in Table XV indicate that the administrators' and instructors' tendency to use the self-learning packages slightly differ in the "frequently used" category but are not different in the "often used" category. The overall rank according to the mean score of 2.12 is ninth. There was no significant difference in perceptions between the administrators and instructors concerning the frequency of "self-learning package" use in the classroom.

The analysis of the data presented in Table XV indicates that more than 50 percent of the administrators have never used a camera, filmstrip projectors, reel-to-reel tape recorders, 16 m.m. movie projectors, closed circuit television, a movie camera, microprojectors, microcomputers, microfilm projectors, and microfiche readers in classroom teaching. It was also interesting to note that more than 50 percent of the instructors never used the above audiovisual items except cassette tape recorders.

HO_3: There are no significant differences between the perceptions of the administrators and instructors concerning the needs for audiovisual aid in-service training.

The administrators and instructors are closely agreed as to the needs for in-service training of various types of audiovisual equipment as the data shows in Table XVI. The

TABLE XVI

NUMBER, PERCENT AND CHI-SQUARE VALUES OF PERCEPTIONS OF RESPONDENTS CONCERNING AUDIOVISUAL MEDIA IN-SERVICE TRAINING NEEDS

Item	Administrators N = 135		Instructors N = 135		Mean Percent	Rank	Chi-square values (χ^2)
	No.	%	No.	%			
1. Overhead projector	16	11.85	25	18.52	15.18	13	2.33
2. Slide projector	21	15.56	33	24.44	20.00	11	3.33
3. Filmstrip projector	32	23.70	45	33.33	28.51	9	3.07
4. Opaque projector	35	25.93	39	28.89	27.41	10	0.30
5. Camera	35	25.93	43	31.85	28.89	8	1.15
6. Movie camera	72	53.33	80	59.26	56.29	4	0.96
7. Cassette tape recorder	14	10.37	21	15.56	12.96	14	1.16
8. Reel-to-reel tape recorder	18	13.33	32	23.70	18.51	12	4.81*
9. Microfilm projector	68	50.37	73	54.07	52.22	5	0.37
10. Microfiche reader	69	51.11	67	49.63	50.37	7	0.06
11. Closed circuit television	77	57.04	82	60.74	58.89	3	0.38
12. Duplicating machine for transparency	68	50.37	70	51.85	51.11	6	0.06
13. Video tape	76	56.30	89	65.93	61.11	2	2.63
14. Microcomputer	94	69.63	80	59.26	64.44	1	3.17

χ^2 .05, df 1, Chi-square value = 3.84.
*Significant difference at the 0.05 level.

opinions of the administrator group and the instructor group differ significantly concerning the needs for in-service training for the use of reel-to-reel tape recorders.

An analysis of data indicates that 23.70 percent of the instructor group rated item eight as "needs for in-service training" as compared with only 13.33 percent of the administrators. The overall rank of need was twelve with the aggregate mean percent of 18.51. A Chi-square value of 4.81, p=0.02 which shows significant differences between the two groups at 0.05 level.

The data in Table XVI shows that large numbers of respondents indicated that they did not know how to operate and use the microcomputer, video tape, closed circuit television, movie camera, microfilm projectors, duplicating machine for transparencies, and microfiche readers.

Rank Number One: Item Number Fourteen
Item 14: Microcomputer -

Concerning the "needs for in-service training" in the use of the microcomputer, the administrator group and the instructor group rated this item differently. The results indicated that 94 of 135, or 69.63 percent, of the administrators agreed that a training program on how to use and operate a microcomputer should be provided by their institutions. There was no significant difference in perceptions of the administrators and instructors as indicated by a Chi-square value of 3.17, p = 0.07. The administrators perceived the item as being first in "training need." The results also indicated that 80 of 135 or 59.26 percent of

the instructors perceived the item as third in "training need". An agreement was indicated by the mutual rank of first in the need for an in-service training program in microcomputers by both groups.

Rank Number Two: Item Number Thirteen
Item 13: Video tape -

The results of this item, as the data in Table XVI, indicate that 76 of 135, or 56.30 percent, of the administrators, agreed to have an in-service training program in video tape; whereas among instructors 89 of 135, or 65.93 percent, of the respondents indicated that the school should provide an in-service training program on how to use this kind of audiovisual equipment. The overall rank according to the aggregate mean percent was second. There was no significant difference in perceptions among the two groups of respondents as indicated by the Chi-square value of 2.63, $p = 0.10$.

Rank Number Three: Item Number Eleven
Item 11: Closed circuit television -

Data concerning the need for an in-service training program as shown in Table XVI indicate that the instructors tended to perceive this item as being slightly more needed than did administrators. Both groups ranked it as second. The rank that this item attained by aggregate mean percent of 58.89 was third. There was no significant difference between the perceptions of the administrators and instructors as indicated by a Chi-square value of 0.38, $p = 0.54$.

Rank Number Four: Item Number Six
Item 6: Movie camera -

Data presented in Table XVI indicate that 53.33 percent of administrators rated the item as "need for an in-service training program" compared to 59.26 percent of the instructors. The administrator group ranked this item fourth, while the instructor group ranked it third. The overall rank on the list was fourth. There was no significant difference in perceptions between the administrators and instructors concerning the need for in-service training programs for item 6, "movie camera," as indicated by a Chi-square value of 0.96, $p = 0.33$.

Rank Number Five: Item Number Nine
Item 9: Microfilm projector -

Of the two groups of respondents concerning in-service training needs in the use of a microfilm projector, 68 of 135, or 50.37 percent, of the administrators indicated that they needed to know how to operate this type of audiovisual equipment, while 73 of 135, or 54.07 percent, of the instructors agreed. With an aggregate mean percent of 52.22, the item received the rank of fifth. There was no significant difference in perceptions between the two groups of respondents as indicated by a Chi-square value of 0.37, $p = 0.54$.

Rank Number Six: Item Number Twelve
Item 12: Duplicating machine for transparencies -

As shown in Table XVI, 50.37 percent of the administrators and 51.85 percent of the instructors agreed that an in-

service training program was needed for this item. Both groups ranked the item of equal importance as six, even though the administrators tended to rate this item lower than instructors. A Chi-square value of 0.06, p = 0.81 indicated that there was no significant difference in perceptions between the administrators and instructors concerning the needs for in-service training on this item.

Rank Number Seven: Item Number Ten
Item 10: Microfiche reader -

An analysis of the responses for this item as presented in Table XVI reveals that 69 of 135, or 51.11 percent, of the administrators indicated that they needed in-service training on the use of the item, whereas among those instructors, 67 of 135, or 49.63 percent, of the respondents indicated so. The overall rank of the item was seven with the aggregate mean percent of 50.37, as indicated by a Chi-square value of 0.06, p = 0.81. There was no significant difference in perceptions between the administrator group and the instructor group concerning the need for in-service training on this item.

HO_4: There are no significant differences between the perceptions of the administrators and instructors in regard to the future needs for audiovisual equipment.

The administrators and instructors did not differ significantly in perceptions concerning the needs of audiovisual equipment in their institutions. Both groups indicated that there was a very great need for all 16 items of audiovisual equipment as shown in Table XVII. Chi-square

TABLE XVII

DISTRIBUTION OF RESPONDENTS AND CHI-SQUARE VALUES CONCERNING THE NEEDS OF AUDIOVISUAL EQUIPMENT

Audiovisual Equipment		Administrators N = 135 No.	Administrators N = 135 %	Instructors N = 135 No.	Instructors N = 135 %	Total No.	Mean	Rank	Chi-square values (χ^2)
1. Overhead projector:									
no need (have enough)	= 1	26	19.26	21	15.56	47	1.91	16	1.21
present need	= 2	95	70.37	103	76.30	198			
future need	= 3	14	10.37	11	8.15	25			
2. Projection screens:									
	= 1	15	11.11	9	6.67	24	2.01	15	2.53
	= 2	104	77.04	114	84.44	218			
	= 3	16	11.85	12	8.89	28			
3. Slide projector:									
	= 1	9	6.67	7	5.19	16	2.10	12	2.84
	= 2	108	80.00	101	74.81	209			
	= 3	18	13.33	27	20.00	45			
4. Opaque projectors:									
	= 1	11	8.15	10	7.41	21	2.20	9	0.25
	= 2	84	62.22	88	65.19	172			
	= 3	40	29.63	37	27.41	77			
5. Camera:									
	= 1	17	12.59	26	19.26	43	2.14	10	2.38
	= 2	73	54.07	70	51.85	143			
	= 3	45	33.33	39	28.89	84			

TABLE XVII (Continued)

Audiovisual Equipment	Administrators N = 135 No.	%	Instructors N = 135 No.	%	Total No.	Mean	Rank	Chi-square values (χ^2)
6. Movie camera:								
no need (have enough) = 1	9	6.67	11	8.15	20	2.17	6	0.98
present need = 2	51	37.78	57	42.22	108			
future need = 3	75	55.56	67	49.63	142			
7. Duplicating machines for transparencies:								
= 1	18	13.33	11	8.15	29	2.04	14	1.91
= 2	97	71.85	102	75.56	199			
= 3	20	14.81	22	16.30	42			
8. Closed circuit television								
= 1	7	5.19	12	8.89	19	2.48	3	1.43
= 2	50	37.04	49	36.30	99			
= 3	78	57.78	74	54.81	152			
9. Filmstrip projectors:								
= 1	16	11.85	14	10.37	30	2.24	8	1.33
= 2	76	56.30	69	51.11	145			
= 3	43	31.85	52	38.52	95			
10. Microfilm projectors:								
= 1	12	8.89	16	11.85	28	2.52	2	1.28
= 2	41	30.37	34	25.19	75			
= 3	82	60.74	85	62.96	167			
11. Microfiche readers:								
= 1	20	14.81	19	14.07	39	2.48	3	0.20
= 2	28	20.74	31	22.96	59			
= 3	87	64.44	85	62.96	172			

