Educational Media in Retrospect

Drew Tiene
Shigenari Futagami
February 1987
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Drew Tiene
Shigenari Futagami

Education Policy Division
Education and Training Department

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ABSTRACT

This report examines how large-scale educational broadcasting projects can most effectively be introduced and implemented in developing countries, describes past problems and recommends project design to avoid them in future projects. The principal topics investigated include: (1) relating to target audiences, taking into account issues such as language, culture, and local concerns; (2) efficiently administering complex and varied broadcasting activities; (3) installing and maintaining economical and reliable equipment; (4) enlisting the active support of educators; (5) developing comprehensive and meaningful programs; (6) utilizing media production techniques to increase audience involvement; and (7) obtaining reliable feedback on broadcast success. The report concludes with a discussion of recent developments in communications technology and describes its potential for educating large numbers of students.
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REFERENCES
The quality of a nation's education system can significantly influence the course of its development. Developing countries today are especially concerned that they provide an adequate education for the populace, whether it is in the school, on the job, or at home. Recent developments in communications technology have provided some exciting new opportunities for educators who understand how they can most effectively be utilized to improve educational standards.

This publication will examine what factors have led to the success or failure of major educational media projects during the past few decades. It is not an effort to comprehensively summarize past experiences, but rather an attempt to define critical issues. In the course of this discussion, it will refer to certain projects as cases in point. The examples used are ones that the authors are highly familiar with. They are cases which are well documented. They are also instances that the authors deem most highly representative of the larger issues involved.

Many of the projects alluded to in the course of this report involved the World Bank. Others were developed by the US Agency for International Development (AID). Several of the projects cited have been among the most highly publicized in the field of educational media. The authors have selected those examples that best illustrate their key points. Although the types of projects described vary widely in their objectives and approaches, they are all relatively large-scale educational broadcasting projects, generally involving thousands of participants at multiple sites. The sources of information used in this report are listed in a bibliography found at the end of the publication. Where citations for specific projects are not included within the text, the material reflects the actual experience of one of the authors. This report has also benefitted from the editorial advice of both John Middleton, educational mass media specialist at the World Bank, and John Clayton, principal specialist in educational technology at the Organization of American States.

The issues considered most critical to the success or failure of educational technology projects include the socio-political context, project management, equipment purchase, the nature of the educational establishment, curricular approaches, production techniques, and evaluation schemes. For each area of concern, the authors describe the most critical problems that have been encountered. Then, they explore several successful strategies for effectively dealing with each aspect of project implementation.

Certain media projects have dramatically raised achievement levels in cost-effective ways. Yet, others have accomplished very little, at considerable cost. While new communications technologies certainly have the potential to significantly enhance a nations educational effort, when approached naïvely and implemented ineffectively they can become a discouraging financial liability.
Developing countries need to maximize educational opportunity and new media can provide dynamic ways of doing so. This publication was designed to help officials intelligently plan large-scale media projects that are appropriate, given the particular set of circumstances found within their country. It will alert them to possible pitfalls and will suggest some approaches to project development which have proven especially successful in the past. Hopefully, this material will contribute to overall efforts to provide much needed education for the struggling populations of the Third World.

February, 1987

AUTHORS

Drew Tiene
College of Education
Kent State University
Kent, Ohio 44242, USA

Shigenari Futagami
Senior Mass Media Specialist
World Bank
1818 H Street, N.W.
Washington, D.C. 20433, USA
INTRODUCTION

In the early 1970s, a major educational television project was launched with considerable optimism in the Ivory Coast, a small nation on the west coast of Africa. Television was considered a critical component of this large-scale attempt to upgrade the country's education system. In an effort to accelerate the modernization of the Ivory Coast, the French Fonds D'Aide et de Cooperation (FAC), along with a number of international assistance organizations, designed a dynamic plan to place battery-operated television sets in remote schools, in regions beyond the reach of the nation's electrical system. These receivers could bring more dynamic forms of education than heretofore available to the children and adults of these areas. The Ivory Coast thus became the site of a major experiment in using sophisticated communications technology to bootstrap a less developed country into the twentieth century (World Bank Report: Ivory Coast, 1969).

However, by the 1980s, the Ivory Coast educational television project was barely still in operation. This farsighted idea had fallen victim to a series of difficulties that gradually eroded any chances of its success. Despite the efforts of many well meaning, talented people and the expenditure of millions of dollars, this experiment in fully utilizing video technology for instructional purposes ended in disappointment. Perhaps it was a project ahead of its time. Perhaps it was, at times, a project that faced some especially difficult circumstances peculiar to the Ivory Coast. But our concern is that it was essentially a project which failed to surmount a set of obstacles characteristically faced by large-scale educational media projects throughout the world (World Bank Report: Ivory Coast, 1980).

In the late 1970s, as the Ivory Coast project was beginning to unravel, another ambitious instructional media project was under consideration in the Philippine Islands. In this case, the medium involved was radio, a far less expensive option than television. However, because of the severe textbook shortage throughout the nation's schools, authorities wondered if it might be better instead to purchase more texts. Consequently, a pilot project was established in two rural provinces that involved exposing different groups of students to either radio instruction, greater accessibility to texts, or various combinations thereof (World Bank Report: Philippines, 1977).

The results of this one year study indicated that teaching by radio was more effective than simply having students use textbooks as their main source of information. The highest achievement test scores were attained by Philippine students who listened to instructional radio and whose teachers had also participated in teacher training sessions via radio. The lowest scores were recorded by pupils in the only two experimental groups that did not include some form of radio instruction, even though these groups had excellent textbook-student ratios with a text for each child in one group and a text for every two pupils in the other (World Bank Report: Philippines, 1983).
Despite this experimental evidence of the effectiveness of radio instruction, the school radio project was rejected in favor of a textbook distribution plan. Why would a nation's educational leaders ignore the findings of a costly pilot study and proceed with measures that appeared to contradict its results? Some of the reasons for their choosing this course of action lay in the way that the experiment was conducted. Perhaps, if the study had been designed somewhat differently, the efficacy of instructional radio as an option might have been more clearly established. Perhaps, if the advocates of radio instruction had more effectively coordinated their activities and could have more actively participated in the decision-making process, the outcome might have been different. As events transpired, however, a promising opportunity to establish a large-scale instructional radio project had been lost (Middleton, 1985).

By the early 1980s, Thailand had been utilizing educational radio for three decades. Yet the broadcasts remained essentially restricted to the area around Bangkok, and their influence upon schools was limited. The Thai government decided to expand its instructional radio system to cover the entire country. The decision to take this major step was influenced by some interesting research findings that seemed to indicate radio was perhaps an even more versatile, dynamic medium for instruction than was previously thought.

One piece of evidence to this effect was obtained from a study that examined the results of an adult education project. This project used radio broadcasts, written materials, and local discussion groups to encourage what Thais call "khiti-phen," or critical thinking, in dealing with everyday problems. Tests administered at the conclusion of the radio series showed that a high percentage of students who heard the broadcasts successfully passed the final exams, whether they had participated in the discussion groups or not (World Bank Report: Thailand, 1979). This high success rate for groups which relied primarily upon radio (along with course handbooks) for their instruction was viewed very favorably by Thai authorities.

Another educational radio experiment was even more encouraging. It involved mathematics instruction, but the materials were not developed in Thailand. They had been designed several years earlier in Central America by the United States Agency for International Development (AID) during its Radio Mathematics Project in Nicaragua. After translation from Spanish to English to Thai (Spanish-Thai translators are hard to find), the programming was broadcast to schools around Bangkok and into the remote northeast region of the country. Achievement test scores one year later were significantly higher for pupils in the radio classrooms than for those who received traditional instruction. Furthermore, the rural students gained more significantly than those in the Bangkok area, narrowing the achievement gap that traditionally exists between urban and rural schools (Galda, 1984).

This experiment in Thailand indicated that cross-cultural transfer of successful radio instruction from one country to another is possible. As with the foreign adaptations of "Sesame Street," it appears
that successful media prototypes can be redesigned for broadcast in other locales. A common weakness of instructional media efforts in the past has been the low quality of programming, which fails to take advantage of dynamic production techniques to deliver content. So this possibility has considerable potential for strengthening future educational media endeavors.

These projects in the Ivory Coast, the Philippines, and Thailand represent three major instructional media efforts which met with varying degrees of success. Interesting questions for educational technologists and policy makers are raised in each of these three cases. Why did a project as well funded as the Ivory Coast school television plan end in disappointment? Why was a radio project in the Philippines rejected, despite evidence that it might be successful? Finally, why has Thailand decided to proceed with a major educational radio project, and what key factors will determine its possible success or failure?

This publication will address these questions by exploring recent experiences with instructional media projects, in an effort to summarize the critical issues involved in establishing effective national education programs using modern telecommunications. These issues are of considerable importance. Innumerable manhours and many millions of dollars are invested in such programs. Millions of children and adults rely upon these projects for their education, in some cases their only opportunity for personal growth and self-advancement. The future well-being of entire populations can be affected by the efficacy of their country's national educational programs.

The electronic media offer valuable opportunities to expand educational opportunities, to improve the quality of instruction, and to increase the cost-effectiveness of present educational systems. However, they also can become educational "white elephants" that consume a nation's financial resources without effectively delivering the much needed instruction that was originally hoped for. Media projects, with their heavy initial start-up costs, represent an especially unnerving, educational gamble for developing nations. While their potential to reach large numbers of students may be tremendous, if that potential is not realized, the financial losses can be staggering, especially for an already impoverished country. Furthermore, the implementation of large educational media projects is generally very complicated, and the possibility exists for major difficulties to arise in a myriad of different ways. Consequently, it is incumbent upon those who may become involved in such projects to fully understand their complex nature (Hawkridge and Robinson, 1982; Wells, 1976).

This publication will describe the specific challenges faced by those who oversee large-scale educational media projects, and will offer a set of specific recommendations for effective implementation, based upon several decades of experience in this area. The opportunity to teach millions via the new communications technologies is here. The question is whether we can intelligently take advantage of these powerful media to improve the present situation in scores of struggling nations throughout the world.
I. THE SOCIO-POLITICAL CONTEXT

1.01 Perhaps the most fundamental set of difficulties to be dealt with in developing an educational media system for a particular country are the complexities surrounding efforts to teach the multicultural populations of Third World countries. Too often, educational technology has been introduced into a complex set of circumstances as a kind of powerful panacea that can transcend even longstanding, deep-rooted dissension between different groups. However, an instructional media plan that does not carefully consider the nature of its audience will usually fail, regardless of how technologically sophisticated the hardware may be. In fact, the more dynamic the communication medium, the more controversial its application becomes, as various groups vie for control over educational programming that could potentially influence an entire generation of young people.

Problems

1.02 In many of the less developed countries, especially those in Africa, the political situation is complicated by the fact that historically the nation was formed rather arbitrarily from its colonial boundaries, which generally included a variety of different groups with different cultures and languages. Politics in these countries is often based upon ethnic or tribal allegiances, a situation that leads to considerable in-fighting between various factions. In many cases, stable compromises have yet to be accepted by all concerned parties.

1.03 Under these circumstances, educational technologists are faced with a set of difficult challenges. One is to deliver programming in a language that is understood by the students. A second important consideration is that the programming include material that somehow acknowledges the cultural background of this particular group of students. There is also the need to be aware of particularly significant local issues. Finally, these local needs must be balanced against the concerns of the national government, which may well ignore or even oppose them. Consequently, those planning major educational media efforts must first make themselves acutely aware of the unique circumstances within a given country, before proceeding to recommend a particular course of action.

The Language of Educational Broadcasting

1.04 Often the language selected for educational broadcasting purposes becomes a highly significant political issue. This decision can affect the schooling of thousands of children. Situations have arisen in which lessons have been transmitted to students in a language that they themselves did not use on a regular basis, and which they found quite difficult to comprehend. In some cases, the problem is that for certain subcultures within a particular society, their limited numbers simply do not justify the effort required to create programming specifically for
them. In other cases, the government may simply insist that the broadcasts be delivered in one of the nation's prescribed national languages. Many governments in the developing world are struggling to strengthen a sense of "national" consciousness throughout their borders, yet certain groups tend to be relatively oblivious to matters outside of their own immediate locale. Establishing a single "national language" can assist in this regard. So, decisions about what language to use on the broadcasts is a complicated one that involves issues such as the political ascendancy of certain factions, traditional group rivalries, the preservation of indigenous cultures, etc.

1.05 For example, Malaysia has a number of different minority groups, with different languages. The situation is further complicated by the presence of a large Chinese minority, which comprises approximately 35% of the country's population. The government has declared Bahasa Malaysian as the national language. Consequently, educational broadcasts must be in Bahasa Malaysian, regardless of the ethnicity of the schools groups receiving the programs. The opportunity to develop school radio programming in Chinese, or in another minority group's language, is thereby restricted by this national policy to discourage these other languages in the nation's schools (World Bank Report: Malaysia, 1985).

1.06 The Philippines is another nation with many languages, for various tribal groups can be found throughout the different islands of the archipelago. Filipino (Tagalog) is spoken by a large percentage of the population and has been declared the national language. But the language situation is further complicated by the importance of English, which was the official language under American rule. It is especially significant as a language of higher education. Consequently, the language of instruction becomes a complex matter. A child may end up being taught in three different languages as he passes through the school system: Tagalog is the official language of the first three primary grades throughout the country, but at this level pupils often need teacher assistance in their own regional language. Beyond fourth grade, English becomes the language of instruction (World Bank Report: Philippines, 1977).

1.07 A complex language situation can especially complicate broadcasting on the elementary level. For, in the earliest grades, at least part of the instruction will invariably be in the local dialect. For primary schools in minority group regions, media instruction in the national language often fails to effectively convey the subject matter. Thus, media's potential to assist in the education of young children is handicapped in areas that do not speak the "lingua franca," unless local translations can be developed for broadcasting purposes.

1.08 In the Ivory Coast, an even more problematic set of linguistic circumstances exists. Unlike the situation in Malaysia or the Philippines, there is no clearly dominant indigenous language. So, after independence, no native language emerged as a new "national language." Furthermore, the French had actively promoted their language as the standard means of
communicating in the Ivory Coast. Consequently, the only language spoken throughout the entire country is French, and it became the language used in the aforementioned Ivory Coast television project. But Ivorian children, by and large, are not conversant in French, which is their second language (if they have been exposed to it at all). Consequently, many pupils throughout the country saw broadcasts in a language they did not understand well. This situation made the entire challenge of teaching students via television much more difficult. Language barriers, along with the ambivalent feelings about using a "colonial" tongue, contributed to the gradual decline of the Ivory Coast project (World Bank Report: Ivory Coast, 1980).

Cultural and Regional Issues

1.09 Another problematic issue associated with educational broadcasts is the question of whether programming content is acceptable to particular ethnic groups. Programs may present material that is alien, or perhaps even offensive, to certain populations, especially if their cultural patterns and social mores differ significantly from those of other groups within the same geographical area (Arnowe, 1976). For example, dramatized sequences may have young people speaking to their elders in ways that would seem typical to most audiences in industrialized areas of the world, but which would be embarrassing to listeners in more traditional societies in which a respect for age is an important part of the value system. Likewise, the way women relate to men within different cultures can vary enormously. So a programming segment involving a discussion between members of the opposite sex which seems natural to some groups might appear quite unusual, or even controversial, to others. Developing instructional material that is appropriate for students from a variety of backgrounds can be a considerable challenge.

