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ABSTRACT

Written for administrators, school principals, and teachers, this manual offers a systematic approach to the implementation of instructional video technologies in developing nations. The manual is divided into two main parts. The three chapters comprising the first part, which address issues related to planning for instructional video, focus on: (1) the application of theories of education to instructional video planning; (2) teacher training; and (3) correlating instructional video programming to syllabi and texts. The second part, addressing issues related to instructional video implementation in the school settings, contains two chapters which focus on teacher and learner access to equipment and programming, and teacher responsibilities associated with the utilization of instructional video. Diagrams throughout the manual supplement the text. References are provided at the end of each chapter. (GL)

The Systematic Implementation of Instructional Video Technologies

A Guide for Administrators in Developing Nations

Agency for Instructional Technology

The Systematic Implementation of Instructional Video Technologies

A Guide for Administrators of Education,
Principals, and Teachers in Developing Nations

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Contents

Preface

"Developing nations have one major problem—the very people who are expected to make use of the technology (imported from developed nations) are never consulted, never properly trained...and when the projects fail, everyone wonders what went wrong!" This is one of the many angry opinions expressed by educators from developing nations, who have had encounters with extremely expensive, but abortive projects. A classic example of such failures is the introduction of instructional video technologies.*

The reasons for the introduction of these technologies (to developing nations) are always very sound. The most common scenario is as follows.

> An international organization or private concern with international interests perceives a genuine educational need in a particular developing nation. The organization discovers an excellent solution to the problem, one which involves advanced technology and requires skilled manpower. The local (developing nation) government is approached with promises of financing which usually runs into millions of dollars, imported machinery, imported manpower, and short-term overall support. The grateful government official assigned to the project agrees to sign legally binding documents with the donor without fully understanding the terms of the contracts, and the implementation process begins. All seems geared for success until the actual programming begins—then everything begins to go wrong. The programming is out of context; teachers reject the innovation; breakdowns of the machinery are reported faster than repairs can be made; the contract runs out and all the imported personnel return home. What remain are disgruntled teachers and learners; inadequate programming; unqualified technical, programming, and administrative personnel; malfunctioning machinery; and no locally available spare parts suppliers. The entire project cracks, threatens to crumble, and in some cases actually dies.

A second, less common scenario is as follows.

> A developing nation experiences a succession of high failure rates among students writing national (external) examinations. An analysis of this problem reveals that students fail because there is a gross shortage of teachers; most teachers who are available are underqualified; qualified but dissatisfied teachers abandon the profession; and, finally, schools lack funds to build and equip libraries and laboratories. The local department (or ministry) of education "discovers" a solution to the problem—the use of some form of instructional video technology. Several arguments are advanced in its favor: the instructional programs will provide instruction where teachers are unavailable, enhance the instruction of teachers who do not understand the subjects they are assigned

* The term "instructional video" is used in this context to refer to both broadcast video (TV) and videotape.

to teach, and reduce the burden of qualified but overworked teachers by providing supplementary instruction. A convincing cost-effectiveness analysis informs the education administrators that this is a venture wor'h taking, and the planning begins. A pattern similar to the one of the first scenario quickly emerges. The only difference is that foreigners are not to blame for the failure this time. The responsibility rests squarely with the local administrators.

These two examples offer a bleak but true picture of instructional video technologies in developing nations. Two questions thus arise.

1. What should have been done to ensure the success of the projects?
2. What can be done to improve on or revive what is available?

This manual attempts to provide some answers to these questions by offering a systematic approach to the implementation process. In recognition of the fact that its primary readership will emerge from education administrators, school principals, and teachers, an attempt has been made to use as little technical jargon as possible.

The manual is written in two parts, which are divided into five chapters.

Part I Focuses on theories of education, instruction, and technology and their implications on the planning and implementation of instructional video technologies. The planning includes the creation of a coalition of agencies which have an effect on the school systems output; the training of teachers; and the correlation of programming to the national curricula, school syllabi, and textbooks.

Part II Discusses the school setting with specific reference to the physical environment of a viewing room, the storage and retrieval of tapes and guides, and teacher responsibilities. These responsibilities include the making of lesson plans and lesson delivery strategies.

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Acknowledgments

John Nelson, the manager of international activities at the Agency for Instructional Technology (AIT), and the author conceived of the idea of the creation of a manual such as this one for developing nations. The writer of the manual, who is also from a developing nation and who has witnessed many of the problems discussed, began the design and development of the manual during her internship at AIT. She, like Nelson and many other educators, feels that the failure of instructional television and video to meet the expectations of educators is attributable to factors which can be remedied.

The ideas presented in the manual are based on the author's personal experiences with educational television in Bophuthatswana; the experiences of other educators in the United States, Europe, and developing nations with whom the author had the honor of visiting during the 1989 Association for Educational Communications and Technology Conference; and authorities cited in the bibliography at the end of each chapter of the manual.

The author is deeply indebted to John Nelson for his patience and wisdom; the staff at AIT for their psychological support at the time of the writing; AIT's editorial personnel for the excellent criticism they provided during the formative evaluation stages of the manual; Gail Trout for providing the wealth of reading materials; Utah State University and Indiana University international students who willingly shared their own experiences as educators in their countries; her graduate committee, Dr. R. Kent Wood (Instructional Technology professor and graduate committee chair), Dr. M. David Merril (Instructional Technology professor), and Penny Byrne (Communications Department professor) for offering continuous advice and academic support; and, finally, the Utah State University's Department of Instructional Technology professors who gave her the academic background without which she could not have ventured into this undertaking.

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Winter, 1989

Part I

Planning for Instructional Video

Chapter 1:
Application of Theories of Education, Instruction, and Technology to Instructional Video Planning

There currently exists a school of thought that the ultimate goal of education should be the facilitating of national development. The development process is facilitated by the collective effort of individual members of society. The individual acquires the ability to make a positive contribution through learning, which in modern society is provided by the school system. The learning itself does not exist in a vacuum—there are crucial environmental f- -tors set by society which influence the learner's ability to assimilate the intended information and display the desired behavior. These factors must be obeyed.

Instruction, which is generally viewed as a subset of education, is on the other hand defined as

> ...the process whereby the environment of the individual is deliberately managed to enable him to learn to emit or engage in specified behaviors under specified conditions or as responses to specified situations (Corey, in AECT 1977, p. 56).

Of technology's application to education, the AECT (1977, p. 57) provides the following definitions.

> ...technology is a complex, integrated process for analyzing problems, and of devising, implementing, managing and controlling and evaluating solutions to these problems.

In fact, Hoban (in AECT 1977, p. 57) emphasizes that technology is a "complex integrated organization of men and machines, of ideas, of procedures, and of management."

Put together, these definitions point to the fact that administrators should not be caught up in the "machine" factor of technology. They must recognize that a complex interrelationship exists between the society, the learner, the management of the learning processes, and the technology; that the machinery is not by itself an answer, but a means to providing solutions to some, not all, educational problems; and, finally, that the human element should be borne in mind throughout the implementation process of the technology.

The Coalition

The major question which thus arises is how the existing interrelationships as described above can be put to strategic use in ensuring the acceptance and success of technologies of instruction in developing nations. The first step is the forming of a **coalition** of agencies most likely to affect the type of learning that occurs in schools (see Figure 1 on page 3).

At the very core of the coalition should be the learner, who in this context is defined as any individual who is learning within the formal school system, and is likely to be affected by the new technology. The agencies, which in Figure 1 seem to encircle the learner, control the school curriculum in real life, and must therefore be involved in the planning of the "other" form of curriculum which technology has the potential of providing. The actions of these agencies are in turn controlled by society and culture, which impact the education and technology the learner is exposed to. The closed nature of society demands the close cooperation illustrated in Figure 1.

The immediate functions of the coalition should be two-fold: (1) it must act as the determiners of educational policy as it pertains to the selected instructional video technology; and (2) it should provide guidelines on the content and overall quality of the programming which will either be acquired or created by the instructional video service.