TABLE XVII (Continued)

Audiovisual Equipment		Administrators N = 135 No.	%	Instructors N = 135 No.	%	Total No.	Mean	Rank	Chi-square values (χ^2)
12. Cassette tape recorders:									
no need (have enough)	= 1	15	11.11	21	15.56	36	2.12	11	3.68
present need	= 2	78	57.78	85	62.96	163			
future need	= 3	42	31.11	29	21.48	71			
13. Reel-to-reel tape recorders:									
	= 1	35	29.93	29	21.48	64	2.07	13	3.75
	= 2	53	39.26	68	50.37	121			
	= 3	47	34.81	38	28.15	85			
14. Video cameras and recorders:									
	= 1	8	5.93	12	8.89	20	2.34	7	0.89
	= 2	68	50.37	67	49.63	135			
	= 3	59	43.70	56	41.48	115			
15. Microprojector:									
	= 1	17	12.59	20	14.81	37	2.45	5	0.28
	= 2	37	27.41	36	26.67	73			
	= 3	81	60.00	79	58.52	160			
16. Microcomputer:									
	= 1	8	5.93	17	12.59	25	2.55	1	3.81
	= 2	38	28.14	32	23.71	70			
	= 3	89	65.93	86	63.70	175			

χ^2 .05, df 2, Chi-square value = 5.99.
No significant difference at the 0.05 level.

values corresponding to the responses of the two groups concerning the needs for audiovisual equipment in classroom teaching range from 1.21 to 3.81. These Chi-square values were not significant at the 0.05 level; thus, the null hypothesis was retained. The administrators and instructors agreed on the degree of need for all 16 items of audiovisual equipment.

> HO_5: There are no significant differences between the perceptions of the administrators and instructors concerning the organization of audiovisual aid centers in their institutions.

Both the administrator group and instructor group were asked to indicate their preference of the organization of the audiovisual center in their institutions. The results of the survey indicated that the instructor group preferred to have decentralized location of audiovisual center more than the administrator group. Table XVIII revealed that 97 of 135, or 71.85 percent, of instructors preferred decentralized location of the audiovisual center, while 84 of 135, or 63.16 percent, of the administrators peferred decentralized location of audiovisual center. In contrast, 36.84 percent of administrators preferred centralized location of the audiovisual center, whereas only 28.15 percent of the instructors stated that they would prefer a centralized location of the audiovisual center. There was no significant difference between the perceptions of the administrators and instructors concerning the type of organization of audiovisual center in their institutions as indicated by Chi-square value of 2.31, $p = 0.12$.

TABLE XVIII

NUMBER, PERCENT, AND CHI-SQUARE VALUES OF RESPONDENTS CONCERNING THE ORGANIZATION OF AUDIOVISUAL CENTER

Type of Organization	Administrators N = 135		Instructors N = 135		Chi-square Value (χ^2)
	No.	%	No.	%	
Centralized organization	49	36.84	38	28.15	2.31
Decentralized organization	84	63.16	97	71.85	

χ^2 .05, df 1, Chi-square is 3.84.
No significant difference at the 0.05 level.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

There has been an increasing emphasis upon improving the use of audiovisual aids in classroom teaching in many educational institutions in Thailand. The problem with which this study was concerned was the uses and needs of audiovisual aids related to classroom teaching in nine engineering technology campuses of the Institute of Technology and Vocational Education.

Summary of Procedures

The primary purpose of this descriptive and analytical study was to determine the availability, utilization, in-service training, and projected needs of audiovisual aids as perceived by administrators and instructors of nine engineering technology campuses of the Institute of Technology and Vocational Education which are located in four different geographic regions of Thailand.

To achieve the purpose of this study, the following hypotheses were tested in order to determine the needs and uses of audiovisual aids as perceived by the administrators and instructors of the Institute of Technology and Vocational Education:

HO_1: There are no significant differences between the perceptions of the administrators and instructors concerning possible problems regarding the uses of audiovisual aids in their institutions.

HO_2: There are no significant differences between the perceptions of the administrators and instructors concerning the frequency of use of audiovisual equipment and materials in their institutions.

HO_3: There are no significant differences between the perceptions of the administrators and instructors concerning the needs for audiovisual aids in-service training programs.

HO_4: There are no significant differences between the perceptions of administrators and instructors in regard to the future needs for audiovisual equipment.

HO_5: There are no significant differences between the perceptions of the administrators and instructors concerning the types of organization of the audiovisual aid centers in their institutions.

A survey questionnaire was designed to obtain the data needed to achieve the purpose of the study. The treatment of the data in this study consisted of frequency distribution, mean scores and rank order scales to determine the differences in perceptions between administrators and instructors regarding the availability, utilization, in-service training, and projected needs of audiovisual aids for their institutions.

A three-point rating scale was used to assess the perceived significant differences between the two groups of participants. Administrators and instructors ranked the types of audiovisual materials and equipment according to a rank order scale. Each scale included a choice of No Need (Have Enough), Present Need, and Future Need which were assigned whole number values of (1), (2), and (3) in that

order. The administrators and instructors also ranked the degree of seriousness of each problem in utilizing audio-visual aids as (3) Extreme Problem, (2) Moderate Problem and (1) Slight Problem.

Another rank order scale was used in this questionnaire to determine the opinions of administrators and instructors with regard to the needs for audiovisual media in-service training. Each scale included the choice of "Never Used", "Seldom Used," and "Frequently Used" which were assigned whole number values of (1), (2), (3) and (4) respectively.

In order to determine the results of this study, the investigator used frequency, percentage, and the Chi-square test $(\chi)^2$ to analyze the data. Mean scores and rank order for each of the items were used to determine the perceptions of the administrators and instructors in regard to the needs, the frequency of use, and the problems of using audiovisual media in their institutions.

The five percent level of significance (0.05) was used to assess the perceived significant differences between these two groups. The asterisk appearing in the tabulated form in conjunction with the statistical values indicated a rejection of the null hypothesis. If the statistical values appeared in the tabulated form without asterisks, these statistical values were not significant at the 0.05 level and the null hypothesis was retained.

Summary of Findings and Conclusions

The sample utilized in this study involved 135 administrators and 135 instructors from nine engineering technology campuses who are directly involved in technical education programs of the Institute of Technology and Vocational Education (ITVE). The data were summarized and organized under two parts: The descriptive information and hypotheses.

Summary of Findings Related to the Descriptive Information

The following findings related to the descriptive information of the administrators and instructors in this study were summarized as follows:

1. It was found that the youngest administrator was 32, the oldest was 56, and the median age was 42. The youngest instructor was 22, the oldest was 48, and the median age was 31.
2. It was found that 83.70 percent of the administrators had earned a baccalaureate degree, and 16.30 percent had earned a Masters' degree. None of the administrators had a formal education less than a baccalaureate degree.
3. It was found that 2.22 percent of the instructors had a vocational certificate, 15.96 percent held an associate degree, and 79.26 percent the

baccalaureate. Only 2.96 percent of the instructors had earned a Masters' degree.

4. It was found that more administrators than instructors had earned the baccalaureate degree and the Masters' degree. The administrators also had more years of teaching experience than the instructors.
5. It was found that 8.89 percent of the administrators had administrative work only, and none of the instructors had administrative experience. The primary source of the administrators' and instructors' audiovisual experience was formal education.

Summary of Findings Related to Hypotheses

Answers to five hypotheses were sought in this study. The following summary of findings related to the research questions is presented. Each question will be stated, and each question will be followed by a summary. Conclusions are then reported, based only on the responses of the sample population of the study.

HO_1: There are no significant differences between the perceptions of the administrators and instructors concerning possible problems regarding the uses of audiovisual aids in their institutions.

Findings - Most administrators and instructors stated that they have problems regarding the uses of audiovisual aids in their institutions. The summary of the findings relating to the problems of using audiovisual aids as

TABLE XIX

COMPILATION OF MEAN RESPONSES, RANK ORDER, AND CHI-SQUARE VALUES CONCERNING THE PROBLEMS OF USING AUDIOVISUAL AIDS

Item	Problems	Administrators Rank	Administrators Mean	Instructors Rank	Instructors Mean	Total Rank	Total Mean	Chi-square Values
8	Lack of budget	1	2.71	1	2.61	1	2.66	4.01
3	Lack of audiovisual equipment	2	2.45	2	2.35	2	2.40	2.71
5	Lack of service personnel	3	2.34	3	2.32	3	2.33	0.79
2	Lack of audiovisual materials (software)	5	2.30	4	2.30	4	3.30	0.29
1	Classroom is not equipped for the use of audio-visual aids	3	2.34	6	2.16	5	2.25	5.62
6	Lack of maintenance and repair technicians	6	2.29	5	2.20	6	2.24	1.09
4	Lack of audiovisual storage spaces	7	2.28	8	2.12	7	2.20	4.80
7	Lack of audiovisual media training specialists	8	2.23	7	2.14	8	2.18	1.81

perceived by the administrators and instructors were presented in Table XIX as follows:

1. It was found that the perceptions of the administrator group and the instructor group did not differ significantly concerning all eight items of the problems of using audiovisual aids. The eight items were: the classroom is not equipped for the use of audiovisual aids, a lack of audiovisual materials, a lack of audiovisual equipment, a lack of audiovisual storage spaces, a lack of service personnel, a lack of maintenance and repair technicians, a lack of audiovisual media training specialists, and lack of budget.
2. It was found that both administrators and instructors indicated that item number eight, "Lack of Budget", was the most serious problem among other problems in regard to the use of audiovisual aids.
3. It was found that most respondents had problems using audiovisual aids. The eight items of problems on the list shown in Table XIX were: lack of budget, lack of audiovisual equipment, lack of service personnel, lack of audiovisual materials, the classroom not equipped for the use of audiovisual aids, lack of maintenance and repair technicians, lack of audiovisual storage spaces, and lack of audiovisual media training specialists. These items were ranked according to the aggregate mean

scores from the highest of 2.66 to the lowest of 2.18.