1.10 Ideally, educational programming should acknowledge the cultural traditions of its audience (even if some of the material challenges certain belief systems). Productions which include references to important stories, songs, and sayings that students can relate to will have greater impact than material that is unfamiliar or foreign. Most Third World nations are quite sensitive about these issues, fearing the influences of westernized media productions in which an alien set of values is embedded. They are particularly sensitive about programming that is broadcast into schools for the edification of the upcoming generation (Masland and Masland, 1976; McBride, 1980).

1.11 Another challenge for educational broadcasters is to provide programming that is relevant to local needs. Instructional material should address issues of immediate concern to the people within a given region. For example, broadcasts about agricultural developments and new methods of farming need to address the specific circumstances faced by a particular locale. Educational material about disease control measures should likewise deal directly with the unique problems of a particular region, so that recommendations are as relevant and specific as possible.
While it is virtually impossible to provide a different set of broadcasts for each ethnic group, educational media specialists must be sensitive to these issues. In the second half of this chapter, some strategies will be suggested for dealing with cultural differences and local needs within the framework of large-scale educational media projects.

Successful Strategies

One possible solution to the problems posed by multilingual, multicultural populations with diverse local needs is to encourage local broadcasting for minority groups. In some situations, this option may be impractical because of the large number of small tribal groups. But at least for reasonably large, culturally distinct groups within a country, a separate radio transmitter and production facility could be provided. This approach was taken by the adult education component of Thailand's fourth education project. The project was decentralized into four separate regional branches, each of which administered the program in a different section of the country (Fry, 1983).

Local Broadcasting

Nations that decentralize instructional media in this way can reap certain benefits. Not only is instructional material linguistically comprehensible to the local schoolchildren, but it is likely to be more reflective of their cultural background and relevant to significant local issues. In fact, in terms of preserving cultural identity, a radio (or television) station can provide a forum for local expression and an opportunity for broadcasts that celebrate aspects of that particular group's culture. When a group feels some sense of ownership in the local educational broadcasts, it will tune in on a regular basis (Futagami, 1981).

There are problems, however, with trying to involve local groups in the educational broadcasting process. Decentralization further complicates what may already be an administratively complex project. There is also the added expense of setting up a series of separate studio production facilities and transmission towers throughout the country, rather than a single central facility. Another problem is the lack of experienced local personnel needed to operate the broadcasting facility. Developing solid instructional programming is a complex, challenging task that involves content area specialists, broadcasters, scriptwriters, performers, etc. The quality of local productions rarely approaches that of programming developed in the nation's premier facilities, usually located in the capital. Broadcasts with low production standards can lack appeal and may fail to interest pupils. These drawbacks inherent in a decentralized approach to instructional broadcasting must be taken carefully into consideration.

Adapting Programming for Different Groups

There are other solutions to this "classic" media issue of centralized versus decentralized production approaches. One is to simply
translate programming produced at a central studio into regional languages. This approach was taken in Ethiopia, where the same programs were recorded in four different languages (Amharic, Oromigna, Tigrigna, and Wollaitigna) and then the appropriate tape was broadcast from each of the regional radio transmission towers. This compromise between nationwide transmission in a single language and broadcasts of local origin was a sensible solution for a country as impoverished as Ethiopia, which could not afford multiple production centers and which is also struggling against separatist rebels in Eritrea, who could use a radio facility to incite the local population (World Bank Report: Ethiopia, 1983).

1.17 An even more dynamic approach was taken in Thailand. As described briefly in the introduction, the USAID Radio Mathematics project developed in Nicaragua was very successful. An experiment was conducted to compare achievement levels in mathematics between radio classes and conventional classes. It indicated 30% higher scores for the first grade groups, 14.1% higher scores for second graders, and 12.3% higher results in the third grade. These dramatic results suggested that the approach taken in Nicaragua for radio instruction was an unusually dynamic one (Friend, Searle, and Suppes, 1980).

1.18 The recent revolution in Nicaragua interrupted any further development of the Radio Mathematics Project, so that its potential was never fully realized. But a model for developing instructionally effective radio broadcasts had been established. In 1980, officials in Thailand decided to try adapting the Nicaraguan prototype to the Thai setting. This process went beyond simple translation. It involved replacing songs, stories, and characters in the original scripts, so that elements of Thai culture were incorporated in the series. While the successful instructional approaches and production techniques were preserved, the programming was revised so Thais could understand and appreciate it. The results of using these programs were highly encouraging. In an experiment designed to compare the two approaches, more impressive learning gains were demonstrated by radio Thai classrooms than by traditionally taught classes. Mathematics achievement test scores were 8% higher in the Bangkok area and 19% higher in rural areas (Galda, 1984).

1.19 The Thai experience suggests that a "prototype-adaptation" model for global dissemination of certain kinds of instructional programs might be a viable proposition. A carefully developed set of programs for one country could later be adapted for other cultures and settings. Similarly, a series of broadcasts developed within a given country could then be revised for minority groups within that country. This approach has potential for providing dynamic programming relevant to local needs. It concentrates resources for purposes of developing really worthwhile instructional broadcasting with enough appeal and pedagogical merit to achieve the desired results. But it can also be modified for different groups, so that children of various backgrounds can understand and appreciate it.

1.20 There are several advantages to using a successful prototype like Nicaragua's Radio Mathematics Project. One is, of course, that the project
has already been tested and its effectiveness demonstrated. Another is that it saves duplication of effort, and the considerable expense involved. Nicaragua’s project enlisted the services of an expatriate staff from Stanford University, which very carefully designed the programming over a period of months. The time and cost involved were far greater than that associated with the typical educational media project. USAID estimated its research and design budget between four and five million dollars. The initial results in Nicaragua showed that this intensive approach was successful. Thailand has taken advantage of all this expertise and experience without having to finance it. Projected adaptation costs for the entire country are estimated well under half a million dollars. Once the project is operational, estimated annual recurrent costs per student range between fifty cents and two dollars.

1.21 There have been other spin-off projects developed by USAID from Nicaragua's Radio Mathematics Project. One of these is presently broadcasting basic reading and mathematics instruction to children of migrant farm laborers in the Dominican Republic. Another set of broadcasts for middle school science instruction is planned for Lesotho and a few other countries yet to be selected. But the most successful full-scale adaptation to date of the Nicaraguan model is the Radio Language Arts Project (RLAP) in Kenya. These half-hour programs teach English on a daily basis to primary school children.

Teaching Language by Radio

1.22 Kenya's RLAP has provided educational broadcasts with another promising alternative in their efforts to effectively deal with the language problems of various countries. An experiment designed to test the effectiveness of this project revealed some impressive results. Students in the RLAP program scored 22.5% higher on reading comprehension tests and 50% higher on listening comprehension than students of similar background studying English in conventional Kenyan classrooms (Christensen and Mugiri, 1983). RLAP's dynamic approach to language instruction via radio appears to be quite successful (specific elements of this approach will be discussed in succeeding chapters.)

1.23 The potential ramifications of this media model for language instruction are interesting to consider. The most obvious application would be to improve English language instruction, wherever English is considered an official language or an important "second language." In many countries formerly under British colonial rule, English has remained extremely important. Kenya is a good example.

1.24 Like many other newly independent nations, in the 1960's Kenya attempted to replace its European "colonial" language with an indigenous tongue. However, as in so many cases, no single native language was an obvious choice as the new "national language." In Kenya's case, the traditional language of trade on east Africa's coast, Swahili, was eventually selected. However, this decision has not been universally
accepted, and Swahili has not become the clearly dominant means of communicating throughout the country. In fact, English remains an important language especially in education and government. Although Swahili is the "national language," English is still considered the "official language."

1.25 Consequently, Kenya was an appropriate place to initiate the Radio Language Art Project. In Kenyan schools, as in the Philippines, English becomes the language of instruction after fourth grade (with Swahili or a local tongue used in the first three grades). Therefore, English language instruction is very important for Kenyan children who wish to continue their education. Yet, many Kenyan teachers are not so well versed in English that they feel confident about teaching it. The RLAP provides excellent speakers of English conducting lively lessons via radio. Consequently, this series became popular with both teachers and pupils in Kenya.

1.26 This type of media model for language instruction could certainly be applied to the teaching of languages other than English (Imhoof, 1981). It could be used by a government as part of its plan to encourage the use of a single indigenous tongue throughout the country (as in Malaysia, for example). If this were to happen, the importance of a former colonial language, like English, as well as the significance of local dialects, could diminish. It is clear that various scenarios are possible wherein a strong approach to teach language via media could potentially affect not only the linguistic situation within a nation, but the political situation as well. Educational media specialists need to first become aware of particularly successful models for media instruction, like RLAP. But in addition, they must be aware of their potential impact within a given country.
II. MANAGING MAJOR MEDIA PROJECTS

2.01 Large-scale educational technology projects can be very difficult to manage effectively because they involve a complex set of activities that need to be carefully coordinated. Furthermore, the success of a project generally depends upon the way it is administered. For the problems associated with project management can interfere with other important aspects of the overall effort, sometimes rendering ineffective even the most promising plans to secure appropriate equipment, produce dynamic materials, involve large numbers of teachers, obtain meaningful feedback, etc. Over the past few decades, inefficient administration has been one of the most serious recurrent problems experienced by major educational media projects.

Problems

2.02 Many media projects attempt to deliver instruction across vast distances. The sheer geographic scale of some of these projects has made them a challenge to develop and coordinate. Furthermore, in many cases, the area covered by the broadcasts includes a variety of imposing geographical barriers, such as mountains, jungles, deserts, bodies of water, etc. Finally, these regions remain rather impenetrable because the transportation and communications systems in the developing countries are usually rather limited. Erecting transmission towers, supplying receivers, delivering supporting written materials, visiting school sites, and other activities involved in establishing an instructional media project can become very difficult logistical problems. Trying to administer these activities efficiently is a major challenge.

Complex Logistics

2.03 A good example is the Malaysian educational project. It involved setting up television facilities throughout East Malaysia. This part of the country is located on a separate island (the north coast of Borneo), quite distant from the capital city of Kuala Lumpur in peninsular Malaysia, where the project's administrative headquarters were located. Consequently, effective coordination of activities was difficult. Furthermore, East Malaysia is a region where the weak infrastructure and adverse environmental conditions rendered progress on the project exceptionally problematic (World Bank Report: Malaysia, 1985).

2.04 Other educational media projects conducted throughout extensive archipelagos, like Indonesia and the Philippines, have faced similar problems with transportation and communications. Projects in mountainous regions, like those as in Ethiopia and parts of Kenya, have confronted the challenge of developing and maintaining facilities for educational broadcasting in highly inaccessible locations. Climatic conditions can also cause problems. The excessive heat and humidity of tropical areas has taxed the endurance of personnel and accelerated the deterioration of equipment.
2.05 In a sense, it is the unique potential of the electronic media to transcend geographical barriers that create these logistical challenges. The modern electronic media are seen as a means to overcome vast distances, forbidding topography, and underdeveloped communications infrastructures. So educational media projects are designed for some of the least accessible regions on the planet. It is no wonder that some of these ventures fall short of expectations, when they are carried out in the hope that they may transcend adverse circumstances that cannot be overcome in any other way.

2.06 Another managerial challenge is the difficulty of overseeing such a complex array of activities, which include procuring equipment, hiring personnel, producing programs, distributing written materials, dealing with international agencies, etc. Getting the various groups involved in each of these activities to cooperate with one another and effectively coordinate their activities is very difficult.

2.07 To further complicate matters, many of these activities involve a high degree of technical expertise, so that various specialists must be brought into the project. Administrators will not fully understand the needs of these technicians, and different specialists will not understand one another. The fact that different groups cannot easily communicate with one another on critical issues makes efficient coordination of activities even more difficult. Then there is the additional complication of language barriers between project staff, which often occurs on projects in multilingual nations, where a variety of languages may be heard around a construction site. The presence of foreign consultants may even further complicate the language situation.

Inefficient Administrative Structures

2.08 Complex large-scale media projects are inherently difficult to coordinate effectively, and government agencies have often been inefficient about implementing them. Many nations in Africa and Asia only gained their independence a few decades ago, and sometimes their administrative systems have not yet fully evolved in ways that might best facilitate the management of technical projects. In some cases, well-intentioned efforts to reform the administrative structure have been unsuccessful and, at times, have reflected the interests of particular groups rather than a genuine attempt to facilitate effective overall administrative performance.

2.09 One example of this kind of inefficiency affecting a project was the case of Kenya's educational radio system (not to be confused with USAID's Radio Language Arts Project in Kenya). Kenya, like many other less developed countries, had expended tremendous efforts to provide primary schooling for its population in the 1960s. Despite the construction of many schools and an extensive teacher training program, the increasing population made it difficult to provide each child with a basic education. Radio was seen as a viable means of providing some of this instruction, especially in subject areas that inexperienced Kenyan teachers might wish for assistance with. In addition, radio broadcasts could furnish
in-service training for these newly recruited teachers, many of whom had never finished high school.

2.10 This important project took years to implement. By the time it finally became operational, valuable time had been lost, large sums of money had been needlessly expended, and the original plans had been modified in ways that weakened the quality of the programming. How did this happen? One of the main difficulties was the general inefficiency of Kenya's civil service. Many government agencies were involved with the project, and obtaining official approval for each specific aspect of the plan became a cumbersome process. Every decision laboriously wound its way through a labyrinthine network of overlapping bureaus. In some instances, project proposals became the subject of lengthy debate between agencies, and these disputes further delayed their eventual implementation. The excessive rules and regulations under which the Kenyan bureaucracy normally operates also slowed the process of official approval for this project.

2.11 Finally, to further complicate matters, the Kenyan Ministry of Education was reorganized twice during the life of the project. These administrative shake-ups served to confound the already complex and ambiguous lines of authority existing both within the Ministry itself and in its relationship with other agencies. The changes also brought new administrators into the process of approving the radio project. Obtaining their input further delayed matters, especially when they had reservations about the existing plans or suggestions for modifying the proposal.

2.12 Consequently, the construction of the media center ran far behind its original schedule. These delays led to considerable cost overruns, a result of both additional labor charges and inflationary increases on all expenses, as prices and interest rates rose each year. These cost overruns became so excessive that the original plans were no longer financially feasible. The various construction projects involved in establishing a school radio broadcasting system were re-assessed, and less ambitious objectives established. These modifications then had to be approved by the agencies involved, thus further delaying implementation.

2.13 These revised plans sometimes so altered the facilities that they subsequently failed to fulfill the purpose for which they were initially intended. In some cases, important features were simply omitted to save money. In other cases, lower quality work was accepted, which led to later difficulties. Furthermore, since construction of these facilities had already begun when the modifications were decided upon, the final results ended up reflecting a series of compromises, rather than a carefully conceived overall plan. Some areas in buildings were eventually used for different activities than they were originally designed for. Other construction modifications disrupted the original wiring patterns planned within studios, so that later efforts to install equipment became needlessly complicated. In general, these alterations weakened the project. Not only had it become more expensive than originally anticipated, but it would not be as technically advanced as originally hoped (World Bank Report: Kenya, 1984).
2.14 Other educational media projects have experienced administrative delays similar to Kenya's. In the aforementioned Ivory Coast television project, bureaucratic complications also resulted in immense cost overruns, which contributed significantly to the eventual decline of the project. Each major decision about the project had to pass through at least ten different steps and at least four different agencies on its administrative odyssey to final approval. With construction delays and escalating inflation, the costs of the project escalated considerably beyond original estimates.

2.15 The Ivory Coast effort suffered from another administrative problem occasionally faced by large-scale instructional media projects. The French Fonds d'Aide et de Cooperation (FAC) became actively involved in the decision-making process. French members of the UNESCO team also tried to influence the course of the project. These activities further complicated the already complex machinations of the Ivorian civil service, and further delayed action on critical items (World Bank Report: Ivory Coast, 1980).