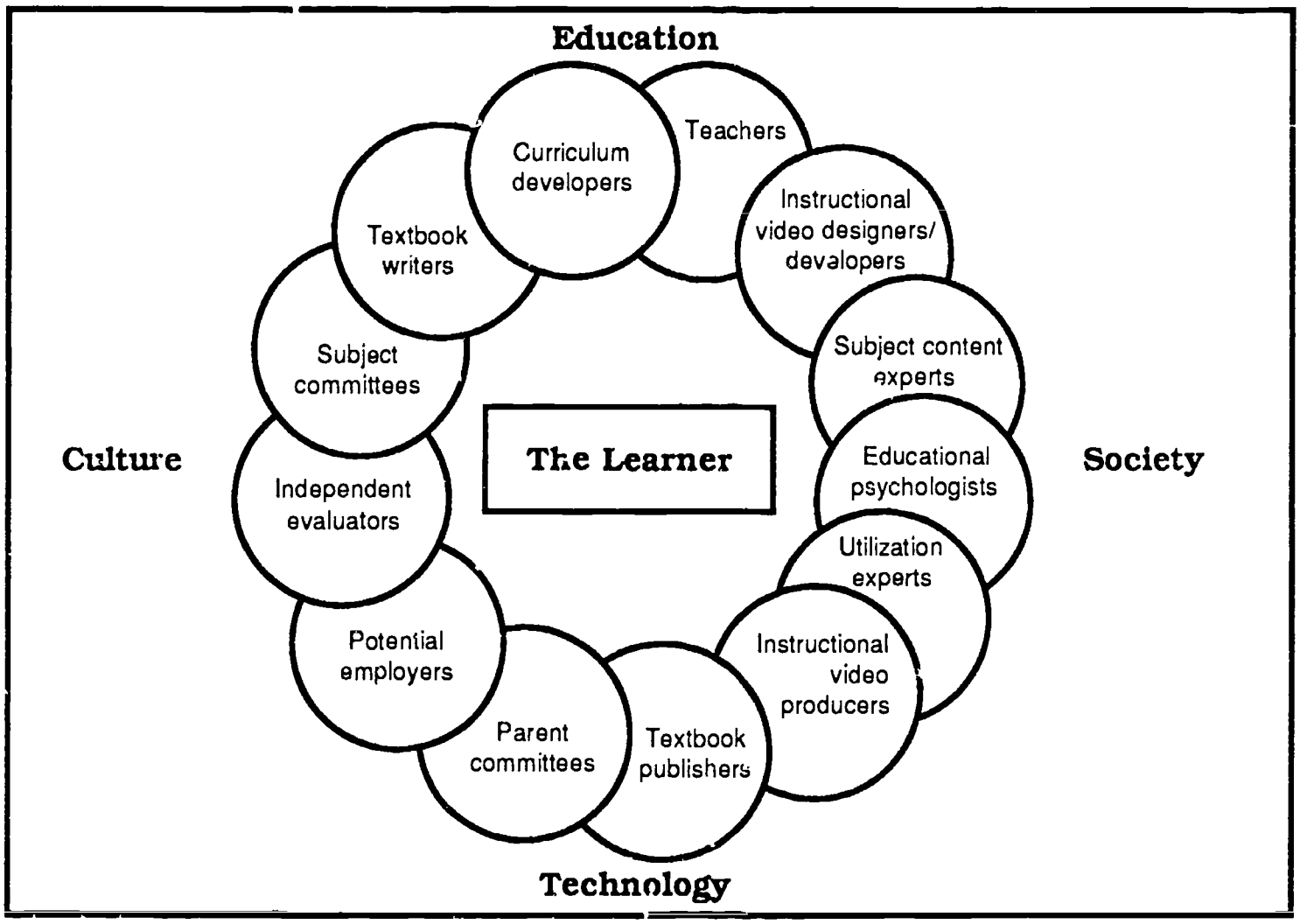

Figure 1: The Coalition

1. The Coalition and the Formulation of Instructional Video Policy

The formulation of policy is unavoidably political and thus very sensitive. For this reason, the membership of the policy recommending body, which may for example, be referred to as the **Instructional Video Advisory Board** should come from only the most capable representatives of each one of the agencies represented in Figure 1. The different backgrounds and experiences which each one of the participants will bring should provide important insights into what is, or is not, necessary and realistic. By virtue of their positions, the participants could play a crucial role in encouraging social and political acceptance of the venture.

It is advisable that the chair of the board be occupied by an education officer at either the ministerial or secretariat level of the local education department because the basic instructional aspect of the policy decision-making process should never be forgotten. This officer will have the capability of seeing to that. Secondly, the official's strategic position in the education department will ensure that all the crucial decisions made by the board are accepted and carried out as required by the department.

Factors which Form a Basis for the Formulation of Policy

First of all, a selection of the instructional video service which will most adequately meet the local educational needs must be made. Selection decisions must be based on a **needs analysis**, which will help determine what the real problem is, and provide an answer to whether the problem can be solved by instructional video technologies (a broadcast or videotape distribution service) or other means. It is very often the success of the technology in developed nations and not

whether the same technology will be adaptable to local conditions which makes the technology attractive. The analysis itself would be best conducted by a qualified analyst who is outside the local education system, and whose decision will not be based on personal biases. (See Figure 2 for an outline of the advantages and limitations of each system.)

Once this is resolved, decisions based on the following issues may be taken on which of the two instructional video technologies (videotape distribution or broadcast television) to adopt.

- The subjects and grade levels to be catered for by the programming.
- The time, location, frequency, and cost of training teachers.
- The geographic area(s) to be selected for the pilot testing of the programming and the criteria for the selection.
- The quantity, size, level of sophistication, cost, and insurance of school and service equipment.
- The maintenance and repair of the equipment.
- The general recruiting and training of instructional video personnel.
- The building or conversions of school and service activities.

Broadcast Video	Distributed Video
• Provides instruction to a wide audience, limited only by the availability of signal transmitters and receivers (TV sets).	• Provides instruction to a limited audience. Only those with videocassette recorders (VCR) and monitors can use the programs.
• Purely linear. The program cannot be replayed at a convenient time: teachers and learners have no control over the pace at which the instruction is presented; a frame cannot be frozen for closer inspection, played in slow motion, paused for explanation, or be stopped and resumed when convenient.	• Some control is allowed. The tape can be replayed; a frame can be frozen, played in slow motion, paused, or stopped.
• Broadcasters arrange for copyright clearance prior to broadcasting the programs.	• Teachers and media centers must be fully conversant with copyright laws. Read: Helm, Virginia M. *What Educators Should Know about Copyright.* Bloomington, IN: Phi Delta Kappa Educational Foundation (1986).
• The establishment and operation of a television broadcast concern is extremely costly. Read: Arnove, Robert F. *Educational Television: A Policy Critique for Developing Countries.* New York: Praeger (1976).	• Much less expensive to establish and operate.

Figure 2: The Advantages and Limitations of Broadcast and Distributed Instructional Video

The Board's Sources of Information

The fact that some of the members of the advisory board will emerge from agencies which do n.t have direct contact with school systems implies that they will base their decisions on written information. This information should come in the form of

- the original proposal,which should provide information on the local education problems, needs, and objectives of the proposed service
- the results of the feasibility study, which should include projected costs of the proposed service; it is important that the board be aware of any major financial or cultural constraints which may emerge later
- personnel whose direct involvement with the school systems should provide further insight into what can be done by production, and design representatives, who should provide insight into what is and what is not possible in terms of programming

The Interpreters of the Policy

The education and instructional video administrators must each receive a copy of the policy document and adhere to it as closely as possible. Any difficulties which arise as a result of the policies must be reported back to the advisory board for revision.

The Board's Meetings

The policy-making process itself is limited and will not require regular meetings except if revisions or crises arise. However, the chairperson of the board should maintain continuous contact with the instructional video service and be prepared to call upon the other board members as the need arises.

2. The Coalition as a Source of Guidance in the Creation and Acquisition of Programming

Who decides whether a particular instructional program should be created or purchased from a foreign source? This question takes us back to the notion that we should look at technology as a **means** to solving instructional problems, and not as an end. This implies that a program should neither be created nor acquired only because these can be done, but rather because an instructional **need** which can be catered for by the program does exist. The processes involved in the determining of the need(s) as displayed by the learners themselves, the designing and developing (or producing) of the program, and the formative evaluations that occur throughout the stages leading to the final product rely very heavily on the input of agencies outside the immediate design, development, and production procedures (see Figures 1 and 3) for the following reasons.

- Instructional technologists, whose functions are the design and development of instructional programs, are trained in techniques of recognizing learner problems, needs, interests, and goals; in media selection and location strategies; and in communicating production specifications to production specialists (Knirk and Gustafson 1986). However, they may not be familiar with, for example, issues pertaining to the content of certain subjects, the various levels of difficulty at which the content is presented, and moral issues that may affect the acceptability of the program.
- The costs of producing or acquiring programs are high enough for the extra security of having as much positive input in the production as possible.

These processes (assessing needs, designing/developing, evaluating, and producing) are typically referred to as the systems approach to problem solving.

The **needs assessment phase** involves providing answers to the questions: What objectives have been set for the learners? What behavior is desired of them? What do they already know and what are they supposed to know? What difficulties are they experiencing with the mastery of the instruction (Knirk and Gustafson 1986)? The instructional developer will not be able to find the answers unless the the learners themselves. the teachers, curriculum developers, and examiners provide the required information. The developer may use any number of

methods ranging from testing the learners to interviewing the agencies listed (Figure 3, Phase 1) to find out exactly what the needs of the learners, and perhaps even teachers are.

In the **design/development phase** the instructional developer needs to use the agencies listed under design/development in Figure 3 as information sources while researching and selecting the best solution to the problem. This involves taking decisions on the type of media and instructional strategy to adopt, the type and level of the content to be addressed (Dick and Carey 1985), and whether the final product should supplement or complement teacher generated instruction, or be fully instructional.

The **production phase** involves the interpretation of the developer's specifications to the production of the actual program. The agencies listed as general information sources in Phase 3 of Figure 3 play a crucial role in ensuring that the final product does not only meet its objectives, but is also suitable for its audience in terms of presentation style, aesthetics, and culturally acceptability.

It is very important that **formative evaluations** of the program occur during various stages of the design/development and production. Developers and producers must find out before the final product is sent out that it does meet the expectations of all concerned with its utilization. Only after the program has been perfected can it be distributed for **utilization** by teachers and learners.

It is not uncommon for administrators to decide to conduct a **summative evaluation** of an educational project. The need for an instructional program to be evaluated at this stage may arise due to a number of reasons, including the need for it to be updated or removed from circulation. The primary sources of information for this purpose will most likely be the learners, teachers, and any other relevant agencies listed under formative evaluation in Figure 3.