4. It was found that the administrator group tended to rate the problems of using audiovisual aids higher than the instructor group in the "extreme problem" category. In contrast, it was also found that the administrator group rated 7 of 8 items of problems of using audiovisual aids lower than the instructor group did in the "slight problem" category.

5. It was found that the two groups of respondents had mutually agreed concerning the problems of using audiovisual aids on rank number one: item number eight, rank number two: item number three, and rank number three: item number five.

Conclusion: The majority of respondents agreed that they have serious problems using audiovisual aids in their institutions. The most serious problem was lack of budget to purchase audiovisual equipment and materials. It was also interesting to note that the majority of the respondents rated item 7, "lack of audiovisual media training specialists," as the least important item listed.

HO_2: There are no significant differences between the perceptions of administrators and instructors concerning the frequency of use of audiovisual aids in their institutions.

Findings - As illustrated in Table XX, the following findings were summarized:

1. It was found that only on item 3, "exercises or

TABLE XX

COMPILATION OF PERCENT OF USE, MEAN RESPONSES, RANK ORDER, AND CHI-SQUARE VALUES CONCERNING THE FREQUENCY OF USE OF AUDIOVISUAL AIDS

Item	Type of Audiovisual Aids	Percent of Use	Mean	Rank Order	Chi-square Values
3	Exercises or worksheets	92.96	3.47	1	14.46*
8	Simulation	90.37	3.21	2	8.40*
2	Drawings	88.52	3.13	3	5.77
1	Charts	88.89	3.05	4	2.41
4	Pictures	90.00	2.99	5	1.47
6	Transparencies	77.77	2.53	6	5.42
7	Models	76.30	2.35	7	0.54
13	Slide Projectors	65.18	2.16	8	5.97
5	Self-learning packages	60.73	2.12	9	2.39
10	Cassette tape recorders	43.33	1.66	10	6.64
14	Cameras	41.11	1.65	11	3.52
9	Filmstrip projectors	35.55	1.52	12	3.71
11	Reel-to-Reel tape recorders	30.96	1.48	13	4.79
16	16 m.m. movie projectors	28.52	1.41	14	3.50
12	Closed circuit televisions	14.81	1.20	15	1.82
15	Movie cameras	14.07	1.19	16	1.24
17	Microprojectors	8.15	1.10	17	0.23
20	Microcomputers	8.15	1.09	18	0.26
18	Microfilm projectors	6.67	1.07	19	0
19	Microfiche projectors	5.93	1.06	20	2.02

*Significant difference at the .05 level.

worksheets," and on item 8, "simulation," were there significant differences between the perceptions of the administrator group and instructor group concerning the frequency of use of these two items.

2. It was found that more than 50 percent of the respondents used exercises or worksheets, simulation, drawing, charts, pictures, transparencies, models, slide projectors, and self-learning packages in their classroom.
3. It was found that exercises or worksheets have the highest percentage (99.1%) of use by the respondents and microfiche projectors have the lowest percentage (6.67%) of use by the respondents.

Conclusion: Administrators' and instructors' utilization of audiovisual aids was slight due to lack of the availability of such things as: audiovisual equipment and materials, physical facilities, and service personnel. The administrators and instructors tended to have little interest in using various kinds of audiovisual aids in their classroom.

HO_3: There are no significant differences between the perceptions of administrators and instructors concerning the needs for audiovisual aid in-service training programs.

Findings - Summary of findings presented in Table XXI concerning audiovisual aid in-service training needs.

1. It was found that only item 8, "reel-to-reel tape recorder," was there a statistically significant

TABLE XXI

COMPILATION OF PERCENT, RANK ORDER, AND CHI-SQUARE VALUES CONCERNING AUDIOVISUAL IN-SERVICE TRAINING NEEDS AS PERCEIVED BY THE ADMINISTRATORS AND INSTRUCTORS

Rank No.	Types of Audiovisual Equipment	Administrators N = 135		Instructors N = 135		Mean Percent	Chi-square Values
		No.	%	No.	%		
1	Microcomputer	94	69.63	80	59.26	64.44	3.17
2	Video tape	76	56.30	89	65.93	61.11	2.36
3	Closed circuit television	77	57.04	82	60.74	58.89	0.38
4	Movie camera	72	53.33	80	59.26	56.29	0.96
5	Microfilm projector	68	50.37	73	54.07	52.22	0.37
6	Transparency duplication machine	68	50.37	70	51.85	51.11	0.06
7	Microfiche reader	69	51.11	67	49.63	50.37	0.06
8	Camera	35	25.93	43	31.85	28.89	1.15
9	Filmstrip projector	32	23.70	45	33.33	28.51	3.07
10	Opaque projector	35	25.93	39	28.89	27.41	0.30
11	Slide projector	21	15.56	33	24.44	20.00	3.33
12	Reel-to-reel tape recorder	18	13.33	32	23.70	18.51	4.81*
13	Overhead projector	16	11.85	25	18.50	15.18	2.33
14	Cassette tape recorder	14	10.37	21	15.56	12.96	1.16

χ^2 .05, df 1, Chi-square value = 3.84

*Significant difference at the 0.05 level.

difference between the perceptions of the administrators and instructors concerning the needs for audiovisual aid in-service training. However, only 13.33 percent of the administrators and 23.70 percent of instructors rated this item as "need for in-service training."

2. It was found that of the 14 items of audiovisual equipment, the respondents rated item 14, "microcomputer," as having the highest need for training, while 12.96 percent of the respondents rated items 7, "cassette tape recorder," as having the lowest need for training.
3. It was found that more than 50 percent of the respondents did not know how to operate and use a microcomputer, video tape, closed circuit television, movie camera, microfilm projector, duplicating machine for transparencies, and microfiche reader.
4. It was found that of 14 items of audiovisual equipment, item 1, "microcomputer," and item 7, "microfiche reader," were the only two items that the administrators rated higher than the instructors had concerning the needs for in-service training programs.

Conclusion: More than 50 percent of the administrators and instructors did not know how to utilize a microcomputer, video tape, closed circuit television, movie

camera, microfilm projector, duplicating machine for transparencies, and microfiche reader. Therefore, it was apparent that both administrators and instructors needed in-service training in the use of the above named audiovisual equipment.

HO_4: There are no significant differences between the perceptions of the administrators and instructors in regard to the future needs for audiovisual equipment.

Findings - The following findings were summarized:

1. It was found that there were no significant differences in perceptions between the administrators and instructors in regard to the present and future needs for audiovisual equipment.
2. It was found that the majority of the administrators and instructors agreed that there was a great need for all 16 items of audiovisual equipment as indicated on Table XXII.
3. It was found that of all 16 items of audiovisual equipment, item 16, "microcomputer," was perceived as being needed more than the other items.
4. It was found that all 16 items of audiovisual equipment, microcomputer, microfilm projector, microfiche reader, closed circuit television set, microprojector, movie camera, video camera and recorder, filmstrip projector, opaque projector, camera, tape recorder, slide projector, reel-to-reel tape recorder, transparency duplicating machine projection screen, and overhead

TABLE XXII

RANK ORDER, MEAN SCORE, AND CHI-SQUARE VALUES CONCERNING THE NEEDS OF AUDIOVISUAL EQUIPMENT BY THE RESPONDENTS

Rank No.	Types of Audiovisual Equipment	Mean Score	Chi-Square Values
1	Microcomputer	2.55	3.81
2	Microfilm projector	2.52	1.28
3	Microfiche reader	2.48	0.20
4	Closed circuit television	2.48	1.91
5	Microprojector	2.45	0.28
6	Movie camera	2.45	0.98
7	Video camera and recorder	2.34	0.89
8	Filmstrip projector	2.24	1.32
9	Opaque projector	2.20	0.25
10	Camera	2.14	2.38
11	Cassette tape recorder	2.11	3.68
12	Slide projector	2.10	2.84
13	Reel-to-reel tape recorder	2.07	3.75
14	Transparency duplicating machine	2.04	1.91
15	Projection screen	2.01	2.53
16	Overhead projector	1.91	1.21

χ^2 .05, df 2, Chi-square value = 5.99

No significant difference at the 0.05 Level.

projector were ranked according to the aggregate mean scores from the highest of 2.55 to the lowest of 1.91.

Conclusion: Both administrator and instructor groups felt strongly that all 16 items of audiovisual equipment were necessary and important for the progress of education in their institutions.

HO_5: There are no significant differences between the perceptions of administrators and instructors concerning the types of organization of the audiovisual aid center in their institutions.

Findings - The results of the findings presented in Table XVIII are summarized as follows:

1. It was found that there was no significant difference in perceptions between the two groups of respondents concerning the types of organization of the audiovisual center in their institutions.
2. It was found that 71.85 percent of the instructor group preferred to have a decentralized location of the audiovisual center, while 63.16 percent of administrators favored a decentralized location.