2.16 Generally, review of a major development project by foreign advisors is highly desirable, especially when problems arise for which outside assistance is needed. Providing intelligent suggestions is a critical part of the role played by international teams sent to examine a project. But this advisory capacity should not include outright interference in the political processes of the country involved. This type of behavior can constitute an inappropriate extension of authority that may offend members of the government and could even jeopardize the project. At the very least, it can further complicate situations that are often quite complex and which may involve sensitive issues.

Lack of Cooperation Between Agencies

2.17 When different departments develop longstanding rivalries, it may become difficult to get them to cooperate on a project. "Territorial" issues as to who has jurisdiction over a particular item may arise. Petty vindictiveness over past injustices may persist. Institutionalized competition may be further aggravated personality conflicts between key figures.

2.18 An administrative conflict that typically affects large-scale educational media projects is the confrontation between the ministry of education and the ministry in charge of the mass media. This struggle is almost unavoidable, since an educational broadcasting project falls under the aegis of both agencies. One issue usually involves the scheduling of educational broadcasts on available airtime. Educators may have to fight for sufficient time, for broadcasters seldom wish to relinquish their time for educational programming. This is especially true on commercial stations, for instructional broadcasts seldom attract revenue. Even public networks may be stingy with their airtime. Broadcasters may attempt to determine aspects of an educational programming that the ministry of education feels should be developed by educators. Conversely, broadcasters
may feel that education officials are trying to dictate production techniques which can best be devised by those who know how to work with the medium. Issues will constantly arise that require the cooperation of both groups, and, unfortunately, the potential for conflict is ongoing.

2.19 In Indonesia, the Ministry of Information and the Ministry of Communications oversee the national media networks. These agencies were not especially responsive at first to Ministry of Education requests that some airtime be provided for educational broadcasts. They demanded that programming of instructional value be presented to them first, and then they would consider the provision of appropriate time slots in the broadcasting schedule (World Bank Completion Report: Indonesia, 1980). This situation is typical, wherein the Ministry of Education must bargain for broadcasting rights. In the Indonesian case, the ministries in charge of broadcasting were eventually satisfied that time slots should be provided for educational broadcasts. Indonesia has also recently purchased satellite time, so that in the future, broadcasting time may not be as limited as it has been.

2.20 On the Philippine radio pilot project (mentioned in the introduction), a conflict occurred between two of the organizations involved in the study which may have contributed to the final rejection of the entire proposal. The Educational Communications Office (ECO) supervised the study, but it hired the Institute of Mass Communications (IMC) at the University of the Philippines to design the evaluation instruments. The IMC, it was felt, had more experience and expertise in evaluation. Yet the IMC's proposed evaluation scheme was criticized by ECO on several counts. Officials at ECO felt that listening skills had been largely omitted from the achievement tests, in favor of reading and writing. (This situation could bias the experiment against radio, which might well be expected to excell in the development of listening skills.) Audiocassette tapes were neglected as an option in the pilot, and ECO wanted to test their potential. Finally, ECO noted that cost effectiveness figures for conventional instruction (as a control group) were not included in the study.

2.21 ECO's suggestions for improving the evaluation scheme were never taken into consideration. The IMC proceeded with its study as originally planned, in spite of objections by ECO. This lack of cooperation between the two organizations may have weakened the project. As it turned out, the omissions cited by ECO later became the subject of some criticism leveled at the study by outside consultants who conducted a final review of the experiment (Middleton, 1985). These flaws in the pilot study may have contributed to the Philippine government's final decision to concentrate on increasing the number of textbooks, instead of expanding the nation's educational radio facilities.

Opposition Within the Educational Establishment

2.22 When agencies fail to cooperate, a project's chances of success diminish. But even more debilitating to a project's potential is actual
opposition on the part of key elements within the agency responsible for overseeing the project. During the Ivory Coast educational television project, it became clear to one of the authors that certain officials within the Ministry of Education did not fully support the project. These educators were not convinced that the innovative approach of using television to teach much of the curriculum could succeed. They felt that traditional teacher lecture was an effective way to instruct young pupils, and other alternatives seemed inappropriate. Some of them undoubtedly felt threatened by the possibility that school television might prove superior to their own conventional approaches to instruction. Also, media instruction was an area they were unfamiliar with. Important officials who are supposed to be experts in their field often find their prestige threatened when they are faced with new developments with which they have little experience.

2.23 In the Ivory Coast, these conservative elements within the Ministry of Education remained uncommitted and aloof through situations in which their support might have helped the project survive (World Bank Report: Ivory Coast, 1980). Other projects have also suffered from a general lack of enthusiasm on the part of certain factions within the educational establishment. Outright opposition to using media for instructional purposes has sometimes surfaced within ministries of education, even after the project has been officially approved.

Weak Project Supervision

2.24 Administrative problems can persist throughout the life of a project. This was the case with the aforementioned Kenyan government radio project. Not only was this project delayed by bureaucratic complications, but even after it was officially approved, certain aspects were poorly managed. For example, an insufficient number of radios were ordered and their delivery to schools was postponed for one full year. Then confusion over which agency was responsible for actually shipping them further delayed their arrival in classrooms. The maintenance plan was also poorly conceived and implemented. Despite a continued shortage of radios, over the course of the project, several hundred were discarded rather than repaired.

2.25 An important aspect of managing a project is overseeing the budget. The auditing procedures followed throughout the Kenya project were also deficient. Some expenses were recorded in the wrong categories. Mathematical errors in calculating sums were later discovered. In general, accounting errors made it even more difficult than it already was to keep the project from overrunning its budget. And these cost-overruns, as previously discussed, created a host of other problems for the project (World Bank Report: Kenya, 1984).

2.26 This discussion has focused upon the managerial problems associated with projects that have largely failed to live up to their potential. However, sometimes, even when an instructional media project is successful in some respect, officials have failed to capitalize upon the
situation. This happened with an adult education program in Pakistan. Television was used to teach basic literacy and arithmetic to villagers. Program topics included subject matter relevant to farmers; nutrition, hygiene, child care, and agriculture. Written materials accompanied the programs, and trained tutors worked with the students after the shows. Achievement tests were given to project participants and the results were considered satisfactory by the government (World Bank Report: Pakistan Adult Literacy Project, 1980). Nevertheless, the project was discontinued at that point. Funding from UNICEF and the World Bank had come to an end, and the Pakistani government was unwilling to finance continuation of the project, despite its apparent success. A potential means of raising the country's low literacy level had been neglected. This "soft money syndrome" has been re-enacted numerous times in the history of educational media projects. Nations are assisted to a certain point by outside funds but balk when they themselves must begin to assume financial responsibility.

2.27 The practice of discontinuing media projects before they have been given a real chance can eventually harm their general reputation. For the start-up costs of broadcasting projects are usually quite heavy, due to the expense of constructing facilities for production and transmission of programming. If a project is called off after only a few years, the expense of the initial investments will lower the overall cost-effectiveness of the project. It is only by securing large audiences over a reasonably lengthy period of time that major educational technology programs can become cost-effective. If media projects are curtailed before these "economies of scale" can develop, they will gain a reputation for being too expensive for the numbers of pupils reached.

2.28 This situation may have occurred in the Philippines. A pilot study showed radio to be more effective than increasing the number of textbooks per student. However, a cost-benefit analysis revealed radio to be more expensive, so the radio project was rejected in favor of increasing the supply of textbooks (Middleton, 1985). Some question remains as to whether radio would have been more costly if larger school audiences had been involved. The greater the numbers listening to a series of broadcasts, the lower the per pupil costs become (while per student costs of providing additional texts remain relatively constant). Perhaps, the Philippine government reacted hastily to a set of unrepresentative figures and neglected an opportunity to improve educational standards at lower costs through radio.

Successful Strategies

2.29 How can the problems associated with managing media projects be dealt with? First of all, governments which have had a past history of bureaucratic inefficiency should be considered questionable candidates for such projects. The more problematic the administrative track record, the less probable it is that a given nation will be able to successfully implement a complex educational technology project. Furthermore, it is often difficult to deal with a government's administrative difficulties,
for such attempts are generally viewed as undesirable interference from outsiders. However, there are a few basic approaches that have proven helpful in circumventing administrative problems.

**Pilot Projects**

2.30 One sensible strategy is to conduct pilot projects to test the feasibility of large-scale projects, before actually proceeding to commit the time, money, and resources involved. During a pilot study, the instructional potential of a particular plan can be tested. If the programming fails to produce adequate results, the whole project can be abandoned without heavy losses. If the pilot proves too expensive for the achievement levels attained, at least this situation is clarified before huge sums are wasted on a full-scale national effort.

2.31 Pilot studies can help clarify where specific problems might arise in a full-scale project. Administrators of the study can experiment with alternative strategies that may prove helpful if the project eventually expands. Positive results on pilot studies can convince skeptical government officials that the idea is sound and may thereby generate support for more extensive efforts of a similar nature.

2.32 It is always wise for a country to gradually begin a project on a small scale, rather than immediately commit itself to a large, complex, costly endeavor. Although not official "pilot" schemes as such, the Chinese began their "Television University" two decades ago in Beijing and Shanghai. These programs have proven themselves worthwhile over the years, so the government decided to proceed with its plan to establish a televised college correspondence course system nationwide. The experiences in these two cities have also been valuable, in that much has been learned about how to operate this type of program.

2.33 Pilot projects can be helpful as long as they are carefully reviewed before plans to expand into full-scale operation are implemented. There are always difficulties encountered in moving from pilot to full implementation. This evolution can be especially problematic when the pilot has been conducted in one location and the full-scale project is eventually implemented elsewhere. The ill-fated television project in the Ivory Coast was initially prompted by the previous success of a small-scale project in Niger, another West African Francophone country. In fact, some of the same people were involved in both projects. Yet one of the crucial problems with the Ivory Coast project, the need to use expensive battery-powered TVs where there was no electrification, was not foreseen as potentially problematic, despite the fact that the same type of equipment had been used in Niger (Silverman, 1976). Problems which appear minor in a small project may become magnified in a much larger one. Also, an experiment conducted in one situation cannot necessarily be used to judge what will happen in a different setting.
Special Arrangements to Facilitate Administrative Efficiency

2.34 It is sometimes necessary to establish special administrative structures to facilitate educational media projects. Especially when administrative conflicts are chronic and severe, a project may sometimes benefit from a special commission established to supervise its operation. One advantage of a specially appointed commission is that it can be staffed with project supporters and people who have some experience with instructional media and who wish to carry it out successfully. If this group can establish its legitimacy within the power structure, it can greatly assist in the management of a project.

2.35 Thailand is a fine example of a country where this approach helped galvanize the implementation of media projects. The relationship between the Center for Educational Technology (CET) and the primary school division of Thailand's Ministry of Education was problematic for some time. It was difficult to obtain cooperation between these groups to develop media projects. In 1982, the Office of the National Primary Education Commission (ONPEC) was established to help facilitate CET's efforts in school broadcasting. Consequently, ONPEC has helped implement the successful pilot project. It is also assisting CET in its efforts to purchase radios and deliver them to classrooms across the nation. Furthermore, ONPEC officials have helped improve general relations between CET and the Ministry of Education (World Bank Report: Thailand, 1982).

2.36 A developing nation with an inefficient, shortsighted, contentious bureaucracy can be a poor risk when it comes to introducing a large-scale development project. But sometimes the situation can improve when new administrative units are created, or when new officials are appointed to replace especially difficult personalities. These strategies may be viable when especially important government officials support the project.

2.37 Management training for those officials who are supervising an instructional media project might help the entire operation function more smoothly. The People's Republic of China's Television University has been making an effort to provide managerial training for senior staff. Foreign consultants were brought to China to deliver seminars on supervising instructional media facilities. Specific suggestions were provided on planning, budgeting, staff relations, supervising, etc. Included in the training program are a series of seminars on financial management for project accountants, so that budgetary records are properly kept.

2.38 China's project also includes the use of computers for storage and calculation of financial records. In addition, computers will store student data and will tabulate test results, final grade points, various statistical measures, etc. Because of its computational and information storage capacities, the computer can be an indispensable aid to administrators and auditors. It may eventually become an important factor in project management throughout the developing world, as the funding and expertise to provide computerization becomes increasingly available in these countries. It is an encouraging sign that a large, complicated project like the PRC's
Television University has turned to the computer for assistance (World Bank Report: Status of China's TVU, 1984).

2.39 Dealing with the bureaucratic inefficiency can be a frustrating experience. Yet, there are recommendations that international assistance organizations can make which may improve matters. In general, careful, ongoing supervision of projects by representatives of foreign assistance agencies, including frequent on-site visits by teams of specialists, can help identify problems in their early stages, so measures can quickly be taken. Intelligent analysis of the circumstances involved can help define an appropriate set of strategies for dealing with various difficulties. This chapter has hopefully clarified a number of potentially helpful approaches to dealing with the critical problems associated with project management.
III. EQUIPMENT ISSUES

3.01 How can educational media projects most effectively install, operate, and maintain the equipment required to deliver their educational programming? This is a critical question, for as dynamic as an electronic medium can be in communicating instructional material, it can also be overly expensive and unreliable. It generally involves tremendous effort and expense to install a new system and to get it operating efficiently. It can be equally difficult to keep it operating efficiently especially when this depends upon the proper functioning of receivers in numerous sites, dispersed over a wide area. Unfortunately, a project which suffers from hardware problems can thoroughly alienate educators from future involvement in media instruction.

Problems

3.02 As with any large-scale endeavor, many of the problems associated with successfully establishing and efficiently operating a complex hardware configuration can be described in terms of acquiring sufficient funds and obtaining qualified personnel. But educational media projects also confront some unique challenges, which the first part of this chapter will describe.

Heavy Start-up Costs

3.03 One of the major obstacles to the development of educational broadcasting in the developing world has been the heavy start-up costs involved. The expense of establishing facilities for broadcasting can be enormous, especially by Third World standards. A nation considering such an investment must feel confident that it will eventually pay off in the transmission of dynamic educational programming to large numbers of students.

3.04 One sensible strategy for limiting costs is to use already existing facilities. An established station or network may be willing to provide studio space, technicians, production personnel, broadcasting time, etc. If these arrangements work out well, the project can become operational in a shorter time frame, with less manpower, and at substantially reduced costs than it would have incurred had it been necessary to provide its own facilities and staff.

3.05 However, relying upon an already existing system can present problems. The successful production of really meritorious educational programming depends upon a variety of critical factors. It is difficult to establish an auspicious set of circumstances, even when the educational media project has full control over its own personnel and equipment. When this is not the case, the challenge becomes even greater. The production standards of programming can suffer from generally inadequate studio facilities, limited access to existing equipment, or insufficient allocation of studio time. Available personnel may lack experience in developing educational broadcasts, since they probably have heretofore been
principally involved in the production of entertainment, news, advertisements, etc. The creation of sound instructional programming demands a sensitivity on the part of the production team to educational issues they may be only marginally aware of. Educators should be involved in the production process, yet this may not be the case, especially when a commercial station is being relied upon to house the production.

3.06 Transmission of educational broadcasts at optimal times for potential audiences can also be difficult to arrange when dealing with a station that already has a full schedule of broadcasts. Seldom will broadcasters place instructional programs in their "prime time" slots, when audiences are largest. Often adult education courses are transmitted at odd hours, like very early in the morning or late at night. Daytime broadcasting for schools may be limited, because this air time is so valuable for other purposes. The timing of school broadcasts can be critical to their levels of utilization, especially in departmentalized secondary schools where classes change throughout the day. (A program aired when class is not in session is obviously of little value unless it can be taped.) Yet, cooperating broadcasting institutions may not be flexible enough to effectively deal with these kinds of scheduling difficulties. Radio and television station managers have their own set of priorities, and it may be difficult for them to fully accommodate those interested in broadcasting for educational purposes.