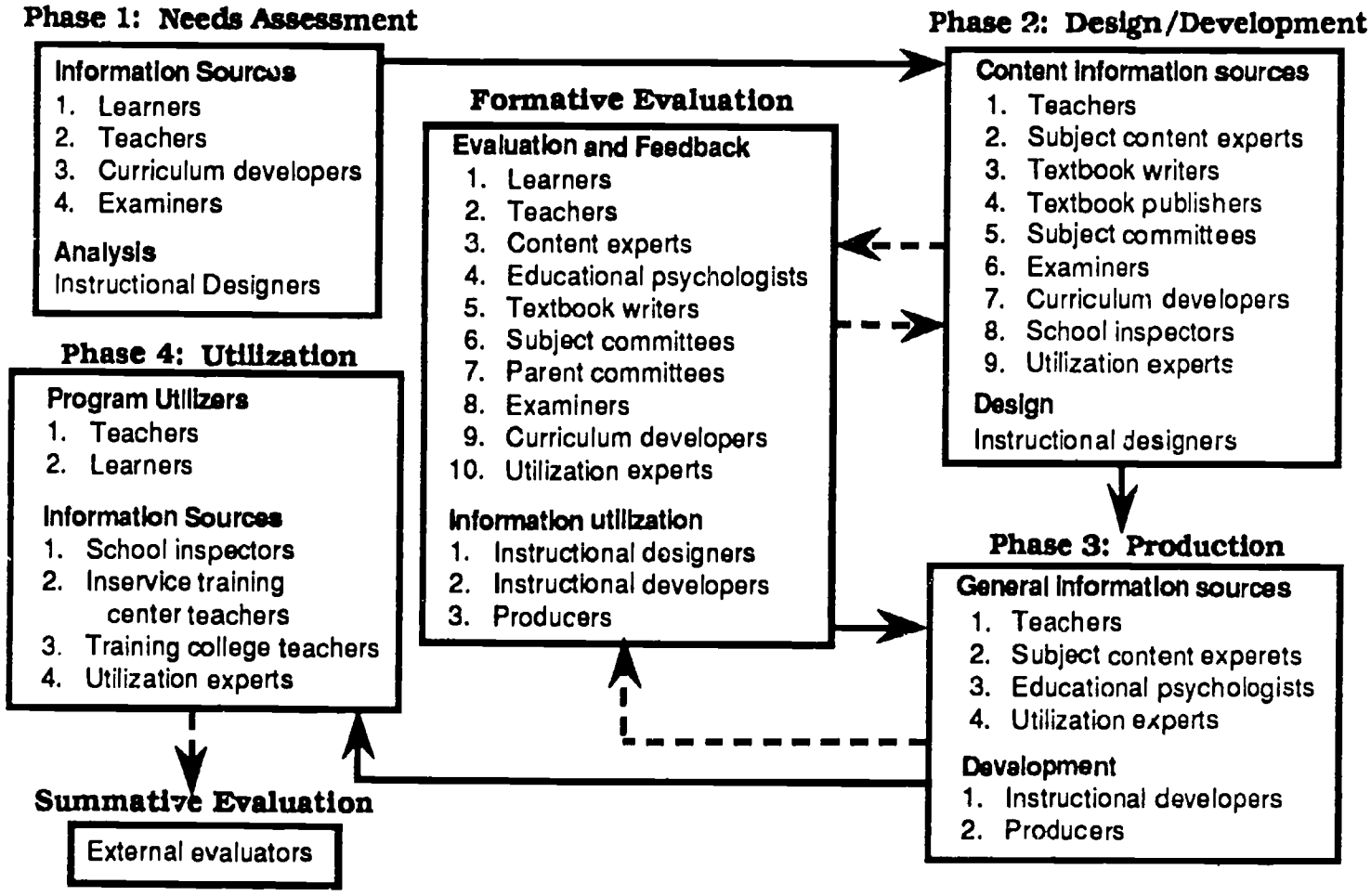

Figure 3: The Coalition Role in the Design/Development, Production, Utilization, and Evaluation Phases of Programming

Employee Training and Recruiting

Because instructional video technologies require highly skilled personnel, it is imperative that the initial employees of the concern you are planning for be very well trained. The finding of trained personnel may, however, be a major problem, particularly for a developing nation. Two alternative solutions to this problem exist. The first is to provide initial training to the most crucial personnel before the new technology is launched, although this may in most instances not be possible locally. The second but less desirable strategy is to recruit qualified persons from other nations and have them contractually bound to providing on-the-job training to local personnel. This may be done through the provision of formal training by the expatriates, or by locals serving as their understudies.

Pre-Launch Training

- **Instructional technologists (designers/developers)**—These play a crucial role in the development of instructional programs and must be very well trained before being entrusted with this responsibility. Recognizing that training institutions for this group may not be available locally, it will be worthwhile to send your trainees to institutions outside your country which do offer the training. According to Knirk and Gustafson (1986), universities in developed nations (particularly the United States) generally offer instructional technology programs at the graduate (masters and doctoral) levels, while also allowing specialization at the baccalaureate level. Their programs draw from fields such as administration, curriculum, and educational psychology, and offer training in the needs assessment, design, development, research, and evaluation aspects of instructional design and development.

- **Producers**—They are overall supervisors of the production, and their responsibilities range from budgeting to translating design specifications into products. According to Ravage (1978), and Degen (1985) they must be highly creative; have a background in writing, the liberal arts, or business; and be able to make quick decisions. Their training is best gained either through actual experience, which may be arranged with a reputable instructional video production concern, or with one of the many educational institutions in developed nations.

- **Engineering and technical staff**—They will be responsible for the setting up, maintenance, and operation of the machinery and will require relevant training. For the maintenance and operations divisions, technicians will need to have been trained to handle machinery which is exactly like that planned for use in schools and at the production or distribution centers. This training is best offered by institutions which offer programs in television and technical training.

The current practice in many production houses in the United States is to hire qualified free-lance personnel, who very often have their own equipment and facilities (Pickens, in Degen 1985). This eliminates the expense of having to train their own personnel.

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Chapter 2:
Teacher Training

In 1970, the Commission on Instructional Technology (Knirk and Gustafson 1986, p. 17) defined teacher training as follows.

> In its more familiar sense, it means the media born of the communications revolution which can be used alongside the teacher, textbook, and blackboard....It is a systematic way of designing, carrying out, and evaluating the total process of **learning and teaching** in terms of specific objectives, based on research in human learning and communication, and employing a combination of human and nonhuman resources to bring about more effective instruction.

This definition raises a crucial point, one which even today is receiving very cursory attention—the training of teachers on the use of instructional media technologies. The underlying presumption has been that anyone who can teach and knows how to manipulate a television set and videocassette recorder should be able to use these technologies in the ordinary day-to-day business of teaching. This is particularly true in developing nations (Schramm 1981; Armsy 1973). The sad reality, however, is that in a large number of instances teachers simply do not know what is expected of them. An even more serious fact is that these technologies are still so foreign to some developing nations that it is not uncommon to find teachers who had never before set their eyes on the equipment until its installation in their schools.

The resultant rejection of these innovations by teachers has been viewed by those in authority as unwarranted resistance to change—a notion which is itself unwarranted! It must be recognized that the acceptance of any form of change depends very largely on the recipient's state of mind. In fact, Arnove (1976), states that the Israeli administrators, recognizing the need to prepare their teachers both psychologically and professionally for the new tasks ahead of them, involved them in every step of the development, production, and evaluation procedures. They instilled in the teachers the belief that their participation was "for the student...by the teacher" (p. 106). Their training was provided well ahead of time so that they could make the necessary adjustments before they faced their classes. This is what paved the way to Israel's success story.

Several training-related problems have been advanced by teachers. Figure 4 on page 10 provides a list of some of those which are most commonly stated, and the possible training areas which can help eliminate them. Nontraining-related problems such as poor programming, bad timing, and the inadequacy of equipment are acknowledged and dealt with in chapters 1, 3, and 4.

Training-Related Solutions

1. **Teacher training colleges**—This is the most reasonable place to begin introducing future users of instructional video to the technology. Lobby for its introduction into the local teacher training college(s) curriculum.

2. **Intensive workshops**—A series of intensive workshops following the suggested agenda outlined in Figure 5 on page 10 could prove most beneficial. They may extend over a three-day period, depending on the needs of the teachers.

   Workshop Representation

   - **Each school must be represented by (a) the principal**, who needs to be completely familiar with instructional video operation, learning environment, administration, lesson preparation, and other factors that may affect the school in relation to instructional video. He or she must be aware of all changes that may need to be implemented and offer the necessary authority and support. **(b) Subject teachers**, who should be departmental heads

Programs Addressable by Teacher Training		
Complaint	**Problem**	**Training Solution**
1. Making plans for lessons is too time-consuming.	• lack of planning skills	• integration of instructional video into lessons
2. There's too much responsibility involved.	• fear of failure	• teaching strategies
3. I teach well enough without instructional video.	• fear of replacement; mistrust of technology	• effective control of class; use of teacher's guide
4. No programs are available in my subject.	• lack of information	• catalog search: interdisciplinary approach
5. I don't know how to operate the machines.	• lack of manipulation skills; mistrust of machinery	• manipulation and control of machinery
6. Programs are aired at wrong times.	• timing problem	• video recording and copyright laws
7. I never know when programs for my subject are aired.	• lack of information	• broadcast schedule use
8. The video library in my school is disorganized.	• storage and retrieval problems	• storage, retrieval, loan strategies
9. I don't know what teaching strategies to use.	• lack of teaching technique	• teaching approaches; use of teacher's guide

Figure 4: Training Needs Analysis

Instructional Video Workshop Agenda

DAY 1 — **Morning Session** — **Hardware and Tapes**

1. Manipulation
2. Video recording and playback
3. Copyright laws
4. Tape Storage
5. General maintenance of tapes and hardware

Afternoon Session — **The Viewing Environment**

1. Ideal types of environments
2. Seating arrangements/viewing angles
3. Administration and security

DAY 2 — **Morning Session** — **Lesson Preparation**

1. Catalogs and schedules
2. Syllabus and program correlation
3. Teacher's guides and previewing

Afternoon Session — **Lesson delivery**

Subject per group preparations

DAY 3 — Group presentations and peer critiques

Figure 5: Sample Workshop Agenda

Workshop Representation (continued)

(if available) or highly motivated teachers, each representing a subject offered at the school. Their responsibility will be to gain as much information as possible and be prepared to transfer it to their colleagues. **(c) School media coordinators**, the key local instructional video center personnel whose responsibility lies in receiving recorded videotapes; arranging their storage, retrieval, and use; and getting the information about new programs to teachers (see Chapter 4).

- **The local inspectorate**—It would be impossible for them to advise teachers on what areas of their teaching to improve if they themselves do not understand the uses of the media.

- **Teachers of inservice training centers**—They, like the utilization experts, are the best human resources teachers can use to improve their skills. They may also find the workshops very useful in helping them improve their own teaching approaches.