Conclusions: Administrators preferred a centralized location of the audiovisual center in their institutions because they would like to save money. On the contrary, the instructors preferred a decentralized location of the audiovisual center because they would like to have more rapid audiovisual services for their instructional needs.

Recommendations

After analyzing the data obtained in this study, reviewing pertinent literature, and careful evaluation of all information, the researcher makes the following recommendations formulated in accordance with the findings:

1. The Institute of Technology and Vocational Education should be made more aware of the importance of audiovisual aids and instructional technology which will increase the efficiency in the teaching and learning processes.
2. A need assessment should be conducted in order to identify audiovisual in-service training needs of the administrators and instructors.
3. Administrators and instructors should be granted time apart from their duties to enable them to participate in in-service training programs.
4. In-service training programs in audiovisual aids should be based upon specific objectives that are congruent with the goals and programs selected by the administrators and instructors of the Institute of Technology and Vocational Education.
5. Audiovisual education courses should be provided for all new instructors in order to increase their knowledge and experience of developing and using audiovisual aids.

6. Each engineering technology campus should have a media training specialist to assist the administrators and instructors in the operation of audiovisual equipment and in the production of audiovisual materials.
7. Audiovisual education workshops and seminars should be offered during summer vacation so that the instructors will have the opportunity to participate in audiovisual workshops.
8. Funds should be provided by the Institute of Technology and Vocational Education to each engineering technology campus for the improvement of the audiovisual services.
9. The classrooms and laboratories in the Institute of Technology and Vocational Education should be carefully planned to accommodate the use of audiovisual aids.
10. The instructor, as manager of instruction, and the audiovisual specialist, as the media expert, should work together in order to improve the quality of instructional design, especially in the areas of selection, production, and utilization.

Recommendations for Further Research

The following recommendations have been developed with the purpose of suggesting further research:

1. Repeat the same study reported in this dissertation at an interval of three or five years on each of the 28 campuses of the Institute of Technology and Vocational Education.

2. A study for the improvement of audiovisual design, selection and utilization should be conducted on each campus of the Institute of Technology and vocational Education.

3. A study of the utilization of instructional technology should be conducted on each campus of the Institute of Technology and Vocational Education.

4. A cost-effective study of instructional technology should be conducted on each campus of the Institute of Technology and Vocational Education.

5. A study of modern educational technology should be conducted on each campus of the Institute of Technology and Vocational Education to determine the extent to which technological advances should alter the facilities needed in audiovisual center which will enable audiovisual specialists to cope with the future needs of the administrators and instructors.

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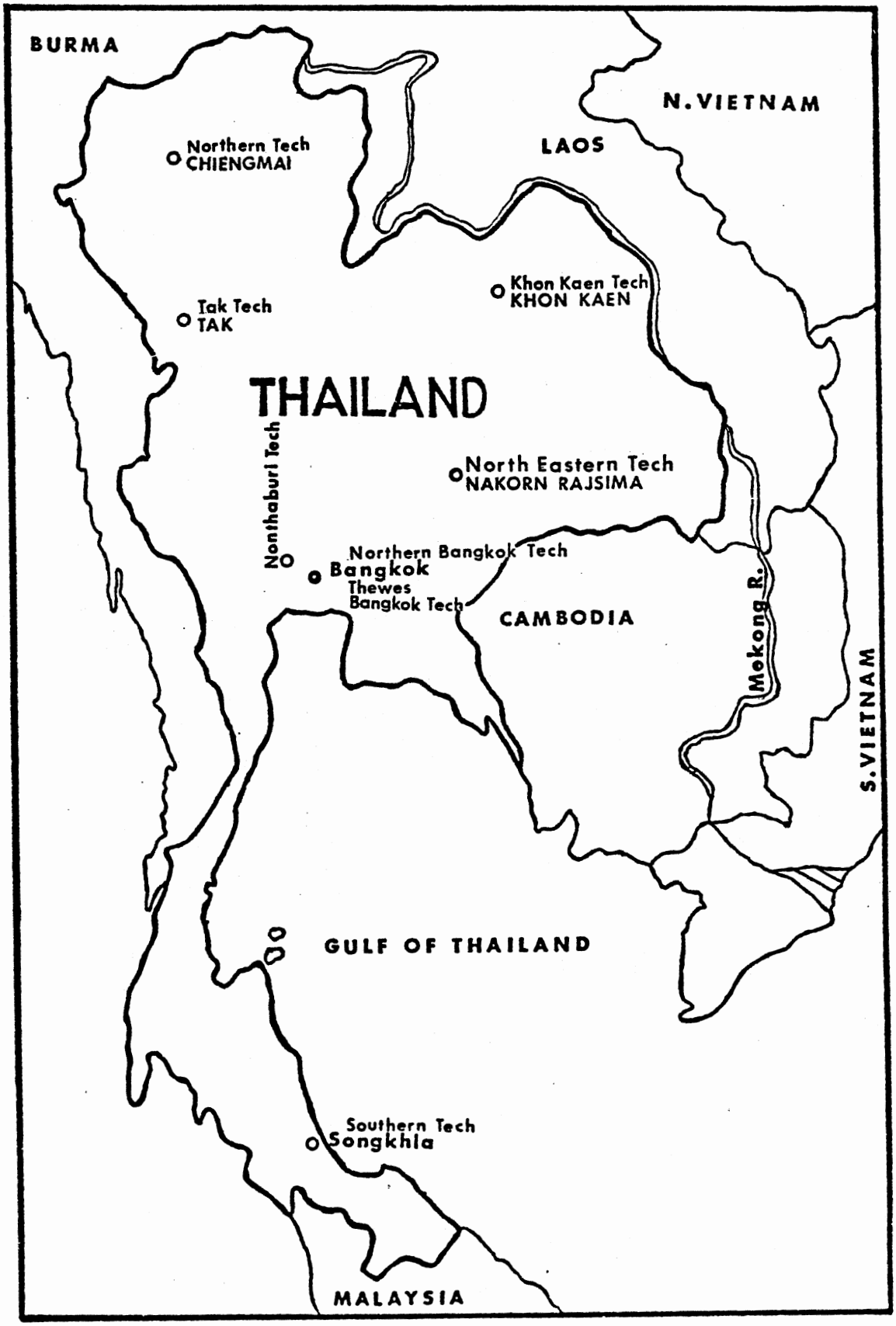
APPENDIX A

MAP OF THAILAND SHOWING THE LOCATION AND NAMES OF NINE ENGINEERING TECHNOLOGY CAMPUSES OF THE INSTITUTE OF TECHNOLOGY AND VOCATIONAL EDUCATION


BURMA
N. VIETNAM
LAOS
Northern Tech
CHIENGMAI
Khon Kaen Tech
KHON KAEN
Tak Tech
TAK
THAILAND
Nonthaburi Tech
North Eastern Tech
NAKORN RAJSIMA
Northern Bangkok Tech
Bangkok
Thewes
Bangkok Tech
CAMBODIA
Mekong R.
S. VIETNAM
GULF OF THAILAND
Southern Tech
Songkhla
MALAYSIA

APPENDIX B

PARTICIPANT QUESTIONNAIRE

(ENGLISH VERSION)

Questionnaire
For Instructors and Administrators of the Institute of Technology and Vocational Education
Thailand

Direction: The information requested in this questionnaire is essential to an evaluative study of audiovisual aids in your institution. Please indicate your response by marking (X) in the appropriate space. It is important that every item be answered.

1. Your Department: .....
2. Your age: .....
3. Please check only one which best related to your role in teaching.
   - ( ) a. Teaching technical education courses
   - ( ) b. Teaching general education courses
   - ( ) c. Both a. and b.
   - ( ) d. Administrative work only
4. Years of professional work experience in teaching:
   - ..... Years/Teaching only
   - ..... Years/Administrative work only
5. What subject matter do you teach in your institution? (Please indicate the subjects that you teach this semester)

Subject	Grade level	Hours per week
.....	.....	.....
.....	.....	.....
.....	.....	.....

6. What is your highest degree? (check only one item that apply)
   - ( ) a. Vocational certificate
   - ( ) b. Associate degree
   - ( ) c. Bachelor degree
   - ( ) d. Master degree
   - ( ) e. other, please identify
     .....
     .....
     .....

7. The information requested below is essential to an evaluative study of your present needs and future needs in audiovisual equipment and materials in your Technical Institute, please respond by marking (X) in the appropriate column at the right (You may check both "Present" and "Future" needs, if appropriate)

	Example	No Need (Have Enough)	Present Need	Future Need
1.	Chalkboards			
2.	Xerox machines			
A.	Audiovisual equipment			
1.	Overhead projectors			
2.	Projection screens			
3.	Slide projectors			
4.	Opaque projectors			
5.	Cameras			
6.	Movie cameras			
7.	Transparency duplicating machines			
8.	Closed circuit television			
9.	Filmstrip projectors			
10.	Microfilm projectors			
11.	Microfiche readers			
12.	Cassette tape recorders			
13.	Reel-to-reel tape recorder			

		No Need (Have Enough)	Present Need	Future Need
14.	Video cameras and recorders			
15.	Microprojectors			
16.	Microcomputers			
17.	Others (please specify)			
B.	Audiovisual materials			
1.	Charts			
2.	Drawings			
3.	Pictures			
4.	Posters			
5.	Models			
6.	Objects			
7.	Specimens			
8.	Bulletin boards			
9.	Magnetic boards			
10.	Transparencies			
11.	Slides			
12.	16 m.m. films			
13.	Filmstrips			

		No Need (Have Enough)	Present Need	Future Need
14.	Microfilms			
15.	Microfiches			
16.	Others (Please specify)			

8. Do you have any experience in audiovisual education?

( ) Yes ( ) No

If yes, please indicate how you obtained this experience:

( ) 1. Through formal education

( ) 2. Through in-service training

( ) 3. Through hobby

( ) 4. Others (please specify) .....
.....
.....