3.07 For example, the educational broadcasting station may be a commercial one, as is often the case in Latin America. As such, it will depend largely upon advertising revenue. Since advertising for educational programs is difficult to obtain, it may be financially impractical for the station manager to allot large segments of the broadcasting schedule to a form of broadcasting that represents a financial loss.

3.08 So, in many cases, the strategy of using existing resources for developing and delivering instructional broadcasts produces disappointing results. Sometimes compromise schemes are devised, wherein educational media project officials arrange to use available resources for certain needs, but establish their own facilities for fulfilling others. A common pattern is to construct new studios for the production of instructional programming, but to rent transmission time on the national public network for broadcasting purposes. This is how educational broadcasting is set up in Jamaica, Kenya, Ethiopia, and many other developing nations.

3.09 Some media projects have managed to secure sufficient funding to establish their own independent facilities, and thereby more fully control their own destiny. Thailand has recently constructed an entirely new radio transmission system solely for educational purposes, because there was not enough air time available on existing radio stations to broadcast the extensive school programming that Thai officials had committed themselves to. Thailand seems to be an appropriate site for this major school radio effort. The country has a rather lengthy history of educational radio broadcasts, dating back to the 1940s. In addition, the recent pilot project which used the Nicaragua Radio Mathematics Project as a model produced especially encouraging results. This experience has further
convinced Thai officials that radio is a viable means of educating its young people. It will be interesting to watch the progress of this major project over the next few years.

3.10 Unfortunately some countries have been overly ambitious about using media for education and development. One clear example of this phenomenon was the Ivory Coast educational television project. This project hoped to bring modern instructional approaches via television to remote areas of the country, where electricity had not yet been introduced. The television sets would be operated by large battery packs specially designed for this purpose. The idea was innovative and exciting. Its proponents envisioned bringing an impoverished, isolated set of traditional African villages into the twentieth century by installing the latest video technology in their local schools. Television would deliver a more modern pedagogy than previously available to rural Ivorian children. Unfortunately, this project eventually became an example of how over-ambitious plans can backfire.

Infrastructure

3.11 The Ivory Coast simply did not possess the kind of modern infrastructure that could adequately support the installation of an extensive new television system. An infrastructure includes various means of transportation and communication that facilitate the normal day-to-day operations within a country. An advanced infrastructure includes an extensive highway system, numerous railroads, nearly universal electrification, widespread availability of telephones, an efficient postal service, highly developed mass media, a considerable degree of computerization, etc. Less developed countries throughout Africa, Asia, and Latin America obviously do not possess these facilities to the same degree that they can be found in the industrialized nations of the world.

3.12 For example, it became very costly during the Ivory Coast project to maintain television sets in working order. The batteries used to keep the TVs working were expensive and periodically needed to be replaced. This expense would have been unnecessary if electrification had been more extensive. When TV sets broke down, as they often did in the tropical climate, communicating the need for repairs was very difficult because of the lack of telephones. Sending a messenger was sometimes inconvenient due to the limited number of vehicles and the poor condition of roads. Even when they were finally made aware of the problem, repairmen found it difficult to reach some villages, because the roads were so few in number, in such poor condition, or perhaps even impassable after a storm. This maintenance effort was clearly handicapped by the poorly developed communications and transportation infrastructure of the Ivory Coast.

3.13 Not only was the nation's infrastructure poorly developed, but in some cases, the project failed to take advantage of facilities that it did not have. The prime example of this was the Ivory Coast government's insistence that an entirely new educational television production center be constructed, and that it be located in Bouake, a small city in center of the country, about two hundred kilometers north of the capital, Abidjan.
This situation created several problems that the project would not have faced, had existing studio space been used or if the center had been situated in Abidjan. An extra microwave linkage had to be constructed so that programming could be transferred to the central distribution point for the Ivory Coast television transmission system in Abidjan. In addition, producers in Bouake found working with officials at the Ministry of Education in Abidjan was difficult because of the distance involved (World Bank Report: Ivory Coast, 1980).

3.14 The Ivory Coast government's rationale for this decision was mainly that it wanted to develop areas of the country outside of Abidjan. It was hoped that the location of an important television facility in Bouake would help stimulate the growth of that city and the surrounding region. A healthier economic situation in the center of the country might help stem population shift down to the coast and into the capital. This idea had some merit, but the decision to isolate instructional television producers in a location far from the national center of all educational, broadcasting, and political activity was detrimental to the operation of the project. The Ivorian communications system was not developed to the point where a complicated project could effectively be coordinated between two different cities. Nor could a developing nation like the Ivory Coast afford the "luxury" of arrangements that did not take full advantage of the existing infrastructure (such as the government television facilities in Abidjan).

Cost-Overruns

3.15 While, in most cases, the potential benefits from a media project appear to justify the original cost estimates, this is not necessarily the case by the time the proposed equipment configuration has actually been installed. Many projects have found the initial projected start-up costs have so escalated by the time the system was finally established, that even high levels of program utilization did not seem cost-effective any longer. In other cases, studio facilities have not actually been built as originally envisioned, so that the quality of the programming suffered. Transmission systems of questionable workmanship have broken down and severely disrupted the broadcasting schedule. Unfortunately, many countries now feel that setting up an educational broadcasting system is too much of a risk, in that major costs are guaranteed but significant results are not.

3.16 The Ivory Coast experience once again is an example of what can go wrong. The primary reason for the huge cost-overruns incurred during the construction of the television facilities were the administrative delays, discussed earlier in this publication. But the difficulties encountered in trying to complete construction and install complex equipment were also a factor. Some contractors unrealistically underbid their competitors, only to discover during the project that considerably greater funding would be required to complete the project. In some cases, government contract requirements and specifications were not clearly delineated, so the contractors were uncertain as to exactly what was expected.
Furthermore, they did not always possess the resources to deal with some of the technical challenges posed by the project. Occasionally, fundamental aspects of the overall plan were flawed. For example, the blueprint developed to position equipment within the television complex was poorly conceived. A group of consultants tried to deal with the problem, but furnished conflicting pieces of advice. Consequently, when operations finally resumed, there were problems with equipment installation. Meanwhile, labor costs and inflation were continually driving the cost of the project higher and higher (World Bank Report: Ivory Coast, 1980).

Lack of Trained Technicians

Equipment installation is typically a problem in developing countries. There are simply not enough well trained technicians available. Sometimes even foreign experts have had difficulty with the equipment selected for the project, which may be unfamiliar to them. This was a problem in the Ivory Coast because the television equipment selected for the project was truly "state-of-the-art" at that time. For example, the cameras used were newly developed, so they could simultaneously shoot both television and film. These complicated units were expensive, and they were difficult to set up, operate, and maintain. It might have been far more advisable to use less sophisticated TV equipment, which would have kept down costs and presented fewer technical challenges to the inexperienced Ivorian staff (World Bank Report: Ivory Coast, 1980).

In Kenya, administrative delays kept interrupting the installation process. Therefore, the construction of the studio began to take place in piecemeal fashion. Several different foreign technicians joined and left the project during these bureaucratic impasses. Each had a different set of ideas about how to approach the process of installing the studio, some of which turned out to be ill-advised. In fact, conflicting recommendations led to a situation where certain pieces of equipment were incompatible with others, and the studio could not function unless these units were connected somehow. These technical difficulties could only be solved by ordering specialized equipment, which placed additional financial burdens upon an already indebted project and caused further delays. Despite the fact that their formal training was limited, Kenyan technicians somehow succeeded in eventually making the radio studio operational, an impressive feat under the circumstances. However, the plans for television production were scaled down, due to the difficulties faced in setting up the television studio (World Bank Report: Kenya, 1984). One would think that an issue as basic as standardization of equipment would not present problems on a major media project, yet a combination of poor planning, limited expertise, and miscommunication has led to these kinds of difficulties.

Finding experienced personnel to work on educational media projects can be difficult in developing countries. The technical infrastructure is generally so poorly developed that opportunities to gain experience with sophisticated forms of technology are limited. Furthermore, technical schools that can train specialists are few in
numbers. The training of new staff is invariably a critical component of any project in the Third World.

3.21 Some preliminary training should be conducted prior to an employee's assuming his position. Unfortunately, because resources are so limited in developing countries, this is often very difficult to arrange. Hands-on experience with equipment, for example, often has to wait until facilities are available. Consequently, much of the training for these projects occurs "on the job" and this can present problems. Inexperienced personnel may make mistakes that disrupt the efficiency of the operation. Their general level of proficiency may be low, due to a lack of familiarity with the task. The overall quality of their work may be substandard. Educational media projects throughout the developing world have suffered from these difficulties associated with a shortage of effectively trained personnel.

3.22 Another approach to training staff is to send them overseas to a developed country which has the resources to fully prepare them. Many major educational media projects have included funds for this kind of training. But these opportunities are, generally, limited in number, so that only personnel in key posts are given the chance to study abroad. Unfortunately, those that are sent do not always take full advantage of their opportunity. Many students from the Third World find it difficult adjusting to a different culture, and a language barrier can make learning very difficult. Some trainees become discouraged and neglect their studies. Others may become enamored of life in a more developed country and never return to their native land.

3.23 Furthermore, the training experience may not adequately address the situation which staff members will face when they return home. Seldom is the equipment they used in their foreign seminars identical to what they must deal with back home. Media facilities in a developed country are usually considerably more technologically advanced than those in the Third World. Personnel trained under ideal circumstances with "state-of-the-art" equipment will find that their less sophisticated equipment back home does not possess the same capabilities. Some of the effects they learned to create may be impossible to achieve with their less advanced hardware. The likelihood is that they will also have to deal with a variety of unforeseen difficulties, with fewer resources available to them. At the very least, a period of adjustment will be necessary.

3.24 Sometimes governments fail to take full advantage of fellowships funded as part of the project's training component. This occurred in the Philippines during the radio pilot project. In this case, administrative bottlenecks interfered with the full utilization of the overseas training allocation. However, sometimes officials simply fail to appreciate the importance of proper training to the successful operation of a mass media project. When faced with budgetary problems, training is often the first item to be cut.
3.25 Unfortunately, even when staff are finally trained and develop experience on the job, it is sometimes difficult to get them to stay with the project. In many cases, they now are qualified for more lucrative positions in the private sector, so they leave. High turnover rates have been characteristic of the educational television program in Jamaica, for example. Chronic staffing shortages exist because it is difficult to find qualified replacements for those who leave, especially since applicants must pass a relatively rigorous service exam to even be considered.

Maintenance

3.26 As already mentioned, maintenance can be a major problem for educational media projects. Even when new hardware is finally delivered, installed, and working properly, it will not be worth the investment involved unless it can be kept operational. Maintenance has, unfortunately, been the "Achilles heel" of many instructional media projects in the developing world.

3.27 Tropical climates can be very hard on electronic equipment. Their extreme heat and excessive humidity can damage delicate circuitry. Television sets should be "tropicalized" for equatorial areas, so there is special protection of vital electrical parts. This procedure was not carried out in Jamaica, and in general, at any given time, only about half the TVs in that nation's schools have been working properly. Conditions in many developing countries can make maintenance of expensive hardware even more problematic than it normally is in the industrialized nations of the temperate zones.

3.28 Another cause of excessive maintenance problems can be the inexperience of those using the equipment. Instructors in Third World instructional media programs may have little exposure to this kind of equipment and can inadvertently mistreat it. School equipment can also be victimized by overly curious students. Sometimes there is a problem with theft. In many cases, institutional equipment does not stay in one place. It is often moved, sometimes bumped, and occasionally dropped, as it is shared by different groups. Because of a general lack of experience, sometimes a minor malfunction, which a layman could conceivably repair, ends up completely disabling a receiver for a considerable period of time.

3.29 Even in more technologically advanced societies, however, people generally rely upon repair specialists to fix their electronics equipment. The problem is that the developing world does not have these services readily available. Most large-scale media projects establish their own equipment maintenance center to provide ongoing repair service. Unfortunately, these units have often failed to keep up with the rate at which equipment breaks down.

3.30 Part of the difficulty is that repairmen are sometimes poorly trained, and do not always efficiently diagnose and effectively repair the malfunction. But, an even more fundamental problem is the complicated logistics involved in the maintenance process. Let us say a television set in a classroom breaks down. First of all, the teacher must inform the
repair service. Where modern telecommunications are lacking, this may take some time. Then the set must be examined. So it must be taken to a shop, or a repairman must come out to the school. Limited numbers of vehicles, remote sites, and poor roads are a problem. When the set is examined, troubleshooting for the problem can be difficult, because the repairman may lack necessary equipment. If a part is needed to fix the set, it may be difficult to obtain. Shortage of parts is a chronic problem in the Third World, since they are invariably manufactured far away in some industrialized nation. If the necessary part is unavailable, a lengthy waiting process can ensue until a new shipment arrives.

3.31 When the part is available, the TV may still end up sitting in the shop, as the repairmen work on other sets that have been waiting even longer. When the TV is finally attended to, hopefully the diagnosis was correct and the repair work is competently carried out. Then, to return the set, the laborious early stages of the maintenance process must be enacted in reverse before the television is back in the classroom. Meanwhile, educational television in that particular school, especially if this was the only available set, may well become perceived as something not to be relied upon. This depressing scenario has been repeated in country after country.

3.32 The maintenance situation in the Ivory Coast was unusually complicated because of the special battery-powered television sets that were supplied to schools that had no electricity. First of all, these specially modified TVs were expensive, costing about 500 dollars a piece. Secondly, the price of the large battery pack necessary to operate the set was around 650 dollars. Furthermore, these batteries only lasted for two years and then needed to be replaced. Finally, the special TVs demanded more routine repair than a regular TV set, especially in the equatorial climate.

3.33 To cope with this maintenance challenge, a French firm, with modern facilities and equipment, was hired. This company was reasonably efficient and kept most of the TVs in operation throughout the project. But its fees were excessive, especially by Third World standards. This maintenance scheme became so costly that project officials began discussing the possibility of solar cells as an alternative power source for the battery-powered TVs. However, solar technology did not advance rapidly enough in the 1970s to rescue the Ivory Coast educational television project from this predicament. Albeit somewhat idiosyncratic, the Ivory Coast experience with equipment demonstrates how significant a problem the maintenance component of an instructional media project can become (World Bank Report: Ivory Coast, 1980).

Successful Strategies

3.34 The ultimate success or failure of many educational media projects has hinged upon how equipment needs were handled. The expenses associated with the establishment and ongoing operation of production and transmission facilities can escalate to the point where the project is no longer a cost-effective proposition. Sometimes the hardware ordered is
inappropriate for the particular circumstances and purposes for which it is to be applied. In a number of cases, the equipment has been unreliable to such a degree that the project can successfully function. A crucial question for future educational media efforts is how dynamic instructional programming can be developed and reliably disseminated, without equipment costs becoming prohibitive.

Assessing the Viability of the Infrastructure

3.35 The first critical issue for educational technology planners to consider is whether the country's infrastructure is developed enough to support the proposed system. It is tempting for a nation to try to use broadcasting to compensate for a poorly developed infrastructure. Transmissions can instantly travel to places which are otherwise barely accessible. But past experiences have shown that it is very difficult to insure the reliability of an educational broadcasting system, without an infrastructure that permits reliable access to schools for purposes of ongoing equipment repair. Without reliable receivers, an educational broadcasting system cannot function effectively.