- The size of the group at each workshop should be determined by the facilities available and the number of available workshop leaders. It is very important that at the end of the workshop each participant will have had full hands-on participation.

After the Workshop

- All the participants should be fully prepared to participate in their own in-school workshops where they will transfer all the information gained to their colleagues. Ultimately, every single teacher in the school should be as well informed as those who represented them. The duration of the workshops can be determined by the school itself, with the support of the local inspectorate.

3. **School Visits**—School visits form an integral part of the training process, which must be viewed as a joint responsibility by the colleges of education, the national education administrators, the inspectorate, the inservice training centers, and the instructional media utilization experts (see Figure 6). Their joint responsibilities are as follows.

   - The maintaining of sustained training, consultation, and support services.
   - The provision of feedback and reenforcement of effort.
   - The maintenance of strong ties with the instructional video

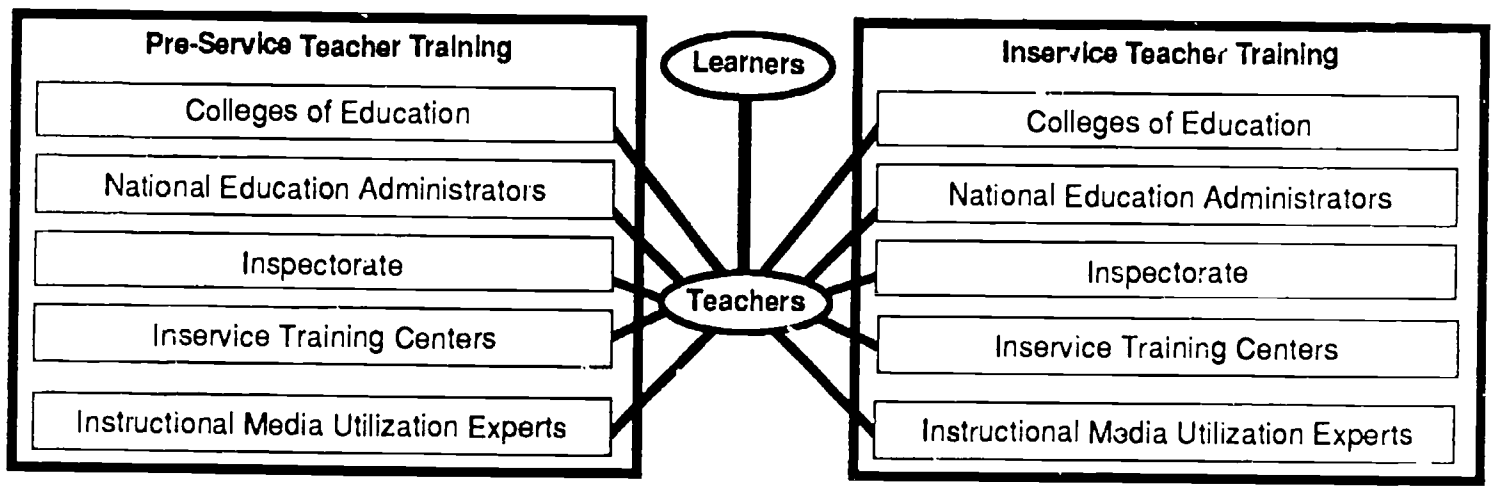

Figure 6: Teacher Support System

coordinators whose ultimate function is the provision of feedback for program production, acquisition, or adaptation.

4. **One-on-One Consultation**—An open line of communication between the school teachers, teachers at inservice training centers, lecturers at colleges of education, and utilization experts must be maintained at all times.
    - Individual teachers should be able to consult the utilization experts at any time when the need arises.
    - Utilization teams should, on the other hand, visit each local school at least once a year, observe lessons, and consult one-on-one with the teachers to provide feedback on their performance, advise where necessary, or provide demonstrations if needed. Teachers **do** need this.
5. **Seminars**—Seminars should be held periodically to encourage teachers to share useful utilization ideas which may be specific to a particular subject. This is inherent in the peer-group support system that is very likely to develop

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Chapter 3:
Correlating Instructional Video Programming to Syllabi and School Texts

One of the worst problems teachers have with using instructional video programs is the often prevalent lack of correlation between the programs, school syllabi, and textbooks. A program may be excellent in all aspects but it will remain unused for as long as it lacks immediate relevance to classroom instruction. This makes it absolutely essential that the creation or acquisition of programs be based on the needs of the local school systems. For example, the Agency for Instructional Technology (AIT) has created a model for their ***Math Works*** programs which helps teachers find programs which match specific topic areas to corresponding pages of leading mathematics texts used in United States schools. The resulting correlation chart from the ***Math Works*** teacher's guide is attached as Appendix A, pages 26–27. (Please refer back to Chapter 1 for strategies of ensuring that locally produced programs meet the needs of learners.) The general procedures of correlating programs are as follows.

- The content and subject matter experts, and a correlation consultant, with the help of text publishers, determine which texts are most commonly used for the teaching of the topic.
- The syllabus itself is checked to determine the scope within which the subject is covered.
- Key points in the program are identified and matched to those in the texts and syllabi.
- A set of objectives for the use of the program are identified and written down.

Teacher's Guides

There are, apart from correlation charts, other means of informing teachers of the relevance of the programs. The one which is most indispensable and must accompany every program distributed or broadcast to schools is the **teacher's guide** (see Appendix B, pages 28–29, for a sample guide). The functions of teachers guides are numerous.

1. **They are time savers.**
   - A statement on the **program's relationship to the syllabus** is a very good way of informing the teacher on that section of the syllabus which can benefit most from the program.
   - A quick look at the **synopsis/summary** helps the teacher decide whether the program is relevant to a specific lesson or not.
   - Checking on the **program objectives** helps the teacher decide whether those are the objectives she wishes to focus on or whether she can fit those offered into her existing ones.
2. **They provide ideas.**
   - The **suggested activities/general hints** section allows the teacher to explore other possibilities of enriching, developing, and reinforcing her class topic.
   - **Before-the-program** suggestions provide ideas on what to do to focus student's attention.
   - **After-the-program** suggestions help the teacher generate ideas for activities in which to engage students to reinforce their learning.
   - **Student worksheets and post-tests** are follow-up techniques which enable the teacher to find out if the lesson objectives have been achieved.
   - The **resources** section provides lists of books, videos, or films which

deal with topics similar to the programs.

The writing of teacher's guides and learner worksheets is normally the function of the original instructional developer. If, however, an acquired program's guide is not designed for local learners, the local instructional developer, content expert, and editor should be asked to develop one.

Adapting Acquired Programs

The problem with imported programming is that its creators focus on their own experiences, environmental factors, cultural norms and value systems, and the needs of their own school systems. The fundamental differences of perspective which thus occur confuse learners from other environments and cultures, and frustrate teachers who do venture to use the programs. There are several ways through which these biases can be overcome.

1. **Previewing**—Have the programs previewed prior to purchase! It is not uncommon to find schools burdened with programs they cannot use because they lack relevance to their syllabi, students cannot understand the presenters' speech patterns, visuals move too fast or are too complex, or they are culturally unacceptable.

   It is thus very important to organize a **preview panel** made up of content specialists, the best subject teachers available, utilization experts, and education specialists. The numbers of representatives may be determined by the geographical factors that may account for differences in the achievements of students, as in the case of rural and urban settings.

   Procedures

   - Scan the syllabus and school texts to get the basic concepts that are taught.
   - Obtain and read a copy of the program's teacher's guide and the script (if available). These two sources should enable you to decide whether the program is worth previewing.
   - Preview the program itself, and make notes on its strengths and weaknesses. This is important if there are to be program changes or improvements: teacher's guide editors and producers need to know exactly what is expected of them if they are required to implement the changes.

2. **Dubbing**—If the only problem the previewers found with an imported program pertains to language, you may arrange to have it dubbed to your local language or dialect.

   Procedures

   - Find out from the company supplying the programs what type of contract you should sign with them if you need to dub their program into your local language or dialect.
   - Engage the services of a content specialist, a language expert, an editor, and a producer experienced in dubbing procedures to begin this process.

3. **Editing**—The content, presentation style, and overall quality of a program may be excellent, but it may include sections that are not acceptable in your culture. If this is the appraisal of the reviewers, you may need to have it edited. This is a highly technical task which is best left to qualified editors who must follow the recommendations of the reviewers as closely as possible

Disseminating Information to Schools

There are several methods through which information on program availability can be disseminated to teachers.

1. **Broadcast Schedules**—Consult the schools in as many geographic areas as will be affected by the programming

to find out what teachers think the best broadcast time slots will be. Create a broadcast schedule or programming guide; both could be prepared to project weekly, monthly, or annual programming. The broadcast schedule should contain information on the grade level, subject, title, duration of the program, and the dates and times of the broadcasts. The programming guide could contain broadcast schedule inform. tion and program summaries.

2. **Media Center Catalogs**—A list showing the program and series subjects, titles, grade levels, lengths, and brief summaries must be made available to teachers (see Appendix C, page 30).

3. **Newsletters**—Periodically, newsletters may be sent out to teachers as sources of information on any video program or related issues. They may include, for example, programming highlights, utilization ideas, and instructional media news.

References

Gunther, Robert. *Correlating ITV Programming with Local Curricula: or Got a Match?* Bloomington, IN: Agency for Instructional Technology, 1986.

Jacobson, M.H. and B. Vanzo. *A Teacher's Guide to* Math Works. Bloomington, IN: Agency for Instructional Technology, 1985.

Related Reading

Middleton, John. *Cooperative School Television and Educational Change: The Consortium Development Process of the Agency for Instructional Television.* Bloomington, IN: Agency for Instructional Technology, 1979.

Part II

Instructional Video Implementation: The School Setting

Chapter 4: Teacher and Learner Access to Equipment and Programming

Many teachers have, quite understandably, thrown their hands up in frustration over the impossible ratio of pupils to monitors. Although, ideally, each classroom should be equipped with its own television set and videocassette recorder (VCR), in developing nations it is not uncommon to find over 50 students huddled around one 17" set. Whether these students actually benefit from this exercise is quite another question. In other instances, a school with more than 200 students may have just one monitor available.