9. Do you have any problems in using audiovisual aids in your institution?

( ) Yes ( ) No

10. If your answer is Yes (for item number 10), then please indicate the degree of the problem for each statement given.

	Statement of the problems	3 Extreme problem	2 Moderate problem	1 Slight problem
1.	Classroom is not equipped for the use of audiovisual aids			
2.	Lack of audiovisual materials (software) such as transparencies, charts, etc.			

	Statement of the problems	3 Extreme problem	2 Moderate problem	1 Slight problem
3.	Lack of audiovisual equipment (hardware) such as overhead projector, slide projector, etc.			
4.	Lack of audiovisual storage spaces.			
5.	Lack of service personnel			
6.	Lack of maintenance and repair technician.			
7.	Lack of audiovisual training specialists.			
8.	Lack of budget			
9.	Others (please specify)			

11. Please check below any audiovisual equipment you know how to operate.

( ) 1. Overhead projector

( ) 2. Slide projector

( ) 3. Filmstrip projector

( ) 4. 16 m.m. movie projector

( ) 5. Transparency duplicating machines

( ) 6. Video camera and recorder

( ) 7. Cassette tape recorder

( ) 8. Reel-to-reel tape recorder

( ) 9. Camera

( ) 10. Movie camera

( ) 11. Microfilm projector

( ) 12. Microfiche reader

( ) 13. Microcomputer

12. Would you like to have training or additional training in the use of audiovisual aids?

( ) Yes ( ) No

13. If your response is Yes (for item number 13), the please indicate the name of the equipment in which you perceive a need for additional training.

( ) 1. Overhead projector

( ) 2. Slide projector

( ) 3. Filmstrip projector

( ) 4. Opaque projector

( ) 5. Camera

( ) 6. Movie camera

( ) 7. Cassette tape recorder

( ) 8. Reel-to-reel tape recorder

( ) 9. Microfilm projector

( ) 10. Microfiche reader

( ) 11. Closed circuit television

( ) 12. Transparency duplicating machine

( ) 13. Video tape

( ) 14. Microcomputer

( ) 15. Others (please specify)

.....

.....

.....

.....

14. Please indicate the frequency of audiovisual materials and equipment used in your teaching by marking (X) in the appropriate column.

Audiovisual equipment and materials	Frequently Used (more than 5 times per sem.)	Often Used (less than 5 times per sem.)	Seldom Used	Never Used
1. Charts				
2. Drawings				
3. Exercise or Worksheets				
4. Pictures				
5. Self-learning packages				
6. Transparencies				
7. Models				
8. Simulation				
9. Filmstrip projectors				
10. Cassette tape recorders				
11. Reel-to-reel tape recorders				
12. Closed circuit television				
13. Slide projectors				
14. Cameras				
15. Movie cameras				
16. 16 m.m. movie projectors				

Audiovisual equipment and materials	Frequently Used (more than 5 times per sem.)	Often Used (less than 5 times per sem.)	Seldom Used	Never Used
17. Microprojectors				
18. Microfilm projectors				
19. Microfiche readers				
20. Microcomputers				
21. Others (please specify)				

15. In your opinion, do you think that the audiovisual aids in your institution should be in a centralized location or decentralized location? (please check one)

( ) Should be centralized

( ) Should be decentralized

16. Please give reasons for your preferred choice in item 15.

1. .....
2. .....
3. .....
4. .....
5. .....

17. What suggestions do you have for improving audiovisual in-service training programs in your institution (if there are some)?

1. .....
2. .....
3. .....
4. .....

Thank you for your cooperation

APPENDIX C

PARTICIPANT QUESTIONNAIRE

(THAI VERSION)

แบบสอบถามสำหรับผู้บริหารและครูช่าง

ของ

วิทยาลัยเทคโนโลยีและอาชีวศึกษา

<u>คำชี้แจง</u> : แบบสอบถามนี้เป็นแบบสอบถามเพื่อหาข้อมูลเกี่ยวกับอุปกรณ์โสตทัศนศึกษาในวิทยาลัยของท่าน ขอความกรุณาให้ท่านช่วยตอบแบบสอบถามนี้ทุกข้อ โดยการเติมข้อความหรือกาเครื่องหมายลงในช่องว่างที่กำหนดไว้ในแต่ละข้อ

๑. แผนกและคณะที่ท่านสังกัดอยู่.....

๒. อายุ .....

๓. โปรดกาเครื่องหมายหน้าข้อความที่ตรงกับหน้าที่ของท่าน (กาได้มากกว่าหนึ่งข้อ)

( ) ก. สอนวิชาช่าง

( ) ข. สอนวิชาสัมพันธ์

( ) ค. สอนทั้งสองอย่างที่กล่าวมาแล้วทั้ง ก. และ ข.

( ) ง. ทำหน้าที่บริหาร

๔. อายุราชการ (กรุณากรอกอายุราชการของท่านตามหน้าที่ข้างล่างนี้)

.....ปีของการสอน

.....ปีของงานด้านบริหาร

๕. วิชาที่สอนในปัจจุบัน (ภาคการศึกษานี้)

วิชา.....ระดับ.....จำนวน ชม./สัปดาห์.....

....

....

๖. กรุณากากบาท (/) หน้าข้อความที่ตรงกับวุฒิการศึกษาสูงสุดของท่าน

( ) ก. ประกาศนียบัตรวิชาชีพ (ปวช.)

( ) ข. ประกาศนียบัตรวิชาชีพชั้นสูง (ปวส.) หรือ อนุปริญญา

( ) ค. ปริญญาตรี

( ) ง. ปริญญาโท

( ) จ. อื่น ๆ โปรดระบุ

.....

.....

.....

๗. กรุณาพิจารณาอุปกรณ์โสตทัศนศึกษาดังต่อไปนี้ ว่ามีความจำเป็นหรือไม่ต่อการเรียนการสอน โดยพิจารณาความจำเป็นทั้งในปัจจุบันและอนาคต ตามความเห็นของท่านเอง แล้วกากบาท " X " ลงในช่องที่กำหนดไว้ในแต่ละข้อดังตัวอย่าง

ตัวอย่าง

ประเภทเครื่องมือโสตทัศนศึกษา	มีเพียงพอแล้ว	ยังขาดอยู่และมีความจำเป็นในปัจจุบัน	ยังขาดอยู่และมีความจำเป็นต้องใช้ในอนาคต
๑. ชอล์ค บอร์ด	X		
๒. เครื่องถ่ายเอกสาร		X	

	มีเพียงพอแล้ว	ยังขาดอยู่และมีความจำเป็นในปัจจุบัน	ยังขาดอยู่และมีความจำเป็นต้องใช้ในอนาคต
ก.ประเภทเครื่องมือโสตทัศนศึกษา (Audio-visual equipment)			
๑. เครื่องฉายภาพข้ามศีรษะ (Overhead projector)			
๒. จอฉายภาพ (Projection screen)			
๓. เครื่องฉายสไลด์ (Slide projector)			
๔. เครื่องฉายภาพทึบแสง (Opaque projector)			
๕. กล้องถ่ายรูป (Camera)			
๖. กล้องถ่ายภาพยนต์ (Movie camera)			
๗. เครื่องถ่ายแผ่นใส (Transparency duplicating machine)			

	มีเพียงพอแล้ว	ยังขาดอยู่และมีความจำเป็นในปัจจุบัน	ยังขาดอยู่และมีความจำเป็นต้องใช้ในอนาคต
๙. โทรทัศน์วงจรปิด (Closed circuit television)			
๑๐. เครื่องฉายฟิล์มสตริป (Filmstrip projector)			
๑๑. เครื่องฉายไมโครฟิล์ม (Microfilm projector)			
๑๒. เครื่องฉายไมโครฟิช (Microfiche reader)			
๑๓. เครื่องบันทึกเสียงชนิดคลับ (Cassette tape recorder)			
๑๔. เครื่องบันทึกเสียงชนิดม้วน (Reel-to-reel tape recorder)			
๑๕. เครื่องเทปบันทึกภาพและเสียง (Video camera and recorder)			
๑๖. เครื่องฉายภาพจุลทัศน์ (Microprojector)			

	มีเพียงพอแล้ว	ยังขาดอยู่และมีความจำเป็นในปัจจุบัน	ยังขาดอยู่และมีความจำเป็นต้องใช้ในอนาคต
๑๖. เครื่องเรียนด้วยคอมพิวเตอร์ (Microcomputer)			
๑๗. อื่น ๆ (โปรดระบุ)			
ข.ประเภทวัสดุโสตทัศนศึกษา (Audio-visual materials)			
๑. แผนภูมิ (Charts)			
๒. ภาพเขียน (Drawing)			
๓. ภาพถ่าย (Picture)			
๔. โปสเตอร์ (Poster)			
๕. หุ่นจำลอง (Model)			

	มีเพียงพอแล้ว	ยังขาดอยู่และมีความจำเป็นในปัจจุบัน	ยังขาดอยู่และมีความจำเป็นต้องใช้ในอนาคต
๖. ของจริง (Object)			
๗. ของตัวอย่าง (Specimen)			
๘. ป้ายนิเทศ (Bulletin board)			
๙. กระดานแม่เหล็ก (Magnetic board)			
๑๐. แผ่นใส (Transparency)			
๑๑. สไลด์ (Slide)			
๑๒. ๑๖ ม.ม. ฟิล์ม (16 m.m. film)			
๑๓. ฟิล์มสตริป (Filmstrip)			