3.36 Other important aspects of an instructional media program also depend upon reasonably efficient transportation and communications to be delivered. Supervisors should visit school sites to observe the progress of the project and provide suggestions. Teachers may be asked to travel to in-service seminars on how to most effectively use the broadcasts. If these activities are thwarted, the project itself can be jeopardized.

3.37 So a developing country's overall infrastructure should be examined before the nature and scope of an educational broadcasting effort are determined. If supporting systems are judged adequate, the project can proceed. Thailand is a country with a reasonably well developed infrastructure, as well as a past history of using radio for instructional purposes. Consequently, it appears a suitable site for the extensive educational radio system it has recently constructed (World Bank Report: Thailand, 1982).

3.38 If a particular component of the infrastructure is substandard, planners can try to compensate in some way. For example, telephone service may be limited and unreliable in areas outside the capital. Alternative means for schools to contact repair services should be devised. Prepaid post cards with appropriate equipment checklists could be provided, so immediate notification of breakdown is encouraged. Perhaps the telegraph is an alternative. An extra vehicle could be included in the budget to make regular rounds in which equipment is examined (along with providing other services, such as delivering of student print materials, teacher guides, notifications, surveys, etc.). While creative approaches can overcome certain limitations, planners should realize that some situation may be too problematic to deal with. For example, lack of electricity is a serious handicap for a media project. Plans to involve a non-electrified region should proceed advisedly, if at all.
Contracting Carefully

3.39 Another major problem for educational media projects is the heavy startup cost involved in setting up a broadcasting system. One solution is to use an already existing broadcasting system. Another would be to try to minimize construction cost overruns by awarding contracts to reputable firms whenever possible, even if they do not necessarily submit the absolutely lowest bids. While penalties for construction delays have been proposed as part of the contractual agreements on these projects, it remains to be seen whether they can actually be imposed. It can be difficult to hold a company strictly accountable for cost-overruns when there are so many other factors complicating the situation. When confronted about overruns, representatives from the firm can invariably blame rising costs, labor problems, bureaucratic delays, and a series of other factors beyond the company's control.

3.40 One step that can be taken is to help developing countries draw up contracts that clarify more precisely what is expected. If contracts were more clearly delineated, some of the confusion that has arisen in the past between corporations and the governments employing them might be eliminated. More specific guidelines would enable officials to hold companies more accountable for their performance during the course of the project. Appropriate consultancies should be provided within the project budget, so that countries with little experience in these kinds of endeavors receive the legal and technical advice they need to draw up binding contracts that will effectively hold corporations responsible for efficiently providing what they need to successfully implement a media project.

Training Personnel

3.41 If future educational media projects are to succeed, the importance of training programs must be appreciated. It appears that this is the case thus far in the People's Republic of China, as officials plan the "Television University." A fully developed set of training sessions has been scheduled, which includes seminars in supervising administrative units, managing TV studios, maintenance of equipment, scriptwriting, radio and TV production, distance education approaches, evaluation, and media research. While some fellowships are being provided for overseas study, most of the training is being conducted in the People's Republic of China. This is the most sensible approach, especially considering the vast number of personnel involved in this large project. These training sessions are also being conducted a reasonable period in advance of the scheduled start of operations, so that staff will be adequately prepared to assume their new responsibilities. There is an effort to find as many Chinese instructors as possible from within the PRC and foreign consultants fluent in Mandarin are also heavily sought for these positions. Specialists in all facets of educational broadcasting will be brought in from various countries to help the PRC launch this major project (World Bank Report: Status of China's TVU, 1982).
Efficient Maintenance Schemes

3.42 Developing an efficient equipment maintenance program is critical to the success of an instructional media project. The school television projects in East Malaysia have provided evidence that a better repair service is positively correlated with higher utilization levels. East Malaysia, on the north coast of the island of Borneo, has two major regions, Sabah and Sarawak. The educational TV maintenance system in Sarawak has consistently been superior to the one in Sabah, where the typical logistics problems described earlier in this chapter abound. School television is more heavily used in Sarawak, where a recent survey indicated 60% of primary schools and 33% of secondary schools had viewed programs, compared with only 32% of the elementary and 14% of the secondary schools of Sabah.

3.43 Maintenance is extremely important, and provisions for it should be made in the planning process. Adequate funding is provided, and a sensible scheme for facilitating the complex logistics involved in the maintenance operation must be carefully developed.

Feasibility of Radio

3.44 One lesson learned in the Ivory Coast, as well as in some other developing countries, is that a complex technology like television may be an inappropriate choice of medium for school broadcasting. Present television systems in the Third World are small, if they exist at all. Consequently, facilities for producing educational television programming are limited. Technicians are few in number and poorly trained. Production staff may not be capable of turning out the kind of dynamic, instructionally effective programs that will excite students. Teachers are seldom prepared to effectively utilize an instructional approach they are unaccustomed to. Finally, television is an extremely expensive proposition for a developing country.

3.45 In the vast majority of cases in the Third World, radio is a more sensible option than television. Most areas of the world have had radio for some time. In many cases, radio networks are already well established and can be used for educational purposes. Transistor radios are widely available. The hardware is simpler to deal with than television equipment, technicians within the country have undoubtedly already had some experience with it. Producing radio programming is much easier than producing television. Although the lack of visuals on the radio medium is a drawback, sometimes this can be compensated for with posters, maps, handouts, etc. Most importantly, radio is much less costly than television; estimates generally indicate it is one-fifth as expensive (Jamison and McAnany, 1978). Furthermore educational radio has proven itself effective in a variety of projects throughout the developing world, located in countries such as Nicaragua, Kenya, Colombia, Tanzania, Thailand, Korea, the Dominican Republic, and Brazil (Academy for Educational Development, 1986; Spain, Jamison, and McAnany, 1977). At the moment, radio appears to be the most viable educational medium for the Third World.
IV. TEACHERS AND MEDIA

4.01 Educational institutions have rarely capitalized upon the full instructional potential of the electronic media. The history of educational media projects in various countries documents this unfortunate failure to take full advantage of new technologies for delivering instruction.

Problems

4.02 Schools rarely possess the financial resources to purchase an amount of equipment sufficient for establishing a significant media component within their curricula. This situation has, of course, been especially true of schools throughout the developing world. But even in developed countries, proliferation of radio and television sets has rarely reached a level where most of the classrooms within a school have their own receiver. When equipment is not readily available, heavy utilization is, of course, discouraged by the inconvenience involved. The number of receivers in schools throughout the world is gradually increasing, as modern electronic media proliferate. Yet the day when a television set can be found in every classroom remains quite distant, especially in the Third World.

4.03 While funding is clearly a problem, there are other reasons why media-based educational approaches have not flourished in the classroom. Schools have traditionally been print-oriented. The book has been the dominant source of formal knowledge for centuries. The electronic media are relatively new phenomena, and educators have not yet fully come to appreciate their potential to inform in dynamic new ways. Teacher training institutions, for the most part, have failed to reconceptualize the teacher's role to include the effective utilization of available media programming. Many older teachers developed their instructional approaches before the advent of the "communications revolution," and they have not fully considered the pedagogical power inherent in these new media forms. Schools have traditionally been slow to react to new technological developments, which the corporate sector quickly seizes upon and uses to its advantage.

4.04 Schools tend to be conservative institutions. They must serve the public, and parents will seldom tolerate experimentation when their own children are involved. Furthermore, like other large, public institutions, school systems can become highly bureaucratic as lines of authority multiply and overlap. Change becomes increasingly difficult when every new initiative, however minor, must survive a time-consuming series of approvals, often by very conservatively-minded administrators. Introducing new technologies into a school can become an exhausting process, which can gradually drain the energies of those who were initially enthused about the idea.
Negative Teacher Attitudes About Media

4.05 Many teachers have developed negative attitudes about the mass media and their effects upon students. Some educators see them as sources of distraction for young people. There is, of course, some justification for this perspective, because many children do neglect their studies to enjoy radio or television entertainment. There is often a concern that pupils' reading ability levels will suffer because they prefer to tune in the mass media rather than read. Some teachers feel that the programs also encourage young people to think and act in ways that they themselves would never dream of. Mass media can suggest an alternative set of values to impressionable children and adolescents, and these values may well conflict with those of the traditional culture. Consequently, the mass media are often perceived by teachers as a negative influence.

4.06 Even when broadcasts are designed expressly for educational purposes, they are not always welcome in the classroom. Teachers, as a group, have generally had mixed reactions to instructional broadcasting. Under auspicious circumstances, instructional programming has been popular with teachers. Some teachers always find media exciting and are eager to use it. But for others, the possibility that broadcasts might directly assume some of their responsibilities in the classroom is usually threatening to them. A handful of projects have attempted to use massive amounts of television programming in place of teachers. Despite the fact that these experiments were largely conducted in regions with teacher shortages, they nevertheless invariably encountered some opposition from teacher groups.

4.07 The following review of major educational broadcasting projects will describe some of the problems that have arisen as teachers worked extensively with instructional media. Certain themes have become evident, among them the fact that how teachers respond to instructional broadcasts depends very much upon their own particular background and the circumstances in which the programming was introduced.

The Master Teacher Concept

4.08 The first major project to use instructional television on a large scale was conducted by the Ford Foundation in 1956 at Hagerstown, Maryland, USA. A cable system with six channels was installed throughout the school system, so a live lesson could be viewed by whichever classes tuned in. The lessons were delivered by Hagerstown teachers, selected for the degree of excellence they had exhibited in their own classrooms. The Ford Foundation felt Hagerstown could be a showcase for what they called the "Master Teacher Approach," wherein fine teachers were broadcast to numerous classes, thereby allowing many pupils to benefit from their expertise. Each classroom also had a teacher actually present to follow up the televised lesson with questions and additional explanation.
4.09 After the four year pilot, achievement test results indicated significant student gains in some areas. The average of Hagerstown's standardized mathematics test scores for grades 3-6 improved rather substantially, shifting from below the national average to above the national norm at all four grade levels. Similar dramatic gains were recorded on standardized tests for certain subjects on specific grade levels. In the junior high, mathematics and science showed significant improvement, as did U.S. history on the high school level. However, in other cases, most notably reading scores on the elementary level, achievement levels did not rise.

4.10 There was some professional jealousy over who was selected as a televised "master teacher." But, at least during the first few years of the project, Hagerstown teachers were generally positive about using television. When asked if television "enriches and expands the curriculum," the percentage of teachers agreeing was 94.2% in primary schools, 90.7% in intermediate, 77.8% in junior high, 76.0% in senior high. However, in general, enthusiasm was higher in the elementary schools. While 76.9% of primary teachers and 80.9% of intermediate level teachers felt that television was a "help in teaching," only 62.5% of junior high school teachers and 40.9% of senior high teachers felt this way (Wade, 1967).

4.11 This phenomenon wherein instructional television was more readily accepted on the elementary level was to become the norm in educational media projects throughout the world (as discussed earlier in reference to the Japanese experience). Elementary school teachers have more flexible schedules within which to incorporate programming. In addition, they must teach a variety of subjects, not all of which may be areas of their own personal expertise. Consequently, they seem to welcome the availability of televised lessons in specialty areas, like science, art, music, etc. Secondary teachers, on the other hand, are specialists in a given subject area, and generally feel less need for assistance from a "television teacher."

4.12 Over the years, the nature of school broadcasts in Hagerstown has changed. The use of televised lessons in which a teacher delivers a lecture gradually decreased, and more sophisticated productions, using visuals with voice-over techniques, took their place. There were several reasons for this shift. Many teachers felt somewhat stifled by the "television teacher" programming, because they did not have a chance to present new materials, just review what had been described on television. They sought a more extensive classroom role. Those producing the programs also felt limited by the lecture format. With new editing equipment available, they wanted to produce more polished programming. The result has been that over the past few decades, Hagerstown has seen less television in schools, but it is of higher quality. Students watch an estimated twenty minutes per day rather than twenty minutes per class. But Hagerstown School System productions are now made available to schools throughout the country.
4.13 The Ford Foundation's ultimate vision of "master teachers" being broadcast widely across the nation never really materialized, although the Foundation invested considerable sums of money in the idea (not only in Hagerstown, but in a variety of other educational television projects). The concept was difficult for teachers in television classes to deal with, for it relegated them to almost a "second class" status within their own classroom. This problem was to surface in a number of other major school television projects, as we shall see.

Developing a School System with Television

4.14 In American Samoa during the early 1960s, the U.S. Association of Educational Broadcasters developed a plan to use televised instruction extensively in the new schools that were being constructed throughout the islands. Up until that point, the Samoan school system had been quite underdeveloped. Television would both serve the immediate educational needs of Samoan children, and it would also help foster the development of modern lessons, which were subsequently broadcast to every Samoan classroom, where the TV set was the focal point of instructional activity. The Samoan students were supervised by a person whose role can perhaps best be described, not as teacher, but "monitor." For these Samoan monitors were seldom well-educated enough themselves to be considered qualified teachers. They were in charge of the class, but the lessons were presented by the "TV teacher." Monitors did, however, ask questions, lead discussion, and help guide children in their studies.

4.15 The Samoan project was actually designed to encourage the professional development of these monitors. Training sessions were presented each afternoon for everyone teaching in the Samoan school system. The American "TV teacher" undoubtedly served as a model for the monitors, who were watching the televised lessons day after day. In fact, after the project was in operation for several years, the monitors became increasingly confident and began to demand a larger role in the instructional process. This was especially true on the secondary level, where monitors were generally more fully educated and were uncomfortable with the degree to which television dominated the classroom. As time passed, these Samoans began assuming the responsibility of teaching their own classes, and television gradually fell into disuse.

4.16 The Samoan educational television project was a qualified success. Achievement test scores during the project showed achievement gains over previous years, but never actually reached a level equivalent to those of American children on the mainland (Schramm, Nelson, & Betham, 1981). In the long run, television did not survive as the principal source of instruction, but it did serve as a vital catalyst in the development of a more modern school system on the Samoan Islands.

Expanding a School System with Television

4.17 In the late 1960s in El Salvador, as in Samoa, television was used to spearhead a major expansion of the educational system. In
El Salvador's case, new technical secondary schools were established, in the hope that more technicians could be trained to help develop the industrial sector. The number of qualified instructors was insufficient to fully staff these new schools. Television was seen as a means of overcoming these shortages by providing high quality lessons presented by well respected Salvadorian teachers. This project was somewhat unique in the way it emphasized teacher training in the use of television for instructional purposes. Teachers received a full year's retraining with pay, so that they would be prepared to use instructional television effectively in the classroom.

4.18 At first, there seemed to be genuine enthusiasm for the televised lessons, especially in the seventh grade classrooms. Yet teacher attitudes about school television gradually became less positive over the course of time. The El Salvador project was designed to be cost-effective as long as the salaries of the new teachers assigned to TV classrooms remained quite low. The major investment had been in the television system, and this was probably justified, as long as television bore the main responsibility for instruction. But once the novice instructors gained experience, they took on more teaching responsibility and subsequently began to demand greater reimbursement for their efforts. These grievances were capitalized upon by the El Salvador Teachers' Union. The union had been uneasy about the project all along, especially since television had provided a rationale for hiring underqualified teachers at substandard salaries. In addition, the expansion of junior high enrollment had greatly increased teaching loads, but salaries had only gone up about 20%. Expressing these grievances, the union finally succeeded, after the project was several years old, in instigating a teachers' strike, which clearly weakened the entire educational reform effort. After the strike was settled, the project resumed but enthusiasm for instructional television had begun to wane. It was also becoming apparent that the nation's industrial growth was not going to provide enough technical positions for the graduates of these new schools (Ingle, 1976).