The problem is often further compounded by the monitor being permanently fixed in one room, thus making it impossible for it to be wheeled from one part of the school building to another. In other cases, the monitor may be movable but its trip from one classroom to another may be very difficult because of the lack of paved sidewalks and bad weather, which can damage the machinery. (In such cases be aware that TV monitors on carts are top heavy and tip over very easily. They can be dangerous!)

Although these situations leave much to be desired, the school teacher, with the help of the school library personnel, and the cooperation of the principal and other teachers, can implement some innovative ideas. These include

- creating a viewing environment which is highly conducive to learning
- maintaining a facilities booking roster and a tape loan roster
- devising a tape and guide storage and retrieval strategy

The Viewing Environment

Educators generally agree that the classroom environment plays an important role in learner attention. An uncomfortable (too warm or cold), noisy (nonacoustical), and overcrowded classroom can be very distracting. It is therefore essential that the viewing room is well ventilated, has adequate lighting, good acoustics (carpeting and a ceiling are good investments), the room temperature is comfortable, and the furniture is arranged to provide maximum viewing and listening advantage to each learner (Virginia Department of Education 1967).

Seating Arrangement and Screen Size

There are three seating arrangement plans which can be followed. These are determined by

- the elevated screen position, which is the most ideal for average sized groups (up to 72 learners)
- the non-elevated position, which is ideal for very small groups
- the multi-screen, elevated position, which is ideal for large groups

Setting the Minimum and Maximum Viewing Distances for the Elevated Screen Position

The first step is to determine the size of the screen, which is measured diagonally. Next, decide on the minimum distance which is calculated in terms of the size of the screen (see Figure 7). For example, a screen which measures 17" (42.5 cm) requires learners to seat at a distance measuring 5'6" (1.5 m).

Screen Size	Min. Viewing Distance
17" (52.5 cm)	5'6" (1.5 m)
19" (47.5 cm)	5'8" (1.7 m)
21" (52.5 cm)	7'1" (2.12 m)
23" (57.5 cm)	7'2" (2.15 m)
24" (60 cm)	8' (2.4 m)

Figure 7: Setting the Minimum Viewing Distance (adapted from Virginia Department of Education 1967)

Check the elevation of the screen to ensure that none of the viewers should tilt their heads more than 30 degrees from their normal eye-level (see Figure 8).

1. Make an imaginary horizontal line between the seated student's eye (**A** in Figure 8) and the set.
2. Next, find the most central point of the screen. Draw another imaginary line, which should meet the horizontal line at a 30 degree angle.
3. Where the two points meet is where learner **A** should seat. Notice that the learners behind **A** maintain the same 30 degree angle.

Setting the Maximum Viewing Distance for the Elevated Screen Position

The maximum viewing distance is, as in the case of the minimum distance, set by the screen size. Note, however, that the furniture you opt to use in the viewing room will determine the number of seats (and learners) you can accommodate at any given time. Figure 9 provides estimated spacings between seats and the maximum number of seats you can accommodate in relation to the size of the screen.

Note that the view of the learner at the farthest seat is not obstructed (Figure 8).

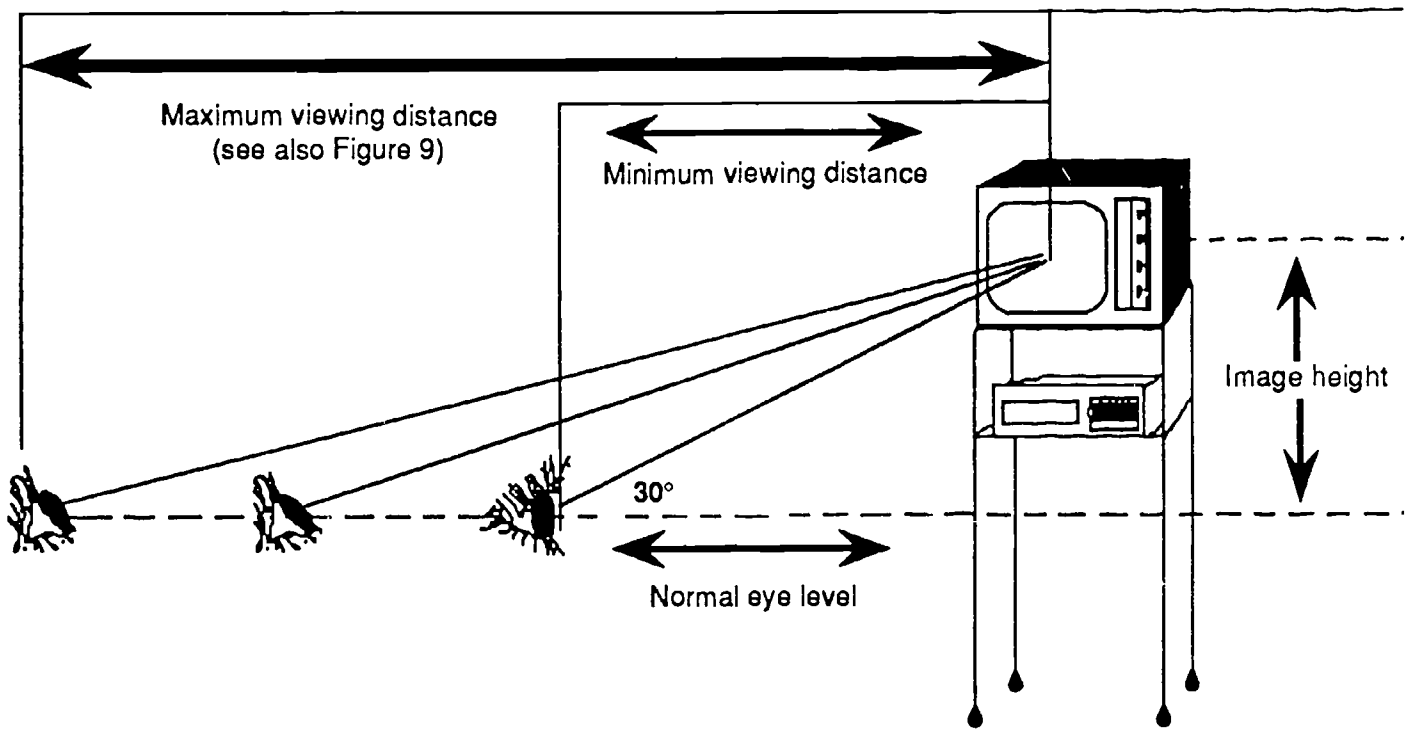

Figure 8: Minimum and maximum viewing distances (adapted from Gillion and Zimmer 1972)

Screen Size (diagonal)	Maximum Distance	Chairs spacing: 3' (.9 m)	Table/Chairs spacing: 4'4" (1.3 m)	Desks & Chairs spacing: 5'4" (1.55 m)
19" (47.5 cm)	15'2" (4.5 m)	38	26	26
21" (52.5 cm)	19' (5.7 m)	54	36	29
23" (57.5 cm)	19'4" (5.8 m)	56	38	29
24" (60 cm)	21'5" (6.4 m)	72	52	34

Figure 9: Seating, Screen Size, Furniture (adapted from Gillion and Zimmer 1972)

The Non-Elevated Screen Position

This position is least recommended for large groups because it limits viewing access to only those students in the front row of seats. Remember, it is absolutely important that every single student has an unobstructed view of the screen. If it is not possible for you to elevate your monitor, you may apply these suggestions.

- Have the chairs arranged in a semi-circular fashion, making certain that the chairs at each front end are at no more than a 45 degree angle from the center of the screen (seats **A** and **B** in Figure 10). The advantage of this arrangement is that it allows for a closer grouping of chairs.
- Make sure that the student sitting directly in front of the set (seat **C** in Figure 4) has a focal length to the screen of no less than 5'6" or 1.5 meters to ensure comfortable viewing.
- The student in the seat farthest from the set (seat **D** in Figure 10) should be no more than the distances recommended in Figure 9.

NOTE: These estimates are for normal vision only. If you have short-sighted students in your group, it is best for you to let them check for themselves which seat would be most comfortable. Remember, every learner must be able to see everything on the screen!

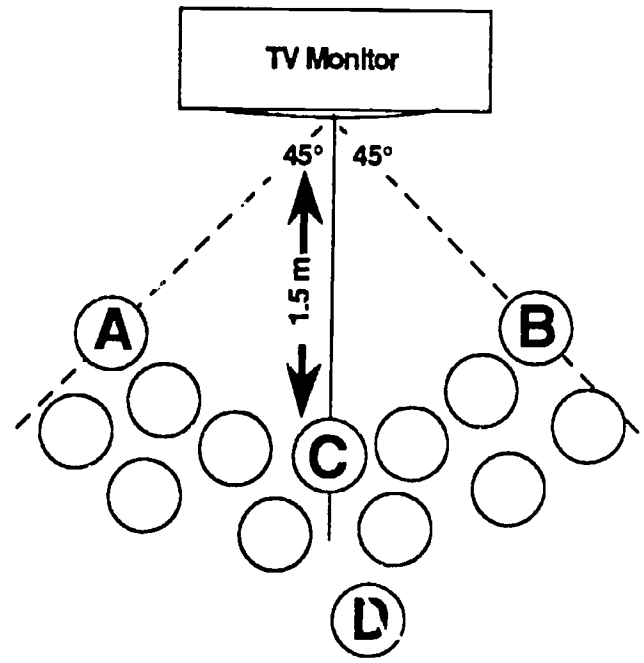

Figure 10: Non-Elevated Screen Position

The Elevated Multi-Screen Seating Arrangement for Large Group Viewing

If it is possible, an existing building may be converted for large-group viewing. Multiple sets are positioned overhead as in Figure 11.