	มีเพียงพอแล้ว	ยังขาดอยู่และมีความจำเป็นในปัจจุบัน	ยังขาดอยู่และมีความจำเป็นต้องใช้ในอนาคต
๑๔. ไมโครฟิล์ม (Microfilm)			
๑๕. ไมโครฟิช (Microfiche)			
๑๖. อื่น ๆ (โปรดระบุ)			

๔. ท่านเคยมีประสพการณ์ทางด้านโสตทัศนศึกษาหรือไม่ (โปรดกากบาทในวงเล็บ)

( ) เคย ( ) ไม่เคย

ถ้าเคย กรุณาระบุในวงเล็บว่าประสพการณ์นั้นท่านได้มาอย่างไร

( ) ๑. จากการเรียนวิชาเกี่ยวกับโสตทัศนศึกษาโดยตรงจากสถานศึกษา

( ) ๒. จากการฝึกอบรม

( ) ๓. จากงานอดิเรกของท่านเอง

( ) ๔. อื่น ๆ (โปรดระบุ)

๔.๑ ท่านมีปัญหาเกี่ยวกับการใช้อุปกรณ์โสตทัศนศึกษาในวิทยาลัยของท่านหรือไม่ (โปรดกากบาทในวงเล็บ)

( ) มี ( ) ไม่มี

๑๐. ถ้ามีปัญหา (ในข้อ ๙) กรุณาบอกระดับของปัญหาของแต่ละข้อความข้างล่างนี้ โดยกากบาทในช่องที่กำหนดให้ทางขวามือ

ประเภทของปัญหา	มีปัญหามาก	มีปัญหาปานกลาง	มีปัญหาน้อยมากหรือแทบจะไม่มีปัญหาเลย
๑. สภาพห้องเรียนไม่เหมาะ/ไม่พร้อมที่จะใช้อุปกรณ์โสตทัศนศึกษาได้			
๒. อุปกรณ์โสตทัศนศึกษาประเภทวัสดุ (Software) เช่น แผนภาพโปร่งใส แผนภูมิ ฯลฯ มีไม่เพียงพอ			
๓. อุปกรณ์โสตทัศนศึกษาประเภทสื่ออุปกรณ์(Hardware) เช่น เครื่องฉายภาพยามศูรีษะ เครื่องฉายสไลด์ ฯลฯ มีไม่เพียงพอ			
๔. สถานที่เก็บรักษาอุปกรณ์โสตทัศนศึกษา มีไม่พอ/ไม่เหมาะสม			
๕. ขาดแคลนเจ้าหน้าที่บริการเกี่ยวกับอุปกรณ์โสตทัศนศึกษา			

ประเภทของปัญหา	มีปัญหามาก	มีปัญหาปานกลาง	มีปัญหาน้อยมากหรือแทบจะไม่มีปัญหาเลย
๖. ขาดแคลนช่างเทคนิคเกี่ยวกับการซ่อมและบำรุงรักษาอุปกรณ์โสตทัศนศึกษา			
๗. ขาดแคลนเจ้าหน้าที่และผู้เชี่ยวชาญด้านการฝึกอบรมวิธีใช้อุปกรณ์โสตทัศนศึกษา			
๘. ขาดงบประมาณในการจัดซื้ออุปกรณ์โสตทัศนศึกษาให้เพียงพอต่อการสอน			
๙. ปัญหาอื่น ๆ (โปรดระบุ)			

๑๑. อุปกรณ์โสตทัศนศึกษาต่อไปนี้มีชนิดใดบ้างที่ท่านรู้วิธีใช้ได้อย่างมีประสิทธิภาพ โปรดกากบาทหน้าข้อความนั้น ๆ (กากบาทได้มากกว่าหนึ่งชนิด)

( ) ๑. เครื่องฉายภาพข้ามศีรษะ (Overhead projector)

( ) ๒. เครื่องฉายสไลด์ (Slide projector)

( ) ๓. เครื่องฉายฟิล์มสตริป (Filmstrip projector)

( ) ๔. เครื่องฉายภาพยนต์ขนาด ๑๖ ม.ม. (16 m.m. movie projector)

( ) ๕. เครื่องถ่ายแผ่นภาพโปร่งใส (Transparency duplicating machine)

( ) ๖. เทปบันทึกภาพ และเสียง (Video camera and recorder)

( ) ๗. เทปบันทึกเสียงชนิดคลับ (Cassette tape recorder)

( ) ๘. เทปบันทึกเสียงชนิดม้วน (Reel-to-reel tape recorder)

( ) ๙. กล้องถ่ายรูป (Camera)

( ) ๑๐. เครื่องถ่ายภาพยนต์ (Movie camera)

( ) ๑๑. เครื่องฉายไมโครฟิล์ม (Microfilm projector)

( ) ๑๒. เครื่องฉายไมโครฟิช (Microfiche reader)

( ) ๑๓. เครื่องเรียนด้วยคอมพิวเตอร์ (Microcomputer)

๑๒. ท่านคิดว่าท่านมีความจำเป็นหรือต้องการรับการฝึกอบรมเพิ่มเติมเกี่ยวกับการใช้อุปกรณ์โสตทัศนศึกษาหรือไม่

( ) จำเป็นอย่างยิ่ง ( ) ไม่จำเป็น

๑๓. ถ้าท่านคิดว่า จำเป็นอย่างยิ่ง (จากคำตอบข้อ ๑๒) กรุณาระบุชนิดของอุปกรณ์โสตทัศนศึกษาข้างล่างนี้ ที่ท่านคิดว่ามีความต้องการที่จะฝึกอบรมเพิ่มเติม (กากบาทหน้าข้อได้มากกว่าหนึ่งชนิด ตามความต้องการของท่าน)

( ) ๑. เครื่องฉายภาพข้ามศรีษะ (Overhead projector)

( ) ๒. เครื่องฉายสไลด์ (Slide projector)

( ) ๓. เครื่องฉายฟิล์มสตริป (Filmstrip projector)

( ) ๔. เครื่องฉายภาพทึบแสง (Opaque projector)

( ) ๕. กล้องถ่ายรูป (Camera)

( ) ๖. กล้องถ่ายภาพยนต์ (Movie camera)

( ) ๗. เครื่องบันทึกเสียงขนาดเล็ก (Cassette tape recorder)

( ) ๘. เครื่องบันทึกเสียงขนาดใหญ่ (Reel-to-reel tape recorder)
( ) ๙. เครื่องฉายไมโครฟิล์ม (Microfilm projector)
( ) ๑๐. เครื่องฉายไมโครฟิช (Microfiche reader)
( ) ๑๑. ระบบโทรทัศน์วงจรปิด (Closed circuit television)
( ) ๑๒. เรียนรู้การผลิตแผ่นภาพโปร่งใส (Transparency) จากเครื่องถ่าย (Transparency duplicating machine)
( ) ๑๓. การใช้ Video tape บันทึกภาพและเสียง
( ) ๑๔. การใช้เครื่องคอมพิวเตอร์ทางการศึกษาช่วยในการสอน
( ) ๑๕. อื่น ๆ (โปรดระบุ)

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๑๔. โปรดบอกถึงการใช้อุปกรณ์โสตทัศนศึกษาข้างล่างนี้ ในการเรียนการสอนของท่าน ว่าท่านใช้บ่อยเพียงใด (กาเครื่องหมายในช่องที่กำหนดไว้ให้)

รายการวัสดุและอุปกรณ์โสตทัศนศึกษา	ใช้บ่อยมาก (มากกว่า ๔ ครั้ง/เดือน)	ใช้ค่อนข้างบ่อย (น้อยกว่า ๔ ครั้ง/เดือน)	แทบไม่ได้ใช้เลย	ไม่เคยใช้เลย
๑. แผนภูมิ (Chart)				

รายการวัสดุและอุปกรณ์โสตทัศนศึกษา	ใช้บ่อยมาก (มากกว่า ๔ ครั้ง/เดือน)	ใช้ค่อนข้างบ่อย (น้อยกว่า ๔ ครั้ง/เดือน)	แทบไม่ได้ใช้เลย	ไม่เคยใช้เลย
๒. ภาพวาด (Drawing)				
๓. ใบงาน (Exercise or work sheet)				
๔. รูปภาพ (Picture)				
๕. บทเรียนสำเร็จรูป (Self-learning package)				
๖. แผ่นภาพโปร่งใส (Transparency)				
๗. หุ่นจำลอง (Model)				

รายการวัสดุและอุปกรณ์โสตทัศนศึกษา	ใช้บ่อยมาก (มากกว่า ๔ ครั้ง/เดือน)	ใช้ค่อนข้างน้อย (น้อยกว่า ๔ ครั้ง/เดือน)	แทบไม่ได้ใช้เลย	ไม่เคยใช้เลย
๘. ของจริง (Simulation)				
๙. เครื่องฉายฟิล์มสตริป (Filmstrip projector)				
๑๐. เครื่องบันทึกเสียงชนิดตลับ (Cassette tape recorder)				
๑๑. เครื่องบันทึกเสียงชนิดม้วน (Reel-to-reel tape recorder)				
๑๒. โทรทัศน์วงจรปิด (Closed circuit television)				
๑๓. เครื่องฉายสไลด์ (Slide projector)				

รายการวัสดุและอุปกรณ์โสตทัศนศึกษา	ใช้บ่อยมาก (มากกว่า ๔ ครั้ง/เดือน)	ใช้ค่อนข้างบ่อย (น้อยกว่า ๔ ครั้ง/เดือน)	แทบไม่ได้ใช้เลย	ไม่เคยใช้เลย
๑๔. กล้องถ่ายรูป (Camera)				
๑๕. กล้องถ่ายภาพยนต์ (Movie camera)				
๑๖. เครื่องฉายภาพยนต์ขนาดเล็ก (16 m.m. movie projector)				
๑๗. เครื่องฉายภาพจุลทัศน์ (Microprojector)				
๑๘. เครื่องฉายภาพไมโครฟิล์ม (Microfilm projector)				
๑๙. เครื่องฉายไมโครฟิช (Microfiche reader)				

รายการวัสดุและอุปกรณ์โสตทัศนศึกษา	ใช้บ่อยมาก (มากกว่า ๕ ครั้ง/เดือน)	ใช้ค่อนข้างบ่อย (น้อยกว่า ๕ ครั้งเดือน)	แทบไม่ได้ใช้เลย	ไม่เคยใช้เลย
๒๐. เครื่องคอมพิวเตอร์ (ขนาดเล็ก) (Microcomputer)				
๒๑. อื่น ๆ (โปรดระบุ)				
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๑๕. ท่านคิดว่า ศูนย์อุปกรณ์โสตทัศนศึกษาในวิทยาลัยของท่านจะจัดแบบ.....