4.19 Final appraisals of the El Salvador project yielded mixed results. Aptitude test scores for students in television classes were higher than those of pupils in conventional classes. Achievement tests showed superior scores for seventh grade television students, but not in the succeeding two grades (Mayo, Hornik, and McAnany, 1976). As in Samoa, television as the major source of classroom instruction eventually declined, but it had played a key role in a major educational reform project.

Replacing the Teacher with Television

4.20 In the North African country of Niger, a unique school television project was developed, which more than any other up to that time relied upon television programming to teach its pupils. The programs developed for the so-called "Tele-Niger" project used the medium more effectively than had previous projects (which had simply broadcast a teacher delivering a traditional lesson). French television producers devised innovative
programs in which interesting subject matter was presented, using some dynamic video techniques. As in the Samoan project, adults with limited educational backgrounds were hired as "monitors" to supervise these elementary "tele-schools."

4.21 The project was successful in a number of significant ways. Absenteeism, a major problem in Nigerian schools, was negligible. Likewise, the attrition rate in tele-schools was minimal. Students rarely had to repeat a grade. Achievement test scores for graduates of these tele-schools compared favorably with those of traditional schools. However, television was never used on a widespread basis in Nigerian schools. It remained essentially a pilot project for many years. Given its success, one has to wonder why.

4.22 Despite the positive response by pupils, it was never clearly demonstrated that the tele-school approach was superior to conventional classroom instruction. In fact, when tele-school students entered secondary schools, with their rigid traditional methods of teaching, they sometimes found it difficult to adjust. Changing only one part of the overall education system was insufficient for enacting meaningful overall reform. Since students were eventually forced back into conventional patterns of learning, the impact of the innovative television approach became difficult to determine.

4.23 The final blow to this unique project was the ongoing opposition of administrators and teachers within the Nigerian educational system. The suggestion that television could outperform an instructor in the classroom was disturbing to many of these educators, sensitive about their special status in the community. The threat to their prestige and their conceptions of proper pedagogy was more than they could tolerate, so they undermined the progress of a promising project. They succeeded in preventing expansion of the project beyond the pilot phase.

4.24 However, the Tele-Niger project demonstrated how effective television could be at involving children in their schoolwork (Silverman, 1976). Furthermore, it spawned a landmark educational television effort in another former French colony in West Africa, the Ivory Coast. The Nigerian team of idealistic young French school television producers hoped that conditions in the Ivory Coast, a more prosperous nation than Niger, might prove more favorable for tele-schools.

Opposition from the Educational Establishment

4.25 Unfortunately, the Ivory Coast project suffered from many of the same difficulties encountered in other school television efforts. Again, many Ivorian educators who had received the rigorous training typical of the French system were offended by schemes that allowed comparatively undereducated individuals to enter classrooms as "monitors" to supervise a class primarily taught by television. This scenario seemed to devalue the revered role of teacher, held so dear by those who had struggled to enter the profession. Televised instruction seemed a second-rate form of education, and many Ivorian educators were uncomfortable with it.
As discussed in Chapter Two, certain officials within the Ivory Coast's Ministry of Education refused to cooperate with those supervising the television project. In addition, the Ivory Coast Teachers' Union vociferously opposed the project from its very beginnings. It succeeded in inciting people against the plan. Parents were encouraged to believe that the tele-schools would provide an inferior education for their children (despite Nigerian evidence to the country). Furthermore, pressure for higher salaries for monitors successfully drove the costs of the tele-school project far higher than originally anticipated (as in El Salvador). Teachers were placed in many of the television schools, and paid far more than the untrained monitors whom project officials had assumed would fill these positions. The cost-effectiveness of the project was further compromised by these circumstances (beyond the already significant cost overruns associated with constructing and maintaining the television system, discussed in Chapters Two and Three).

The school television project was not the only educational television project in the Ivory Coast. To take full advantage of the huge investment in television hardware, an adult education program had also been established. In communities throughout the Ivory Coast, people filed into their local school in the evenings to watch a variety of television programs designed to stimulate discussion of various problems facing inhabitants of African countryside. When the programming concluded, the television was turned off, and a discussion group leader attempted to facilitate a dialogue about the particular topic raised by the show. This adult education project faced some formidable obstacles. The broadcasts were in French, the official language of the Ivory Coast. But, in many cases, the local people barely spoke French, since they spoke their own native language in everyday conversation. Discussion leaders were inexperienced at encouraging reactions from the often reticent adults. Local traditions sometimes mitigated against the recommendations outlined on the programs and interfered with their implementation (Lenglet, McAnany, and Grant, 1979).

Initially, this adult education effort was a secondary thrust of the overall educational television plan in the Ivory Coast. Yet this project was gradually granted increasingly higher priority status. Forces within the Ivorian educational establishment, who opposed the in-school television plan, voiced their support for the community education component of the project. Gradually, funding was siphoned from the school project into the adult education program, further debilitating the school effort. Not only did this hurt the school television project, but unfortunately, the adult program never really had the impact that its supporters had originally envisioned.

There is one final example of the degree to which some elements within the educational establishment of the Ivory Coast actively opposed the television project. It involved the results of the official project evaluation. A number of tests were administered throughout the country to determine the effectiveness of televised lessons versus conventional teacher instruction (World Bank Report: Ivory Coast, 1975). The results
of these evaluations are not known because they were never made public. It is hypothesized that forces within the government managed to suppress the findings. Certain educators seem to have fought the instructional television effort right through to the very end. Without data to support its effectiveness, it became increasingly difficult to maintain enthusiasm in the Ivory Coast for a television project that had become very costly and very controversial.

Overview of Major Projects

4.30 To summarize, educational media projects have characteristically faced a problematic set of circumstances in dealing with school systems. Providing enough hardware for the thousands of classrooms throughout a nation's school system is generally very difficult. Administrators are often unreceptive to new instructional approaches, and may be discouraged by the costs involved in acquiring equipment for educational media endeavors. Parents have perceived media instruction as an inferior alternative to conventional teaching and have sometimes actively opposed its introduction into the classroom.

4.31 Finally, teachers themselves have often been disinterested in or even opposed to the utilization of media in their classes. On a number of large-scale projects, television was employed as the primary source of instruction, and in several of these projects, the person assigned to these classes was not a qualified teacher. The prospect of television assuming their role was unsettling to fully certified teachers, and their unions fought the introduction of television into classrooms, rather than encouraging it.

4.32 In general, firmly established teachers in developed countries, or in the modernized sections of developing nations, have tended to resist large-scale, intensive efforts to use broadcasts for presenting major portions of the curriculum. But underqualified, inexperienced teachers in Third World slums and rural areas have often welcomed broadcasts that helped them in their struggle to cope with their disadvantaged circumstances. So despite the fact that media broadcasts have sometimes been unappreciated, or even opposed, by the educational establishment in various countries, this does not mean that media cannot still offer a great deal to these teachers working in highly impoverished areas of the Third World. Some examples of how this assistance can effectively be delivered to these types of teachers will be provided in the second half of this chapter.

Successful Strategies

4.33 How can future educational media projects hope to survive, when they are routinely undermined by powerful factions within the educational establishment? What strategies may serve to enlist support, where opposition has characteristically arisen in the past? This section will explore a number of possible solutions to this problem.
Equipment and the Convenience Issue

4.34 One critical issue is the convenience of broadcast utilization. Obviously, involvement in a media project can become frustrating for teachers when it is a struggle to use the broadcasts in the classroom. Teachers become justifiably angry when they cannot rely upon adequate reception of the broadcasts or timely delivery of written materials to accompany the programming.

4.35 Properly functioning transmission equipment is absolutely essential to the success of any educational media project. Top priority should be placed upon obtaining a reliable transmission unit, even if this means additional expenditures for the rental or purchase of high quality equipment. This is not an area where costs should be cut to trim the budget.

4.36 Past projects have tried to maximize the number of schools receiving broadcasts by asking teachers within a building to share a limited number of sets. This approach was understandable, because funds were limited. It was hoped that sharing sets would increase the numbers of students benefiting from the programming, thereby enhancing the project's instructional impact.

4.37 However, past experience has shown that this approach may be ill-advised. When equipment was not easily and quickly obtained, teachers often neglected to use the broadcasts. The lower the receiver/instructor ratio, the more problematic this situation generally became. Receivers should be readily available to the teacher, and preferably should be permanently located in the classroom. The higher the degree of equipment saturation, the higher the probability that broadcasts will be used.

4.38 Thus, experience indicates that making broadcasts conveniently available to teachers should be the first priority of any educational media project. Adequate resources must be devoted to establishing reliable transmission facilities, a high receiver/instructor ratio in the schools, and an efficient maintenance program. This may require reallocation of funds within the budget to strengthen these aspects of the project. It may mean that the geographical area encompassed by the project must be limited at first. It may also mean that the number of students initially involved will be relatively small. Yet, without reliable transmission, reception, and maintenance, an educational media project cannot hope to succeed.

4.39 Too many past projects have initially overestimated what could be accomplished. Their reach exceeded their grasp, and they came up empty-handed. A far better strategy for future projects would be to limit size in favor of providing reliable, high-quality broadcasts. For a small, intensive, dynamic project has a much greater chance of success than a large project, which has dispersed its hardware to such a degree that aggravating problems soon arise. The practicality of this small-scale approach has been demonstrated on a number of noteworthy educational media
projects, including Nicaragua Radio Mathematics, Tele-Niger, and the current "TV University" of the People's Republic of China.

4.40 Starting small does not preclude later expansion. In fact, successful pilot projects have often attracted the kind of attention that has allowed them to evolve into full-scale efforts. It is far better for an educational media project to concentrate its equipment resources at first and make some significant impact upon limited numbers, than to overextend itself and disappoint large numbers of teachers and students.

Modeling Effective Instructional Methods

4.41 Teachers' resistance to educational media is generally rooted in a fear that it will be either much better or much worse than the average instructor's lesson. When it is better, teachers are sometimes threatened. When it is worse, they feel it is a waste of time. What is more desirable than either of these two extremes is the more realistic attitude that media can help the teacher instruct in a variety of significant ways.

4.42 The most obvious way in which broadcasts can help teachers is in providing worthwhile instructional material for the class. But programming can educate teachers, as well as students. In presenting classroom lessons, "television teachers" may model methods of instruction that the classroom teacher can use at a later date, and which he may even incorporate into his repertoire of instructional skills. Other types of instructional broadcasting can be produced expressly for teachers (after school or during planned teacher meetings). This type of programming may provide suggestions and approaches that help improve classroom instruction. It may deliver material in content areas that the classroom teacher deals with on a regular basis. Or it may provide general coursework for teachers whose educational background is deficient, a common situation throughout the developing world, where a shortage of fully qualified teachers is a chronic problem.

4.43 One key function of educational programming is to provide model lessons for classroom teachers. In attempting to produce these model lessons, educational radio and television directors have several advantages. First of all, they can secure some of the finest teachers available to deliver these lessons. Secondly, a team of specialists can be assembled to design the programs and each aspect of a given lesson can be carefully planned. Thirdly, a variety of supplementary materials for the lesson can be brought into the studio and sometimes special taped footage obtained on location may also be edited into the program. Finally, the taping process itself allows the participants to perfect the final performance. The lesson can be rehearsed several times, performed in segments, re-done if there is a problem, and even edited to insure that it is of high quality.
If the programming is cleverly produced, the teacher on an educational broadcast is likely to appear even more dynamic than he normally is in the classroom. This "television teacher" can be an excellent role model for other teachers throughout the school system. In addition, the lesson itself should be exemplary, including some techniques that teachers throughout the country wish to use in their own classrooms.

The effects of television teachers as role models has already been alluded to in this chapter. In a number of projects, most notably those in Samoa and El Salvador, classroom "monitors" seemed to have learned from the television teachers, to the point where they began taking more of the instructional responsibility onto themselves. This phenomenon contributed to the gradual decline of instructional television in those projects, for as these monitors aspired to become full-fledged teachers, they themselves delivered lessons which they formerly would have shown to the class on television. These trends, in one sense, led to the demise of several media projects. But, in another sense, the medium fulfilled its purpose. It presented lessons to school children at a time when fully qualified instructors were not really available. It also helped train the monitors as instructors, so that they could proceed to teach effectively.

But does this mean that televised role models are no longer necessary once a nation possesses a qualified teaching force? Japan is certainly a country with a well-educated, professional corps of teachers. Yet, in the 1960s, a school television program so influenced the pedagogical approach of Japanese teachers, that government guidelines for official texts had to be altered to accommodate the new perspectives on how to teach that particular subject.

The subject was primary school science. The Japanese Broadcasting Corporation (NHK), produced a series of science programs that modelled discovery-oriented lessons for young children. The use of demonstration was coupled with questioning techniques, so that the school audience was asked to predict what might happen if the television teacher tried a particular procedure. Concepts, rather than memorization of factual material, were stressed. This approach to science instruction intrigued both the teachers and the students in Japan's elementary schools. The program became the most popular school television series in Japan. Teachers began imitating the teaching style of the NHK primary science "television teachers," by using questioning techniques to get children to think, rather than simply supplying information. This new approach became so popular in elementary classrooms throughout Japan that eventually the Ministry of Education revised its elementary school science texts, which had previously been rather traditional in their approach, so that they were more discovery-oriented (Tiene and Urakawa, 1983).

Instructional Media Organizations for Teachers

Other NHK elementary school television programs also attained rather impressive levels of utilization in the schools. How was this degree of enthusiasm for educational television achieved in Japan? There
are many reasons for this phenomenon. The dissemination of equipment throughout Japanese schools is extensive. There is nearly a television set for every elementary classroom. Furthermore, NHK is a particularly strong public television network, and it has concentrated some of its considerable resources upon developing dynamic school programming. But a significant factor has been the way in which the NHK has actively cultivated a positive relationship with teachers throughout Japan.

4.49 In fact, NHK was instrumental in helping to organize the all Japan Teacher Federation for Studying the Use of Radio and Television in Education. The acronym for the Japanese title of this organization is ZEMPOREN. The ZEMPOREN has numerous committees and research groups at all levels of education, from kindergarten all the way up to the university. These committees are also administratively organized on each of the three tiers of Japanese public education: local, prefectural (state), and national. These groups promote an ongoing dialogue in Japan's schools about effective use of media.

4.50 The ZEMPOREN's annual national conference is attended by approximately 10,000 participants, from every corner of Japan. In addition to the usual speeches, workshops, awards, dinners and discussion groups, an interesting feature is the mass visitation of a nearby school system. Convention participants observe the use of media in local classrooms. Teachers from this school system are, in turn, invited to the conference to discuss their perspectives on media in the schools. This yearly cross-fertilization of ideas at the grassroots level is indicative of the kind of communication that has been encouraged throughout Japan between educational media specialists and classroom teachers.

4.51 In Japan, teachers have been invited to participate in media activities, through this organization expressly designed to bridge the gap between classroom teachers and those involved in producing educational programming. Committees that determine the content and approaches of school broadcasts invariably include teachers. "Television teachers" are selected upon the recommendations of ZEMPOREN groups. Teachers are encouraged to bring their classes to NHK studios, and, in general, to appreciate the educational potential of the mass media. In Japan, the potential resistance of teachers to school broadcasting was recognized and measures were taken to combat this opposition. These efforts have been quite successful in the elementary grades (Tiene and Urakawa, 1985).