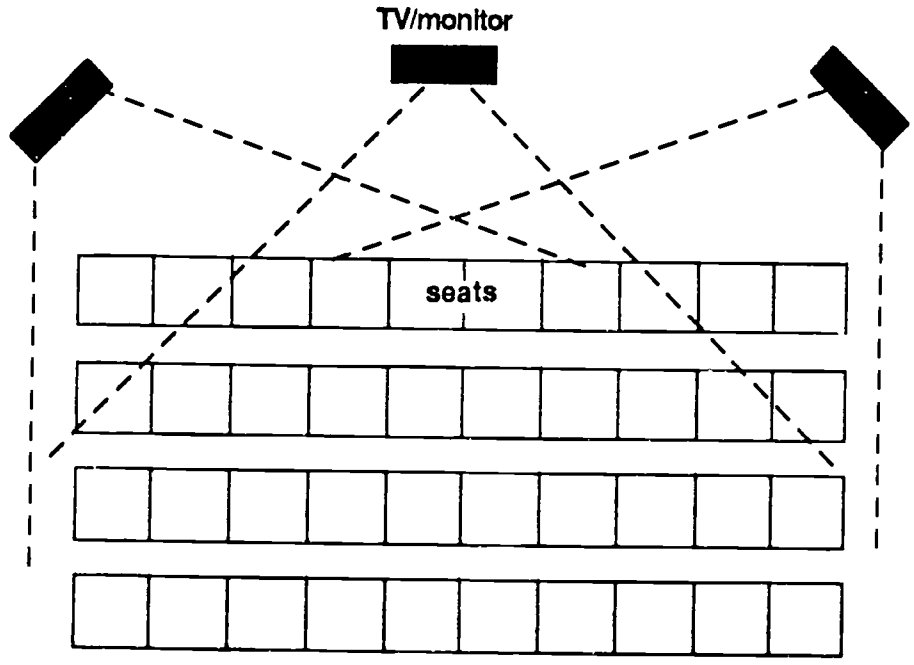

Figure 11: Large-Group Viewing

The Maintaining of Facilities Booking and Tape Loan Rosters

Facilities Booking Roster

The previously mentioned pupil to equipment ratio problem can be remedied by the maintaining of a **facilities booking roster** (see Figure 12). This roster may serve two functions: it will ensure that the equipment is available at the time needed, and it can be used to find out how often the equipment is used and by whom. The second function will become handy when teachers are evaluated on the use of the technology, and when a training needs assessment is carried out.

The following procedure for maintaining the **facilities booking roster** is suggested.

- The teacher should consult with the librarian on the availability of the facilities at the required time.
- The teacher should enter his or her name, student grade, date, and the time agreed on.
- The librarian then approves by signing his or her name.
- The "Comments" section may be used for the writing of any other pertinent information or in case of cancellation or rescheduling.

Tape Loan Roster

Keeping track of videotapes can be an awesome responsibility if no definite strategy is used. One way of keeping track of the tapes and making sure that they are in good condi-tion is to maintain a **tape loan roster** (see Figure 13).

The following **tape loan** system may be adopted.

- Maintain a separate loan roster for each subject and grade level.
- Where a single tape is shared by more than one grade level, the roster may reflect the **relevant grade numbers** (for example, Standard 5, 6, 7)
- If it is not possible to state specific grade levels, then the word "**general**" may be used.
- The teacher who requests the tape should write down his or her name in the appropriate column and the date of the loan.
- When the tape is returned, the responsible person (librarian or media coordinator) should sign the appropriate column in the roster and enter any comments made by teachers about the condition of the tape.

Teacher	Class	Date	Time		Signature— Librarian	Comments
			From	To		

Figure 12: Facilities Booking Roster

Subject	Program Title	Tape No.	Teacher	Date		Signatures In--		Comments
				In	Out	Teacher	Librarian	

Figure 13: Tape Loan Roster

Tape and Guide Storage and Retrieval

It is very easy to lose track of tapes and guides if no defined storage and retrieval systems are devised and established. The following is one method of developing such a system.

1. **The numbering system**—a qualified librarian will be able to design a numbering system which is in accordance with the Dewey Decimal system. If no librarian is available, it is advisable to design a fairly simple one, in which matching numbers are used to identify tapes and guides. This may be done per subject and grade level as follows.

Tapes

- Alphabetize the subject areas covered by the tapes and group them accordingly (see Figure 14).

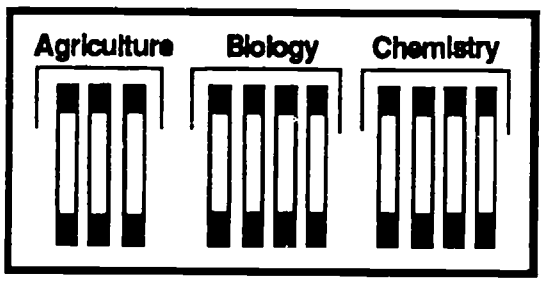

Figure 14: Alphabetized Subject Areas

- Form subgroups of each subject by indicating grade levels (see Figure 15).

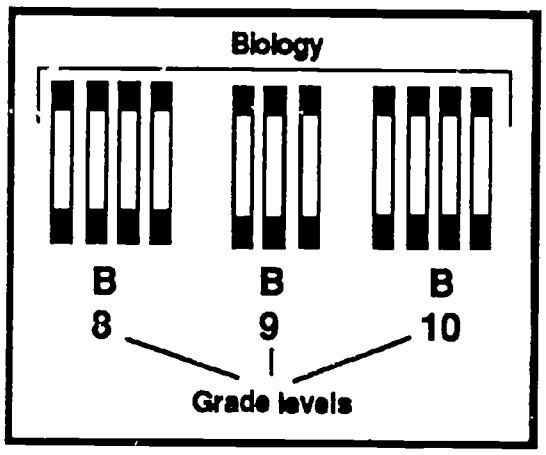

Figure 15: Subject Area Subgroups

- Form grade-level subgroups by numbering according to media center or broadcast schedule. For example, the first videotaped grade 9 biology program on the first schedule may be reflected on the spine of the tape cover just below the grade level as ".1" (see Figure 16).

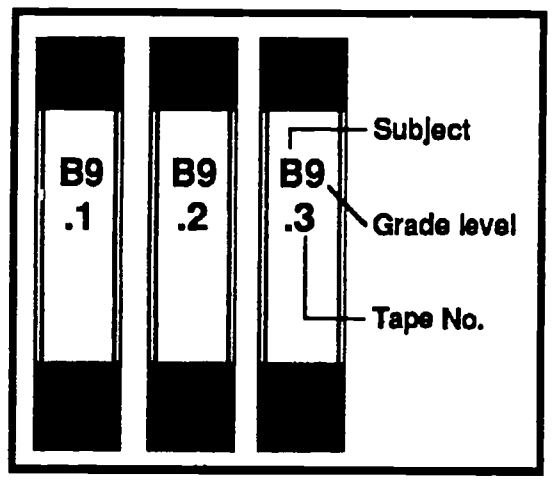

Figure 16: Grade-Level Subgroups

- On the top cover of the tape, paste a sticker which contains the program title(s), and the duration of each program (see Figure 17).

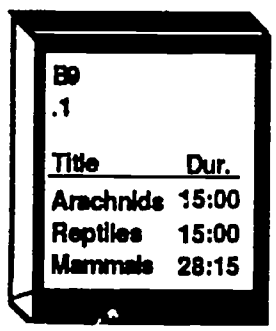

Figure 17: Tape Cover Sticker

Guides

- Number and file the guides in a manner similar to that of the tapes.
- If the guides come in loose-leaf form, arrange them in a folder in a sequence similar to the matching tapes.

- Paste a sticker with the same information that appears on the spine of the tape on the spine or lower left hand corner of the file.
- For guides in booklet form, paste the information on the lower left hand corner of the guide's front page (see Figure 18).

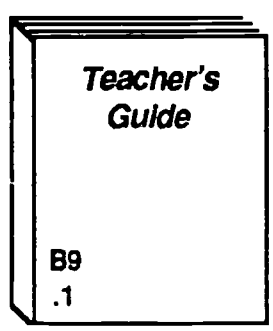

Figure 18: Teacher's Guide in Booklet Form

2. **Cataloging**—Develop a card catalog system which matches the information on both the tape cover and guide booklet or folder (see Figure 19).

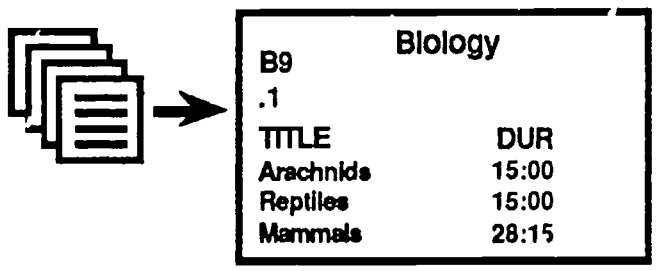

Figure 19: Card Catalog Sample Card

3. **Storage**—Arrange the tapes either by grade level and subject, or by subject and grade level. If the grade level of a program is wide, it may be placed under the **general** section of the subject area (see Figure 20). Follow a similar pattern for storage of the guides.