( ) ก. เป็นศูนย์รวมอุปกรณ์โสตทัศนศึกษาของวิทยาลัย

( ) ข. เป็นแบบศูนย์ย่อยของแต่ละคณะพร้อมภาควิชา

๑๖. โปรดให้เหตุผลสนับสนุนความเห็นที่ท่านเลือกในข้อ ๑๕ (กรุณาตอบเป็นข้อ ๆ)

๑. .....

๒. .....

๓. .....

๔. .....

๕. .....

๑๗. กรุณาแสดงความเห็นเพิ่มเติมเกี่ยวกับการจัดฝึกอบรมทางด้านการใช้อุปกรณ์โสตทัศนศึกษาในวิทยาลัยฯของท่าน ว่าควรเป็นไปในรูปใด เพื่อให้มีประสิทธิภาพต่อการเรียนการสอนดียิ่งขึ้น (กรุณาตอบเป็นข้อ ๆ)

๑. .....

๒. .....

๓. .....

๔. .....

๕. .....

ขอขอบพระคุณในความร่วมมือ

APPENDIX D

A LETTER OF PERMISSION FROM THE RECTOR OF THE INSTITUTE OF TECHNOLOGY AND VOCATIONAL EDUCATION

ME/20/03/3589

Institute of Technology
and Vocational Education,
Ministry of Education

9 June 1982

Subject: Questionnaire Answering Cooperation

To: The Campus Director

This letter is to ask for your cooperation to answer the questionnaire for Mr. Teravuti Boonyasopon, a graduate student pursuring doctorate degree and working on his doctoral thesis entitled A Study of Educational Technology as Perceived by the Administrators and Instructors in Selected Technical Institutes in Thailand at Oklahoma State University, School of Occupational and Adult Education, Oklahoma, USA, under the supervision of Dr. Cecil W. Dugger, thesis advisor.

It is considered that the finding of this study will provide very useful criteria for the improvement of audiovisual services in general. Moreover, it is believed that the result would be feasible for the implementation in order to create the audiovisual center for the Institute of Technology and Vocational Education.

To complete this project, however, the researcher needs to collect and obtain data concerning various aspects about audiovisual aids used in this campus. Thus, in any possible way, please give Mr. Teravuti Boonyasopon the support that he may need in conjunction with his data collecting at your campus.

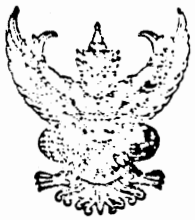
Your prompt cooperation on this matter will be very much appreciated. Thank you.

Yours faithfully,
Professor Swath Tscheikuna
Rector of the Institute of
Technology and Vocational
Education

APPENDIX E

A LETTER OF PERMISSION FROM THE RECTOR OF THE INSTITUTE OF TECHNOLOGY AND VOCATIONAL EDUCATION

(THAI VERSION)



ที่ ศธ. ๑๒๐๑๐๓/ ๓๕๘๕ วิทยาลัยเทคโนโลยีและอาชีวศึกษา
กระทรวงศึกษาธิการ

๕ มิถุนายน ๒๕๒๕

เรื่อง ขอความร่วมมือในการตอบแบบสอบถาม

เรียน

ด้วยนายธีรวุฒิ บุญยโสภณ จะทำวิทยานิพนธ์เรื่อง "การศึกษาปัญหาความต้องการและการใช้อุปกรณ์โสตทัศนศึกษาในการสอนวิชาช่างอุตสาหกรรมของอาจารย์ในวิทยาเขต สังกัดวิทยาลัยเทคโนโลยีและอาชีวศึกษา" โดยวิทยานิพนธ์ฉบับนี้ Dr. Cecil W. Dugger ของ Oklahoma State University ประเทศสหรัฐอเมริกาเป็นอาจารย์ที่ปรึกษา การจัดทำวิทยานิพนธ์ในหัวข้อเรื่องดังกล่าวจำเป็นจะต้องได้ข้อมูลเกี่ยวกับสถานภาพความต้องการและปัญหาหรืออุปสรรคต่าง ๆ ในการใช้อุปกรณ์โสตทัศนศึกษา ในวิทยาเขตแต่ละแห่งของวิทยาลัยฯ

วิทยาลัยฯ พิจารณาแล้วเห็นว่า วิทยานิพนธ์ฉบับนี้จะเป็นแนวทางในการปรับปรุงและจัดบริการด้านอุปกรณ์โสตทัศนศึกษาในวิทยาเขตของท่าน นอกจากนี้ยังเป็นแนวทางในการเสนอโครงการจัดตั้งศูนย์พัฒนาสื่อการเรียนการสอน ของวิทยาลัยเทคโนโลยีและอาชีวศึกษาในอนาคต

จึงแจ้งมาเพื่อโปรดอำนวยความสะดวกในการให้ข้อมูลและบริการด้านอื่น ๆ ที่จำเป็นแก่นายธีรวุฒิ บุญยโสภณ ด้วย จะขอบคุณมาก

ขอแสดงความนับถืออย่างสูง

(ศาสตราจารย์สวาสดิ์ ไชยคุนา)
อธิการบดีวิทยาลัยเทคโนโลยีและอาชีวศึกษา

APPENDIX F

DIRECTIONS FOR RESPONDING TO THE QUESTIONNAIRE

Department of Occupational Education
Oklahoma State University
Stillwater, Oklahoma 74078

5 มิถุนายน 2525

เรื่อง ขอความร่วมมือในการตอบแบบสอบถาม

เรียน ท่านอาจารย์ที่เคารพ

ด้วยกระผม นายธีรวุฒิ บุญยโสภณ อาจารย์ประจำภาควิชาครุศาสตร์เครื่องกล สถาบันเทคโนโลยีพระจอมเกล้า พระนครเหนือ จะทำวิทยานิพนธ์ เรื่อง "การศึกษาปัญหาความต้องการและการใช้อุปกรณ์โสตทัศนศึกษาในการสอนวิชาช่างอุตสาหกรรมของอาจารย์ในวิทยาเขต สังกัดวิทยาลัยเทคโนโลยีและอาชีวศึกษา" เพื่อให้ทราบถึงสถานภาพความต้องการ และ ปัญหาหรืออุปสรรคต่าง ๆ ในการใช้อุปกรณ์โสตทัศนศึกษา ของกรมเทคโนโลยีและอาชีวศึกษา

ข้อมูลที่ได้จากการสำรวจวิจัยในครั้งนี้จะนำไปใช้ในทางที่เป็นประโยชน์ต่อส่วนรวมและอาจนำมาใช้เป็นแนวทางในการเสนอแนวทางปรับปรุง และ จัดบริการด้านอุปกรณ์โสตทัศนศึกษาในวิทยาเขตของท่าน

เนื่องจากกระผมจะต้องเดินทางกลับไปยังประเทศสหรัฐอเมริกาในวันที่ ๑ กรกฎาคม ๒๕๒๕ กระผมจึงใคร่ขอความร่วมมือจากท่านอาจารย์ในการตอบแบบสอบถามนี้ ให้ตรงกับสภาพเป็นจริงในวิทยาเขตของท่าน โดยให้เสร็จอย่างช้า ภายในวันที่ ๒๖ มิถุนายน ๒๕๒๕ นี้ และขอขอบพระคุณเป็นอย่างสูงในความร่วมมือของท่านมา ณ โอกาสนี้ด้วย

ขอแสดงความนับถืออย่างสูง

ธีรวุฒิ บุญยโสภณ

(นายธีรวุฒิ บุญยโสภณ)

APPENDIX G

STRATEGIES OF SELECTING AND DESIGNING TEACHING AIDS

A. Selecting teaching aids

The proper use of teaching aids requires much careful thought. This is particularly true if they have to be prepared from scratch. The trainer should always make quite sure that the subject matter, the training methods and the visual aids are all suited to each other. The trainer should also have adequate rehearsal in their use, especially if they are being used for the first time, to ensure that she is quite familiar with them. Some factors to consider in choosing the aids are:

Situation. To whom will the presentation be made - one trainee or group of trainees? Where will the presentation take place - clinic, classroom or field? This will affect the size of the aids. How often will the aids be used? If they are to be used once only, it may not be worth while to prepare expensive and elaborate aids. Will the use of the aids depend on such things as electricity, transport or other equipment like projectors; if so, are these available?