4.52 Other nations could profit from Japan's experience. The ZEMPOREN model could be adopted in other countries. A strong educational broadcasting organization can spearhead a variety of worthwhile activities in the schools. An ongoing series of discussions about the benefits of media in classrooms would help educate teachers, whose pedagogical perspectives were previously limited to unimaginative rote learning techniques. In those nations where teachers can effectively be persuaded to support the utilization of instructional media, it may be possible to implement a variety of dynamic new communications technologies in the
Instructional Methods Via Radio

4.53 Another means of demonstrating the instructional potential of the mass media to teachers is by providing media-based in-service training that fosters professional growth. One project of this type, conducted recently in the Philippines, was not only responded to favorably by teachers, but also indicated that their instructional effectiveness in the classroom may have been enhanced by the experience.

4.54 The World Bank began this study in 1978 into the effectiveness of radio for both teacher training and school instruction. Two rural regions of the Philippines, Pangasinan and Leyte, were selected as sites for the study. In neither of these regions are teachers, in general, as fully qualified as they tend to be in the area around Manila. Likewise, student achievement levels tend to be lower than in the capital. Finally, in neither region is the national language, Tagalog, the native language. Consequently, relatively high percentages of both teachers and students were unfamiliar with it.

4.55 The project involved two major components. The Continuing Education of Teachers (CET) program developed a set of radio correspondence courses covering how to effectively teach Tagalog (Filipino), English, social studies, science and mathematics. The Radio Assisted Teaching in Elementary Schools (RATES) program provided daily half-hour radio broadcasts to upper elementary pupils in Tagalog. Supplementary written materials were included as part of both programs, and the teachers periodically attended seminar meetings with an instructor to discuss the CET coursework.

4.56 This radio project was tested after both its second and third years of operation, with much the same results. The effects of both CET and RATES upon student achievement were compared with the achievement test results of other classes that never heard the broadcasts. There were actually nine different learning conditions established altogether, which included various combinations of radio-based instruction for students, radio correspondence course instruction for teachers, and textbook utilization.

4.57 The results produced two separate clusters of achievement test scores. In the higher group were (in descending order) RATES and CET together, RATES with a 1:2 textbook student ratio, RATES alone, CET with a 1:2 textbook student ratio, and CET with a 1:1 textbook-student ratio. In the lower cluster were CET alone, RATES and CET with a 1:2 textbook-student ratio, a 1:1 textbook-student ratio, and a 1:2 textbook-student ratio (Middleton, 1985).

4.58 One anomaly of the study was that the treatment which included both types of radio courses and a favorable textbook ratio should
theoretically have produced the highest achievement levels, but ended up in the lower cluster of scores. However, with this one exception, the study indicated that radio instruction produced higher levels of student achievement than did textbook instruction. The direct radio classroom instruction to improve students' language skills (RATES) appeared somewhat more effective than the indirect approach of providing teacher in-service coursework (CET). Nevertheless, this study has provided evidence that teacher education via radio can help improve the achievement levels in the classroom, a significant finding.

Unfortunately, as described in the introductory segment of this publication, this pilot study never was expanded into a full-scale project. The reasons for the Philippine government's decision to eschew radio education will be explored in an upcoming chapter. However, indicative of their success, both CET and RATES continued to be used in audiocassette form in schools throughout both experimental regions even after the pilot study had been officially terminated. More importantly, this pilot project successfully documented the fact that broadcasting for professional development of teachers can ultimately contribute to improving student achievement levels.

Professional Development Via Radio

Unfortunately, a number of other broadcasting correspondence courses for teachers in various countries have not experienced the same degree of success as the Philippine CET project. The programming needs to provide some tangible gain for teacher. Teachers, who are busy on the job, will not take on additional work after hours without good reason. They need meaningful incentives to participate in in-service programs. When such coursework can lead to advanced degrees, promotion, or salary increases, teachers will tune in.

A media-based teacher education project that did succeed by offering job-related incentives was Kenya's Radio Correspondence Course program. During the 1960s, Kenya's school enrollment had increased dramatically, especially on the elementary level, as the new nation sought to establish universal schooling through sixth grade. This sudden escalation in enrollment forced the government to hire teachers who were not fully qualified. By 1970, approximately 40% of the teaching force fell into this category. There was a need to upgrade the education of these teachers, most of whom were primary school instructors who had not yet graduated from high school.

Asking these teachers to attend classes in their local high schools was extremely impractical. Not only were teachers busy working during the day, but it would be embarrassing for them. A special face-to-face program designed to upgrade the educational level of such large numbers of teachers located throughout the entire country would have been prohibitively expensive, given the number of instructor salaries, the costs of travel reimbursement, the possible release time coverage for
So it was decided that a radio correspondence course program for these teachers might be the best solution.

4.63 This program was designed more for the purpose of continuing the general education of Kenyan teachers, than it was for developing professional expertise in instructional techniques. In addition, it relied rather heavily upon printed materials, which were revised constantly throughout the course of the project so that they were current and accurate. The radio broadcasts were transmitted in time slots made available on the national radio network, the Voice of Kenya. Teachers generally owned their own radios, so they could receive the broadcasts at home during the evenings and on weekends. Consequently, the hardware expenditures on this project were minimal.

4.64 Enrollment in the correspondence course program was of modest proportions, considering the huge numbers who needed more education. Yet a highly respectable percentage of those who participated were eventually able to pass the state examination that all Kenyan high school students were required to pass in order to graduate (Kinyanjui, 1977). Successful completion of high school meant a more advanced level of teacher certification which, in turn, could lead to salary increases.

4.65 With such incentives, the project operated successfully for a number of years. However, over time, enrollment figures in Kenya's in-service correspondence course program began to decline (Hawridge, Kinyanjui, Nkinyangi, and Orivel, 1982). Part of the reason for this was the fact that a higher percentage of the new teachers being hired tended to already possess adequate academic qualifications. Another disincentive was the Kenyan government's hesitancy to promote all teachers who had completed the correspondence course program. Salary increases for every graduate would have strained the already overburdened budget.

4.66 Yet, Kenya's radio correspondence course project for in-service teacher education successfully provided an opportunity for large numbers of teachers to upgrade their education. It is hard to see how this could have been accomplished in any other way, given the limited resources available. If education is truly a critical catalyst in a nation's overall development, then such programs for teachers are worth serious consideration.

Broadcasting and the Third World Teacher

4.67 The problems in developing nations are especially acute in the countryside and in poor urban sectors. The schools of these areas are often poorly constructed, inadequately furnished, and minimally equipped. They are often supervised by teachers whose qualifications are substandard. It is these schools that most desperately need the instructional assistance that educational broadcasting projects can provide.

4.68 In fact, it is the type of teacher found in the countryside or the urban slum whose circumstances are such that he is most likely to
appreciate educational broadcasts. He is generally dealing with large
groups of children, sometimes of varying ages, whom he is trying to teach
with few books and limited supplies. Perhaps, in addition, he is unsure of
his own ability to teach effectively, since his training may have been
minimal. He may feel inadequately prepared to teach certain subject areas,
for which he has little background. To tune in a radio lesson that assists
with this struggle must be a relief in many cases, especially when the
broadcasts free him to work with part of the class, while the rest listen
to the radio lesson.

4.69 It makes considerable sense to target instructional broadcasts
for these underprivileged schools. First of all, there is a strong
rationale, in terms of the need to provide educational opportunities in
these areas. But, in addition, this strategy may allow a project to
sidestep a confrontation with the educational establishment, which may
oppose the extensive use of educational media.

4.70 In the landmark school media projects described in the first half
of this chapter, it was a faction of the educational leadership in these
countries which orchestrated their demise. This group included officials
in the Ministry of Education, leaders of the teachers' union, and
influential teachers who were fully qualified and highly experienced.
Large-scale educational technology projects generally change the structure
of an educational system and this is seldom in the interests of those in
charge of it or of those who feel it has worked for them. Unfortunately,
the apathy or opposition of influential sectors of the educational
establishment can obstruct projects which might benefit the less favored
members of the teaching profession, who struggle daily in the poorest of
schools.

4.71 A number of educational media projects have been well received in
the impoverished schools of the Third World, and this has been especially
true when the programming was expressly designed for underprivileged school
situations. Some examples are the Mexican Radioprimaria, the Mexican
Telesecundaria, The Maranhao Educational Television Project of Brazil,
Samoan Educational Television, Tele-Niger, the Shuar Radio Schools of
Ecuador, the SITE Teacher Training Project of India, the Radio Education
Teacher Training Project of Nepal, the Kenyan Teacher Training Project, the
Nicaragua Radio Mathematics Project, and the Kenya Radio Language Arts
Project (Academy for Educational Development, 1986; Spain, Jamison, and

4.72 The Kenya Radio Language Arts Project is a fine example of a
broadcasting effort that became very popular with teachers in rural areas.
It adopted the Nicaragua Radio Mathematics Project approaches for radio
instruction to teach English to primary school children in grades 1-3.
This material is extremely important, since beginning in grade four, the
language of instruction is English.

4.73 These radio lessons appealed to Kenyan teachers for several
reasons. First of all, these teachers were not especially fluent in
English, since they grew up primarily speaking either a tribal language or Swahili. So, for the most part, these teachers did not feel confident about teaching a language that they themselves were not entirely familiar with. The radio lessons relieved them of this responsibility, providing the voices whose pronunciation, diction, and grammar were essentially flawless.

These English programs fulfilled a critical instructional need better than the teachers themselves might have been able to. They were even designed to complement the English textbooks which the teachers had been given. They systematically proceeded through the instructional sequence outlined in the Kenya primary school curriculum guides. Furthermore, the programs used a variety of entertaining production techniques.

In fact, another reason teachers liked the radio lessons was that they were popular with the children. There was no problem getting pupils involved in the lessons, which included skits, songs, rhymes, riddles, etc. Pupils were encouraged to respond out loud to the radio, and in general, these English radio lessons proved a lively half hour that the teachers also enjoyed.

Perhaps most significant of all, this project turned out to be instructionally very effective. At the end of the year, tests were administered in both the radio classes and in classes that had been taught English in the conventional way. As mentioned in Chapter One, the results revealed a 22.5% higher set of scores for the radio students on the English reading comprehension tests and a 50% higher set of scores on listening comprehension tests (Christensen and Mugiri, 1983).

The Radio Language Arts Project of Kenya exemplifies how a carefully conceived set of broadcasts can have considerable appeal for a Third World teacher. These teachers labor under adverse circumstances and worthwhile programming that assists them effectively could not be more welcome.

The Type of Teacher Most Likely to Use Broadcasts

In general, the type of teacher for whom broadcasting is likely to be most attractive can be targeted by those planning school broadcasts. This teacher may lack certain qualifications for the profession and is probably inexperienced. Media programming that effectively teaches subject matter, models teaching technique, or provides worthwhile suggestions, will be especially helpful to a teacher who is still somewhat unsure of himself.

Broadcasting will also be more attractive, in general, to elementary school teachers, who lack expertise in certain subject areas, than to secondary teachers, who are generally more fully versed in their particular specialty area. As with the RLAP programs in Kenya, elementary teachers will especially appreciate programming that teaches those subjects which they feel least prepared to teach.
4.80 Another reason why elementary teachers are more likely to use broadcasts is that their schedule is more flexible. Since their class is with them all day, they can easily incorporate broadcasts into the day's activities. Secondary teachers, with their changing classes, find scheduling broadcasts much more difficult.

4.81 Furthermore, the instructional mode of secondary classrooms is predominantly lecture. Media programming, therefore, would generally be used in lieu of the teacher's presentation. Especially when a broadcast includes a "media teacher," the secondary teacher might simply prefer to present the material himself and may even feel some sense of competition with the teacher on the program. Elementary classrooms tend to be less teacher-centered. The teacher spends less time lecturing, with more of the school day devoted to student worktime. A school broadcast is less directly in competition with an elementary teacher's style than a secondary teacher's. In fact, it can be incorporated quite naturally into the day's various activities.

4.82 This description of the type of teacher most likely to appreciate school broadcasts fits large numbers of teachers throughout the Third World. Many of them are underqualified and inexperienced, because school systems in many developing countries have expanded so rapidly in the past few decades. Most of them are elementary-level teachers, because the first educational goal of most developing countries is universal, nationwide primary school education (secondary-level schooling, at this point, is generally only available for a fraction of the potential school-aged population). These underqualified elementary school teachers throughout the developing world represent a huge group for whom appropriate media programming could be of tremendous assistance.

4.83 Does this discussion imply that educational broadcasters should abandon efforts to develop secondary-level programming? Not necessarily, although it does clarify that the secondary-level situation is certainly more problematic, in terms of getting teachers interested in using broadcasts. However, if media programming were appropriately designed and produced, it could play a vital role in secondary curricula throughout the world (see further discussion in Chapter Six).

4.84 Educational media projects have at times been sabotaged by the uncooperative behavior of certain teacher groups within a nation's educational establishment. However, several appropriate strategies can be developed to help minimize the possibility of this occurring on future projects. Projects must have reliable transmission systems, even if it requires heavier expenditures than anticipated. An equipment saturation approach should be taken in the schools, even if this means fewer schools will be involved. An efficient maintenance system must be developed to adequately maintain the existing equipment. Teachers must be convinced that educational broadcasts can help improve their curriculum. The programs should model sound pedagogical approaches for them. In-service activities can be delivered via media to help teachers grow professionally. Appropriate job-related incentives for becoming involved in
Media-based programs should be provided, so that the teachers feel participation is worth their while. Perhaps broadcasters could help organize teachers' groups like Japan's ZEMPOREN, which would encourage use of new communications devices in classrooms. Targetting school broadcasts into poorer areas rather than to the privileged sectors of modern cities, seems the most sensible plan of action. Not only is the need greatest in these regions, but perhaps opposition to such projects within the teaching force is less likely. Elementary schoolteachers are generally those most interested in broadcasting. Finally, nothing convinces educators more effectively that media is worthwhile, than reliable indications that students can learn a great deal from the programming.
V. INSTRUCTIONAL APPROACHES TO MEDIA PROGRAMMING

5.01 Throughout the history of educational broadcasting, there has been an ongoing debate over the proper role of instructional media. One school of thought has insisted that media programming be designed as an essential component of a given course. Programs should take students through major sections of the curriculum, covering key ideas and critical factual material. They should be used on a regular basis. They should be designed to stand alone and not depend upon a teacher's explanation to clarify their relevance to the rest of the course. Educators should have significant input into the design of the programming, so that it is curriculum-based and instructionally sound.

5.02 Like any good lesson, the broadcasting lesson should move at an appropriate pace, in logical sequence, with appropriate review of critical concepts. It should organize the material effectively, so students can more easily grasp it. It should stimulate students, so they develop an interest in the subject matter. It should also get them thinking carefully, perhaps even in creative ways. In short, media productions should teach at least as effectively as the average teacher.

5.03 An alternative approach to classroom media utilization views media productions as supplementary classroom materials. Programs should be used as the teacher sees fit, to clarify material or to provide audiovisual experiences. In this model of media utilization, the teacher remains the primary source of instruction and media materials are ancillary. It is often described as a media "enrichment" approach.

5.04 As enrichment, programming need not adhere closely to curriculum objectives or attempt to teach substantial sections of a course. It need not include instructional devices to structure the material. Programs may simply provide audiovisual experiences, which the teacher must integrate into the curriculum. Often these programs explore a single topic in some detail, rather than attempting to cover a predefined part of the course. Under this media utilization model, programs are not necessarily viewed on a regular basis, but sporadically, depending on the teacher's degree of interest and awareness about the availability of programming relevant to particular topics in the course of study.