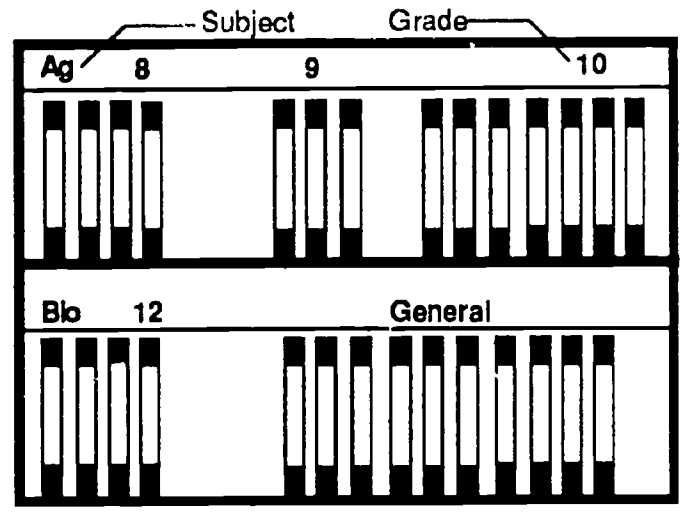

Figure 20: Sample Tape Arrangement

4. **Retrieval**—Consult the card catalog and make your selection. Use the letter and number at the top left hand corner of the card to trace the guide and program. For example, the information on the card in Figure 19 will lead you to the Biology (**B**) grade **9** shelf. The tape or guide you are looking for will be the first on the shelf (**.1**).

References

Gillion, B. and A. Zimmer. *ITV: Promise into Practice.* Columbus, OH: Columbus Public Schools, 1972.

Heininch, Robert et al. *Instructional Media and new Technologies of Instruction.* New York: Macmillan, 1986.

Knezevich, S. *Instructional Technology and the School Administrator.* Arlington, VA: American Association of School Administrators, 1970.

Virginia Department of Education. *Instructional Television: A Utilization Guide for Teachers and Administrators.* Richmond, VA: Department of Education, 1967.

Chapter 5:
Teacher Responsibilities

It must be recognized that television and video are teaching tools that are by no means meant to replace you, the teacher. What they do, however, is offer an alternative approach to teaching; one which may not only enhance your ability to explain difficult concepts, but also provide an interesting approach to the child's learning experience.

Your decision to use either of these media for any lesson should be based on whether they supplement or offer a better alternative to any other technique. If they do, remember, **YOU** are in control.

Planning Lessons

Selecting Programs—Your local instructional video center should provide you with a broadcast schedule which will enable you to make your program selection before it is aired. The same or modified broadcast schedule may be used by your school librarian or media coordinator to arrange for the taping of the programs. Even better still, if the center also supplies duplicated copies of the programs, they may provide you with a schedule which also reflects tape numbers to make for easy storage and retrieval. If this is not available, request your school librarian/media coordinator to prepare one.

Procedure

- **Check the schedule** for programs available in your subject. Some may reflect titles that make the content seem irrelevant—do not let that deter you from checking them out.
- **Consult the teacher's guide**, which should be available in your school library/media center. It will help you decide even before previewing the program whether it will be useful for your purposes or not. (See Appendix B for a sample guide.)
- **Preview the program**. Although this can be done only if the program is on video, its necessity can never be over-emphasized! Previewing will help you decide where in your lesson to fit the program—you may want to use it only to introduce or conclude your lesson; only a small section may be relevant, in which case you may want to show your pupils only that section of the program; you might need to select areas that will need to be clarified to your pupils; the presenter's accent/intonation may not be suitable for your pupils, in which case you may need to turn the volume off and do the narration yourself; there may be areas that are not acceptable for your pupils, in which case you will need to be ready to skip over those during the lesson. As you can see, the list of possibilities is endless.

Prepare the lesson—The time taken to do this certainly does pay off in the end. In your preparation, you might want to focus on, for example, the following issues.

- **Seating arrangement.** Are there any sequences, still pictures, graphics, etc., that require close attention or are too small or detailed for the student in the farthest seat to see? What special viewing arrangements will you need to make?
- **Lesson sequence.** Will you need to prepare your pupils for the lesson the day before the program is shown?
- **Presentation.** Will you need to turn the volume off and do the narration yourself? At which points will you need to put the video on "pause" to give explanations?
- **Program length.** Is one class session enough or do you need to arrange for more viewing time?
- **Pre-viewing activities.** What do you or your pupils need to do before viewing the program?
- **Post-viewing activities.** Are the post-viewing activities in the teacher's guide

adequate or will you need to create your own? What else needs to be done to reinforce the learning which will be acquired (experiments, projects, questionnaires, post-tests, etc.)?

Prepare to present the lesson—After you have made all the necessary preliminary instructional arrangements, you can decide when to present your lesson. However, the following are some of the things you will need to attend to before doing so.

- Prepare the viewing environment: make sure the room is properly ventilated; cut off any light that causes reflections on the screen; arrange the chairs properly (you may request your pupils to do this beforehand); and adjust room temperature for comfort.
- Prepare the tape—set the tape at the exact point where you want it to begin; tune the TV monitor; check picture and sound quality.

Presenting the Lesson

It may be necessary to incorporate some changes in your teaching technique to accommodate the new technology. Of the several techniques which have been designed and researched by instructional technologists, Gagne and Briggs' nine instructional events model seems to lend itself well to teaching with instructional video technologies (Reigeluth 1983, pp. 90–93). You may therefore present your lesson as shown below in Figure 21.

Instructional Event	Teaching Technique
1. Gain the attention of the learner.	This may include simply stating the topic of the day.
2. Inform the learner of lesson objectives.	State in simple terms what the learner should be able to do at the end of the lesson. For example, you may state: "At the end of the lesson, you should be able to calculate the area of any surface."
3. Stimulate recall of prior learning.	Ask questions about the previous lesson and relate them to the current lesson.
4. Present the stimulus material.	This may include introducing, for example, the concept **area**, giving a synopsis of the video program, and then switching over to the video presentation.
5 Provide learning guidance.	You may pause or stop the tape to offer clarifications, answer learners' questions, or review segments of the program. All these activities should be aimed at enhancing materials presented.
6. Elicit performance.	Find out if your lesson has met its objectives by asking questions related to the objectives.
7. Provide feedback about performance.	Inform the learners of the accuracy of their responses. Inform them, in specific terms, of what they are doing wrong.
8. Assess performance.	Provide test items which will show the mastery level of the concept taught.
9. Enhance retention and transfer.	Provide other practice instances where the newly learned concept may be applied.

Figure 21: Nine Instructional Events Model (Reigeluth 1983)

While the video program is being shown, you should do the following.

- Encourage students to pay close attention by doing the same; for example, call for a response if one is asked for.
- Observe the reactions of the students; their facial expressions will reveal to you if anything was puzzling and requires closer discussion after the viewing.
- Deal with behavior problems or distractions immediately.
- Consider asking students to take notes when content is appropriate for such an activity; this is another way of ensuring their attentiveness.

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Armsy, J. and N. Dahl. *An Inquiry into the Uses of Instructional Technology.* New York: The Ford Foundation, 1973.

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Jacobson, M.H., and B. Vanzo. *A Teacher's Guide to* Math Works. Bloomington, IN: Agency for Instructional Technology, 1985.

Reigeluth, Charles M. (Ed.). *Instructional Design Theories and Models: An Overview of their Current Status.* Hillsdale, NJ: Lawrence Erlbaum, 1983.

Correlation of the Math Works Video Programs with Six Fifth-Grade Mathematics Textbooks

(United States Version)

TO THE TEACHER:

Following is a correlation of the content of the MATH WORKS video programs with the six most widely used fifth-grade mathematics textbooks.

The page numbers given are found in the *student editions of the fifth-grade textbooks*. The editions chosen are the most recent copyrights in widespread use in the United States. They are:

ADDISON-WESLEY MATHEMATICS K-8 (1985 edition)
Addison-Wesley Publishing Company

HARCOURT BRACE JOVANOVICH MATHEMATICS TODAY (1985 edition)
Harcourt Brace Jovanovich, Publishers

HEATH MATHEMATICS (1985 edition)
D. C. Heath and Company

HOLT MATHEMATICS (1985 edition)
Holt, Rinehart and Winston

HOUGHTON MIFFLIN MATHEMATICS K-8 (1985 edition)
Houghton Mifflin Company

SCOTT, FORESMAN MATHEMATICS K-8 (1983 edition)
Scott, Foresman and Company

Agency for Instructional Technology
Box A, Bloomington, Indiana 47402

RECOMMENDED FIFTH-GRADE TEXT CORRELATION

(Correlated to student editions)

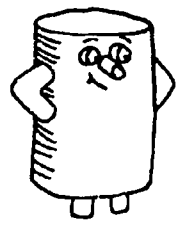
Math Works Programs	Addison-Wesley (1985)	Harcourt Brace Jovanovich (1985)	Heath (1985)	Holt (1985)	Houghton Mifflin (1985)	Scott, Foresman (1983)
PROGRAM 1. Measurement: *Finding Areas of Rectangles.* Shows how the concept of square units is related to the formula for finding the area of a rectangular surface.	pp. 198-199	pp. 250-251	pp. 262-263, 274-275	pp. 322-323	pp. 168-171, 236-237	pp. 340-343, 346-347
PROGRAM 2. Problem Solving: *Identifying the Problem.* Shows that it is useful to identify the essential elements of a problem before trying to solve it; illustrates three techniques to help identify the essential elements of a problem	pp. 14, 171	pp. 210-211, 298-299	pp. 52-53, 104-105, 113, 338-339	pp. 64-65, 114-115, 148-149, 172-173, 302-303	pp. 84-85, 108-109, 198-199, 224-225, 256-257	pp. 300-301, 314-315, 336-337
PROGRAM 3. Mental Computation: *Using Mental Computation for Addition.* Presents situations in which mental computation can be useful; shows two techniques for adding mentally.	pp. 50-51	pp. 34-35	pp. 25, 29, 36	pp. 30-31, 38-39	pp. 10, 18-19	pp. 10-15
PROGRAM 4. Decimals: *Place Value in Decimals.* Shows how to read aloud numbers that have decimal points; describes the place value of numbers to the right and to the left of a decimal point.	pp. 54-59	pp. 288-289	pp. 228-233	pp. 290-295	pp. 264-269	pp. 70-79
PROGRAM 5. Geometry: *Exploring Geometric Shapes.* Emphasizes the usefulness of analyzing and describing three-dimensional objects in terms of their two- and three-dimensional geometric components.	pp. 272-273, 280-282, 288-289	pp. 330-331, 350-351	pp. 134-137, 146-149, 152-153	pp. 326-327	pp. 326-329	pp. 274-275, 350-353, 364-367, 374-377

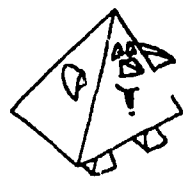
STUDENT WORKSHEET

Exploring Geometric Shapes

(Content Cluster: Geometry)

For each group of Flat Earthers, write the name of the Round Earther whose shape they could make if they got together.