Subject matter and desired effect. What emotion is the trainer trying to arouse - fear, surprise, shock? A much stronger impact can be made when teaching the symptoms and effects of kwashiorkor or marasmus by showing real severe cases or coloured pictures than by using sketches. Does the information require gradual buildingup and linking with other information? It is better to use a flannel-board than a chalkboard when teaching the use of growthchart and how to interpret the information on it.

Cost. Teaching aids cost money, and some are very expensive. Film and slide projectors and overhead projectors are the most expensive, followed by the magnetic board and the flannel board. Chalkboards are cheap and are practical in many situations.

Strategies of selecting and utilizing some common teaching aids are attached in the following pages.

B. Designing visual aids

Visual aids are intended to improve the transfer of knowledge and skills by showing what has to be learnt or done. They must be very carefully chosen to suit the subject exactly. If new ones have to be designed, the following points should be borne in mind:

- Use pictures whenever possible.

- When words and numerals must also be used, use as few as possible.

	Advantages	Disadvantages	Tips on preparation and use
1. Handout sheets and other printed matter.	1. Particularly useful to trainees because they serve as visual aids during the training. Can also serve as useful sources of reference later on.	1. May distract trainees who will read or work on handouts if they are distributed too early. 2. Not very useful for illiterate trainees unless carefully planned. 3. Reproduction depends on available facilities and time - e.g., stencil, offset, typing with carbon copies, photocopy machine.	1. Can be designed in different ways: - as visual illustration of trainer's presentation - as work-books with exercises - simply as printed information. 2. State the use of the handouts. 3. Plan carefully the spacing, illustrations, labelling, headings, paging, type and size of paper.
2. Chalkboard (blackboard)	1. Generally available and inexpensive. 2. Does not require advance preparation of visual aids. 3. Very useful in presentations which require much erasing - e.g., mathematical calculations. 4. Allows step-by-step build-up of presentation.	1. Trainer has to turn her back to the trainees. When writing, her attention is on the board, not on the trainees. 2. Trainer does not see audience reaction while writing. 3. Can usually be read or seen only at a limited distance. 4. Dusty and messy to hands and clothing. 5. Limited dramatic effect of the presentation.	1. Keep in mind the audience for whom you are writing. 2. Use print or block capitals for emphasis. 3. Write only the essentials; do not overcrowd; be tidy and neat. 4. Use coloured chalk for emphasis. 5. Carry your own chalk and eraser to ensure availability.
3. Charts and posters	1. Useful for displaying information on a permanent or temporary basis. 2. May be prepared cheaply by the trainer, especially if only one or a few copies are needed. May be produced in quantity by a printer. 3. Flipcharts are useful for presenting a number of points (or even story-telling) in short steps and certain order. 4. Presentation is not messy and saves time. 5. Materials are reusable for summary review and another presentation. 6. Portable.	1. Pages have limited spaces. 2. Could present problems in transportation and storage, depending on amount and bulk. 3. Limited dramatic effect of the presentation. 4. Should be big to be useful with a large group of trainees.	1. Do not overcrowd; use big, clear lettering. 2. If cost permits, use colour. 3. Uncover the charts or posters one by one to create suspense and concentrate attention. 4. Avoid crinkled and noisy sheets, which can be annoying. Stand to one side when presenting the chart. 5. Store carefully and preserve well for next use.
4. Flip-charts	1. Inexpensive and allows for writing space where chalkboard is not available. 2. Easy to carry. 3. Useful for recording ideas during group discussions.	1. Requires special felt pen for big writing. 2. Suitable only for small groups.	1. Bring extra paper and pens of different colours; also tape or thumb-tacks for posting paper on the wall.

	Advantages	Disadvantages	Tips on preparation and use
5. Flannelboard	1. Easy and inexpensive to construct. 2. Can be prepared in advance. 3. Reusable and permits quick changes. 4. Permits step-by-step build-up of complex figures. 5. Versatile: can use words, phrases, lines, drawings, photographs and other cutouts.	1. Visuals have to be prepared in advance.	1. The essential parts of any flannel-board are the flannel itself, from which the surface and the cut-outs to be placed on it on it are made, and a flat piece of wooden sacking to keep the flannel firm. The backs of the cut-outs are pasted with material to make them stick on the flannel. This may be sandpaper, blotting paper, foam-rubber or any other material that will adhere on the flannel. 2. Plan and rehearse in advance the exact appearance of the board at any one time during presentation. Mark the positions of cut-outs lightly. 3. Arrange the cut-outs in the order of presentation before you begin. 4. Store the board and cut-outs carefully to keep them clean and prevent the sides folding.
6. Overhead projector	1. Flexible materials can be prepared easily by different methods. It can be used in different ways - for writing and presentation of charts, etc. 2. Can be used without completely darkening the room. It is easy to manipulate. 3. Trainer faces audience all the time. She can work and write on it - (horizontal surface) while sitting down. 4. Permits use of colour and other effects by presenting short steps in orderly sequence. 5. Transparencies are reusable.	1. The projector is expensive. 2. Requires electricity, special pen and acetate or plastic transparencies. 3. Heavy, although portable. 4. Spare parts may be difficult to obtain and expensive. 5. Light from the projector in the trainer's eyes may be unpleasant.	1. Produce transparencies by drawing or writing directly on to transparent acetate (plastic) sheets. Use suitable grease pencils or felt-tip pens. 2. Two techniques which may be used are: - "overlay" technique: transparencies can be laid one on top of the other to add labels, colour or other details. - "uncover" technique: start by covering the entire transparency with a sheet of paper and gradually uncover more parts as necessary. 3. Mount transparencies on cardboard with adhesive tape to preserve them for future use and for easier handling. Store carefully. 4. Arrange transparencies in exact order of presentation; rehearse their use.
7. Slides and filmstrips with appropriate projector	1. Easiest way of bringing real-life situations into the classroom; colourful and dramatic. 2. Less expensive and easier to operate than films. 3. They may be prepared for a complete lesson, accompanied by written notes or tape-recorded commentary. 4. Filmstrips cannot get out of order. 5. Both slides and filmstrips are compact and convenient.	1. Expensive. 2. Most projectors require electricity. 3. Even the portable models may present a problem in mobility. 4. Spare parts may be difficult to obtain and expensive. 5. Require darkened room for presentation.	1. Slides are easier to edit and arrange for training purposes than filmstrips. 2. Put slides in the right order before presentation. If filmstrip is used, check the direction of the filmstrip. In both cases, make sure you have the correct machine. Rehearse. 3. Before and after the showing, prepare good presentation guides - e.g., what to look for, discussion guidelines or leading questions. 4. Repeat the showing or parts of it for emphasis. 5. Switch off projector when not in use. 6. Make sure you have extra bulbs and long extension cord.

	Advantages	Disadvantages	Tips in the preparation and handling
8. Sound filmstrips or slide-tape presentations	1. The accompanying tape can present a dramatic account of the story behind the slides or filmstrip. This can be very dramatic, and effective for motivation and training, especially if professionally done.	1. Additional investment needed for equipment. 2. Need special expertise to prepare and training and practice to use.	1. The script or story (sound) and pictures should match well. 2. Many agencies have prepared good sound filmstrips on slide-tape presentations. It would be less expensive to purchase these than prepare from scratch. Always preview before buying to see if relevant to your need and situation.
9. Use of real examples (e.g., real food items or food models)	1. Convenient and bring real-life situations to class. 2. Very effective for clear teaching and learning.	1. May not be readily available or difficult to bring in.	1. Use real examples whenever possible.
10. Radio	1. Radio is probably the most widely available mass communication medium. It is very popular in rural areas. It is cheap, easy to operate, and portable. 2. It meets the need of institutions to reach scattered and distant segments of the population. 3. Broadcasts can be taped for replay.	1. Available broadcasts may not contain material that is useful to the trainer. 2. Influence on station programming is possible only through official channels. This requires considerable preparation. 3. Listener reaction to the programme is not known, except when the broadcast is being heard by trainer and trainees in a group. 4. Limited to audio only.	1. If broadcast of a certain programme is known in advance, group listening can be organized. About 20 members listen together and discuss what they heard, using guide questions. Feed-backs can be given to the broadcasting station. 2. To be successful, the radio programme must be phrased to be understandable to the community. It must be presented to interest the average reader.

- Use graphs to present statistics and numerical information such as the results of weight surveys.

- Use colours as often as possible. The use of colours can increase the effectiveness of a picture and emphasize key points. They can be used for coding, contrast, and improving visibility. Colour combinations or contrasts are important. The colours that attract attention best are red and blue. Good combinations of colours are black on white, white on black, dark blue on white, brown on white, and green on white.

- Make the visual display simple. Use only key words and phrases, simple shapes and lines, and a few well-chosen colours. Do not crowd the display.

- Make the visual display bold and large enough to be easily seen and read. This is done by using the proper colours and letter styles and sizes and by careful attention to the spacing and layout.

- Make the visual display clear and easy to understand; it should convey only the information being presented. Ensure that the main points are emphasized.

- For lettering, use special pens for the desired size, colour and boldness. You may use commercial pre-cut letters, lettering guides (stencils) and stick-on letters, or you may write free-hand. Be sure the letters are large enough and not overcrowded so that the farthest person in the audience can read them. Plan the lettering ahead, using light pencil or white chalk.

- If a complex figure is necessary, the different elements should be brought in one by one. Build up the picture step by step and it will be more easily understood and accepted. Flannel boards and overhead projectors are very good for this purpose; for instance, a flannel-board can be used to teach the use of a growth-chart. One item can be added at a time (Guidelines for Training Community Health Workers in Nutrition, 1981).

VITA

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