Cut

Cut

My name is

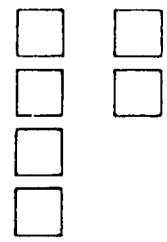
_____

Fold

Cut

Shapes you could make:
- Cone
- Cube
- Cylinder
- Prisms:
  - Rectangular
  - Triangular
- Pyramids:
  - Rectangular
  - Triangular
- Sphere

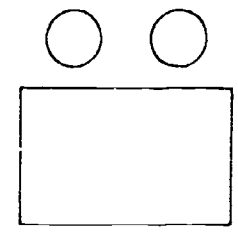
1



Fold

(Name of the shape)

2



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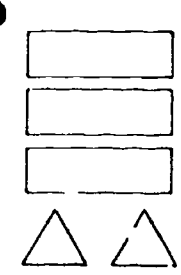

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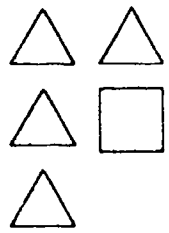

Fold

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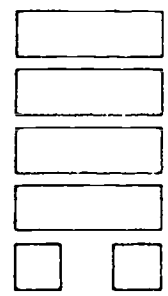

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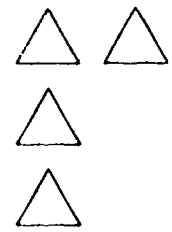
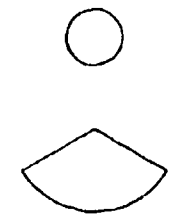


Fold

7



Cut

Cut

Fold

Cut

(Name of the shape)

Cut

8 a. Cut along the outside of the shape on this worksheet.

b. Fold along the fold lines.

c. Write the name of the shape in the box.

PROGRAM
Exploring Geometric Shapes
(Content Cluster: Geometry)

Purpose

This program emphasizes the usefulness of analyzing and describing three-dimensional objects in terms of their two- and three-dimensional geometric components.

Before the Program

Suggest to students that during this program they watch for the many two- and three-dimensional shapes that are part of the characters' environment.

Program Summary

Story. Nancy and her friend Roy are babysitting for Nancy's brother Jason and sister Karen. Roy is trying to take photographs while Nancy, with one eye on the little ones, is disassembling a blender and making a diagram of its parts. Nancy likes to take objects apart, while little Jason likes to put shapes together and build objects. As the host points out, geometric shapes are all around us, and we use them whenever we build something or take something apart.

Nancy shows Roy a dismantled radio and the outline of each of its parts traced on paper. She comments that the tracings are actually a two-dimensional representation of the three-dimensional radio. Roy in turn shows Nancy his photographs of the many geometric shapes he has found in the environment. The host explains that three-dimensional objects can be described in terms of their two- and three-dimensional components. Conversely, two-dimensional shapes can be put together to make three-dimensional objects.

Animation: The Flat Earthers feel inferior to the Round Earthers. They want to be solid citizens like their neighbors, and not live in a world where all the shapes are flat as a pancake. Gradually it dawns on the Flat Earthers that if they work together they can be just as substantial and interesting as the Round Earthers.

Real-Life Application. A landscape architect shows how she translated an idea into two-dimensional drawings that helped her develop a three-dimensional playground.

Story. Nancy and Roy decide to build a soapbox racer to give Jason a safe outlet for his boundless energy. After preparing a two-dimensional drawing of their "Shapemobile," the two youngsters are able to get the parts they need from a nearby repair shop.

After the Program

1. DISCUSSION QUESTIONS.

a. Was the blender that Nancy was taking apart two-dimensional or three-dimensional? Were the drawings that she was making of its parts two-dimensional or three-dimensional? How did the drawings help Nancy understand how a blender is made?

b. What are some three-dimensional objects in your classroom? Can you name the two- and three-dimensional shapes that make them up?

c. What did the Flat Earthers discover about themselves that made them realize they were equal to the Round Earthers?

d. How did the landscape architect's drawings help translate her ideas into a real playground?

e. Why did Nancy and Roy draw the shapes needed for the soapbox racer on paper before they tried to build it? Can you name some of the two- and three-dimensional shapes you saw in the finished "Shapemobile"?

2. WHAT TWO-DIMENSIONAL SHAPES ARE FOUND IN THREE-DIMENSIONAL SHAPES? (*Materials:* A variety of containers from a grocery store. For example, butter boxes, oatmeal boxes, milk cartons, raisin boxes, or salt boxes. Two or three boxes are needed per group of four students. You may wish to ask students to bring containers from home. Students will also need paper and pencils.)

a. Give each group of students a container. They are to look at the container and write down the two-dimensional shapes that they see and the number of times each shape appears. (For example, 4 rectangles and 2 squares are found in a butter box.) After all students have written down their guesses, each group should carefully take the box apart, compare their answers with the actual shapes, and make a chart similar to the one that follows.

Name of Container *Butter Box*		*Rectangular Prism*	
Guess		Actual	
Shapes	Number	Shapes	Number
Squares	*2*	*Squares*	*2*
Rectangle	*3*	*Rectangle*	*4*

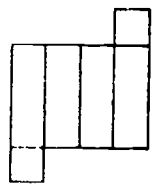
Repeat with other containers. Students may wish to make a display of the disassembled boxes and the related charts.

b. Ask students to find containers of unusual shape and bring them to class. If the container can be taken apart, have students follow the procedure above. If it cannot be taken apart, have them study it and guess as best they can what shapes it contains.

3. MAKING THREE-DIMENSIONAL COVERS FROM TWO-DIMENSIONAL SHAPES. (*Materials:* One building block per student, construction paper, pencils, and scissors. If possible, provide blocks in a variety of shapes, not simply cubes. Building blocks can often be borrowed from a kindergarten room.)

Give each student a block. Students are to make covers for their blocks by tracing around the different sides of their blocks. Students should try to design covers that are all one piece of paper, making fold lines and tabs as follows:

Cover for a Rectangular Prism



Encourage students to try to make as many different covers as they can. When all are finished, compare covers and discuss construction methods.

4. BUILDING A "SHAPEMOBILE." Students might enjoy building a scale model of a "Shapemobile" similar to the one in the program. They could use construction paper or tagboard for their models. Teams of students could compete in a contest with categories such as Shapemobile with the most different shapes, Shapemobile with the fewest shapes, Shapemobile with the most unusual shapes.

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1. **Hey Wait! Think, See, So?**—(A Problem-Solving Guide) In the video, a family setting up camp, Alexander Graham Bell, and a touch football team all apply the *Hey Wait! Think, See, So?* problem-solving guide to their difficulties. The computer activity offers an optional review of the guide and then challenges students to apply it to problems they encounter as they try to return a borrowed guitar by a specific time. (8:16)
2. **Plan Ahead**—(Time Management and Problem Solving) In the video, students meet Charlie, whose failure to plan ahead interferes with his chances to play basketball, leaves him overwhelmed by schoolwork, and causes friction between him and his father. Charlie learns a three-step process for planning ahead—*list*, *schedule*, and *review*. The computer activity encourages students to use the school computer to apply this process to their own activities. (5:57)
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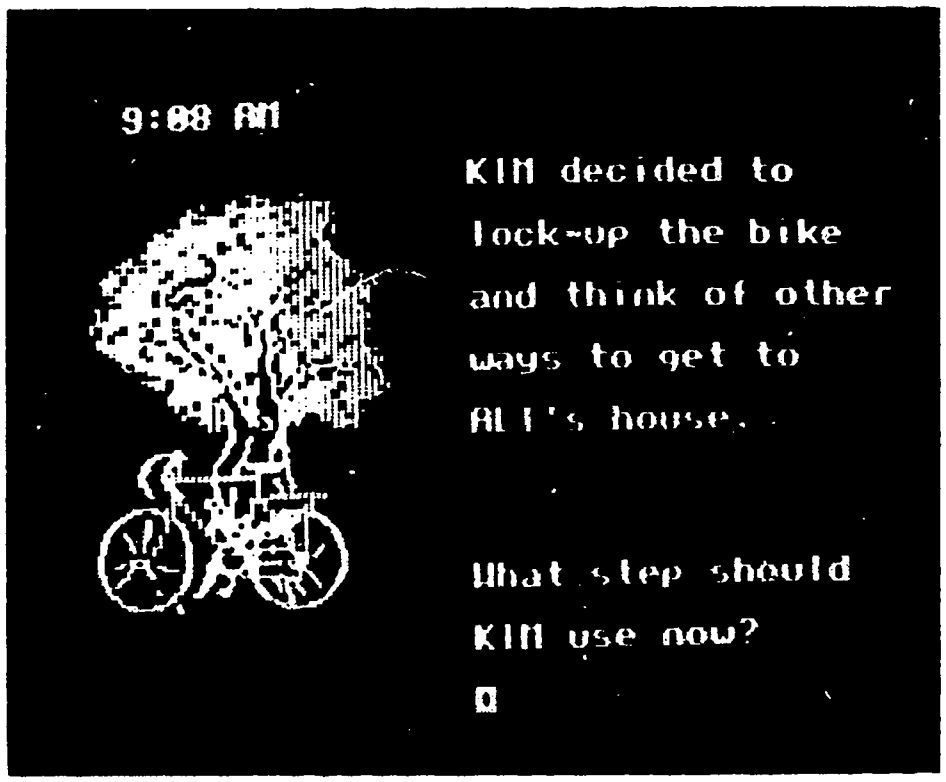
See pages 4-5 for more information on AIT computer software.



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