Problems

5.05 While many educational broadcasters would prefer to see programming used in classrooms on an ongoing basis, this pattern has been difficult to establish. Certain circumstances mitigate against the extensive use of school broadcasts, so that, in many cases, classroom media utilization has gravitated into an "enrichment" mode, almost by default.

Factors Underlying the Adoption of Enrichment Approaches

5.06 The enrichment approach makes sense when broadcasts cannot be coordinated effectively with classroom lessons. If programming cannot be
presented on a regular basis during appropriate sections of the course of study, then the teacher will present the material himself, relying on media only to supplement his lessons, either on an occasional broadcast or through renting a film (or tape). Two factors have made the ongoing classroom use of broadcasts very difficult, and have thereby contributed to the tendency of teachers the world over to see media as an enrichment activity, rather than as a primary source of instruction to be relied upon on a steady basis. The first factor is the degree of variation in educational curricula across different school systems. The second factor is the scheduling difficulty inherent in the departmentalized structure of secondary schooling.

5.07 The educational television experience in the United States is an excellent example of how a decentralized educational system can frustrate teacher attempts to use broadcasts on a regular basis. As befits its confederate political origins and multi-ethnic heritage, education in the USA is primarily the prerogative of the states and of local municipalities. There is very little central control of education on the national level. Appropriate curricula are developed by local school boards throughout the country to suit regional needs. Consequently, it is extremely difficult for educational technologists to develop series that will be used on a regular basis throughout the nation. A given broadcast seldom coincides with most curricula around the country, in terms of their exact scope and sequence. Even within a given state, variations in curricula limit the applicability of programming (Blakely, 1979).

5.08 To surmount this problem, one American educational television production unit, the Agency for Instructional Technology (AIT) has organized large consortia to develop programming, thereby determining needs and securing potential clients before a television series is actually produced. AIT solicits financial support from as many state education agencies as it can interest in a specific school television series. Only when funding has been obtained and a potential audience identified, does AIT proceed to produce the programs (Middleton, 1979). Several of its series, including "Think About," "Inside-Out," and "Bread and Butterflies," have been among the more heavily viewed programs in American public schools (Dirr and Pedone, 1979). But even these programs were designed as supplementary instruction, rather than as an integral part of a required curriculum.

5.09 The Children's Television Workshop adopted a radical approach to dealing with these problems associated with coordinating broadcasts with school curricula. Its founders decided to target programs for children when they were at home rather than when they were at school. The CTW productions, "Sesame Street" and "The Electric Company," became a kind of independent "television curriculum" for young children learning to read and compute (Land, 1971).
5.10 By and large, today's American school television programming can
be characterized as enrichment material. Few programs actually present a
substantial segment of the required course of study. Rarely can an
American school television program be shown effectively as an independent
lesson, without teacher explanation.

5.11 The second factor which has contributed to the adoption of
enrichment approaches to school media utilization is the problem of
scheduling broadcasts for classroom viewing. This problem has even
frustrated the efforts of a nation that has produced some of the world's
most respected, most successful school television programs: Japan.

5.12 Few nations are as well suited to school broadcasts, as in
Japan. The country is racially, culturally and linguistically uniform. It
has only one time zone. It has a strong public broadcasting system, with
its own separate educational network, which extends to every region of the
country. The historically centralized administrative structure includes a
powerful Ministry of Education, which has established national curriculum
guidelines that Japanese schools, by and large, tend to follow.
Consequently, the Japanese Broadcasting Corporation, NHK, can plan
programming that it can reasonably be sure will relate to what is occurring
in many classrooms throughout Japan. As discussed in Chapter Four,
some of the NHK's elementary school programs have been among the world's
most successful school television programs (Nishimoto, 1969).

5.13 Yet, the utilization levels of NHK secondary school programs are
low. Despite the enormous effort expended by NHK to penetrate the
secondary schools of Japan, there have been negligible results. Although
other factors, such as the preoccupation with college entrance exam
preparation, contribute to this vast difference in television utilization
levels between the elementary and secondary schools in Japan, scheduling is
undoubtedly a major difficulty. It is simply impossible to coordinate
broadcasts to match the scheduling of a given subject in a departmentalized
school structure where it can be offered at any time during the day.
Japanese secondary school teachers use television programming on a
supplementary basis, if at all (Tiene, 1985).

5.14 One solution to this scheduling problem is, of course, the use of
tape to record programs for convenient use at another time. The problem at
this point is that videocassette recorders (VCRs) are not found in
sufficient numbers at schools, even in the developing nations. In Third
World schools, the use of VCRs in significant numbers is years away. The
use of audio recorders to tape school radio programs in developing
countries is a more feasible proposition, which will be discussed in the
second half of this chapter.

5.15 Another way to use recorders is to play back commercially
available material. However, most of this material is for enrichment
purposes. Also, the process involved in acquiring tapes (and films) can be
problematic.
Weaknesses Inherent in the Enrichment Approach

5.16 In an ideal scenario, the teacher would have an extensive set of audiovisual materials to select from. These films and tapes would be cataloged in such a way that the teacher would be aware of what each item was about, whether it was well produced, and how to obtain it. The arrangements for procuring these programs would be efficiently expedited, so the particular item arrived on the right day. Equipment would be readily available to show the programming that he ordered, and it would be functioning properly. The curriculum could be fully enriched by a variety of interesting media productions.

5.17 If this system worked efficiently, the "enrichment" approach to media utilization might be more viable. Unfortunately, the process of obtaining and presenting media productions is somewhat complicated. Finding out what specific productions are available to help teach a certain topic can be a time-consuming experience (a helpful media specialist can, of course, expedite this process). Locating a media collection where a particular program is available and making the arrangements for obtaining it involve some additional time and effort (school tape libraries can simplify matters). Funding must be available to cover costs of rental (or purchase), and perhaps some administrative approval is necessary. Equipment to show the production must be reserved and properly set up. Hopefully, the teacher will take some time to preview the production and prepare appropriate follow-up activities.

5.18 This process has a number of weaknesses. First of all, it presupposes an interest in using media that many teachers simply do not possess. Finding excellent programs on a given topic can be a real challenge. The whole procedure of obtaining audiovisual materials taxes a busy teacher's valuable time. It demands extra energy that some teachers are unwilling to give. These problems exist even under the best of circumstances. But in addition, the process can break down at a number of points. Orders can be misplaced. Production can be lost in the mail or arrive late. Equipment can malfunction. Sometimes just a few frustrating experiences like this can cause a teacher to become discouraged thereafter about the idea of using media in his class.

5.19 While the use of "audiovisual aids" has enhanced classroom teaching since the advent of instructional films, it has not revolutionized classroom instruction in the developed countries. Furthermore, it is a very difficult system to implement in the Third World, for the above mentioned logistic problems associated with ordering a film or tape are far more serious in developing countries. Few titles are available, playback equipment is scarce, postal services are unreliable, etc. This system, which is cumbersome in the industrialized nations, is rather impractical in most developing countries. Broadcasting is still a more viable approach in the Third World than is the postal distribution of media productions.
5.20 Many developing nations have experimented with broadcasts designed as "enrichment" activities. Countries like Ethiopia, Iran, Jamaica, Indonesia, Iraq, Kenya, Malaysia, and others have opted for school broadcasting that is supplementary in nature (Academy for Educational Development, 1986; World Bank Reports). These efforts have, on the whole, failed to interest large numbers of teachers. When an activity is non-essential, it will tend to be overlooked.

5.21 The really unfortunate part of all this is that educational broadcasting is so expensive. The equipment costs can be substantial for a reliable transmission system with studio production facilities and an adequate number of receivers. If the broadcasts are not very heavily utilized, this considerable outlay of a developing nation's limited financial resources has largely been wasted (Jamison, Klees, and Wells, 1978).

5.22 Not only do enrichment type programs generally fail to generate sufficient interest among teachers, but even when they are used, their impact may well be limited. In many cases, teachers fail to effectively integrate this type of programming into their curriculum. Especially when it is received "live" in the classroom, teachers may find it difficult to spontaneously provide appropriate comments, questions, activities, etc. Many teachers perceive media presentations as an opportunity to take a break, and do not take the instructional potential of programs very seriously. Some teachers in the developing world lack the kind of professional training that would prepare them to utilize media effectively. Even when a teacher is skilled in using broadcasts, the instructional payoff from the programming may not warrant its use, because it relates only tangentially to the topic that the class is presently investigating. In short, even under the best of circumstances, programming designed as supplementary is likely to be somewhat disappointing in terms of overall instructional benefit.

5.23 In a sense, wealthy nations like the United States can afford to devote entire television channels to school programming for enrichment purposes. In fact, the amount of money spent on PBS school broadcasting is rather small in the overall scheme of things, when compared, for example, with total government spending, the budgets of the commercial U.S. networks, or even the budget for the entire PBS schedule (Corporation for Public Broadcasting, 1978-1979). Yet, this same amount would not be inconsequential to a developing country. The impoverished nations of the Third World cannot afford to waste their limited resources on an enrichment style of school programming, which is not likely to substantially improve the education of its young people.

Educational Broadcasting Needs of the Developing World

5.24 Media programming that teaches entire units is the only type worth developing for the Third World. First of all, equipment costs associated with an educational broadcasting system represent such a significant financial outlay for developing countries that they need to use
it to its fullest potential. Secondly, the audiovisual resources available for teachers for curriculum enrichment purposes are generally so limited in these countries, that this is not a viable option for providing classroom media experiences.

5.25 Furthermore, the needs of most Third World classrooms for "mediated" instruction are far greater than those in developed countries. For example, in industrialized nations, the vast majority of teachers are fully certified and have graduated from a four-year college. As discussed in the previous chapter, this situation does not hold true throughout the Third World, where some teachers may not even have the equivalency of a high school diploma. Consequently, school broadcasting can play a far more critical role in the developing countries. American school children could of course, benefit from interesting instructional programming, but most of them will receive an adequate education from a qualified teacher, regardless. Large numbers of pupils throughout the developing world will not receive an adequate education unless dynamic broadcasts can be delivered to their classrooms (World Bank Education Sector Policy Paper, 1980).

5.26 In Third World classrooms, one does not want to have to heavily depend upon the abilities of the teacher to effectively interpret the programming (as is the case with "enrichment" programs). For many teachers in these schools have never been trained to do so or may be unfamiliar with the particular topic. Nor does one want to have to depend upon books to convey the gist of material (as is often the case with "enrichment" programs). For sometimes textbooks are in short supply, inadequate, or out of date.

5.27 Schools in developing countries are often characterized by multi-aged classrooms, in which a teacher attempts the unenviable task of instructing several grade levels at once. Under such circumstances, available broadcasts that teach whole lessons to a given cohort of students can really help a teacher meet this challenge. The teacher can turn on the radio (or television) for that group and spend his time teaching another group.

5.28 The weaknesses of Third World schools often stem from major curriculum deficiencies. In many cases, the material is antiquated. Subject matter may still reflect the curriculum of the colonial period. In other cases, topics are not especially relevant to the pupils' everyday lives. Students may be learning about products from faraway countries, but never explore more pressing concerns, such as nutrition, local diseases, or family planning. Textbooks may date from earlier decades. Students may be reading science texts that eagerly anticipate man's first steps on the lunar surface.

5.29 Instructional approaches also tend to be very traditional, generally consisting of teacher lecture mixed with textbook reading and rote drill. Seldom is student participation encouraged. The amount of pictorial material in the classroom is typically very limited. Rarely do
instructors try any imaginative pedagogical techniques, like games, debates, or drama. Discovery-oriented approaches to learning are equally difficult to find. The typical school day in most developing countries is predictably routine.

5.30 Educational broadcasts, therefore, can make some significant contributions to schooling throughout the Third World. There is a need to demonstrate dynamic up-to-date instructional approaches for teachers, especially for those whose educational backgrounds are deficient. There is a need to help redefine curricula in many countries, so that more relevant topics are introduced and more current information is supplied. There is a need for greater variety of activities during the school day. There is a need for visual material that helps clarify for pupils, in a concrete way, what is being investigated. Students must be stimulated to think for themselves. The pedagogical strategies assumed by educational broadcasts should attempt to redress as many of these deficiencies in Third World schools as possible. An "enrichment" approach is far too superficial to accomplish very much in this regard.

Successful Strategies

5.31 Educational media productions for the developing world should be designed to cover comprehensive sections of the curriculum. Given the weaknesses of many Third World curricula, educational broadcasting can play an extremely significant role in this regard. "Enrichment" programs, which generally only deal with certain selected topics within the course of study, will simply not do the job, for their coverage of the curriculum is incomplete. To limit the scope of educational broadcasts in this fashion is to neglect an opportunity to fully address major problems within the nation's educational system.

Coping with Varied Curriculum Needs

5.32 How can broadcasting be utilized to provide flexible approaches for diverse curriculum needs? This has become an important educational issue throughout the Third World. For programming needs can vary from place to place, and a given production may fail to satisfy certain groups. While most developing nations are struggling to bring various regions under control of the central government, a great deal of autonomy sometimes remains in the hands of local leaders. Many Third World countries are culturally diverse, and each group has retained a certain degree of independence. Often languages change within the distance of a few kilometers. Sometimes, the specific needs of different groups vary considerably because of unique cultural patterns, traditional lifestyles, relationships with neighboring groups, local ecological factors, etc.

5.33 Transmission of media courses to Third World schools will fail to effectively educate certain elements of the school population, unless measures are taken to take local needs into account. As already suggested in the first chapter, one possible solution to this problem would be the construction of local FM radio facilities. These are not prohibitively expensive and their cost in the near future is likely to be even lower,
since the prices for electronic products have been steadily declining over the past few years. They would provide an opportunity for local broadcasters to select programming that is meaningful to populations in surrounding areas. Small radio studios included in each facility would allow for translation and adaption of available programming. Perhaps some local educational productions, of a limited nature, could even be developed. This might include lectures by a prominent local teacher, public discussions of important local issues, description of local projects, etc.

5.34 Educational broadcasting will probably reach the largest numbers of students by means of a hybrid national transmission system that includes local FM stations for various ethnic minorities, along with a national radio (or even television) network. This type of system would combine extensive access to the school population as a whole, with the flexibility to provide for varied circumstances on the local level (Futagami, 1981).

Overcoming Scheduling Difficulties

5.35 The best way to overcome scheduling problems is to use tape recorders. Tape allows a teacher to use a series effectively. Programs can be presented in the proper sequence at an appropriate pace. If necessary, material can be conveniently played back for review. Programs can be stopped at appropriate points, for questions, discussion, or further explanation. Tape makes it realistically possible to use programming on an ongoing basis, so that whole units can be taught with media. In fact, tape also gives the teacher more control over the media presentation, enabling him to use it as he feels best and providing flexible opportunities for him to insert his own comments about the topic (Akiyama, 1983).

5.36 As mentioned earlier, one problem with using tape is that recorders are not widely available in schools. This is especially true in developing countries. Videotape recorders are an extremely rare sight in Third World schools. However, audiocassette tape players and tape recorders can be relatively inexpensive. Just as transistor radios have become fairly common throughout Third World countries, audiotape recorders may soon become more commonplace. Schools in developing countries should be encouraged by educational officials to purchase recorders, so they can take full advantage of available educational radio programs.

5.37 In the past, many educational broadcasting projects neglected to include recorders as an integral part of the overall plan. In the future, the significant potential of recorders to overcome scheduling difficulties and conveniently deliver programming should be more carefully considered. Many teachers would use media in more significant ways, if it were more convenient to do so, and tape can make that possible.

Curriculum Reform

5.38 School broadcasts can be effectively used to initiate curriculum reform. In fact, some of the most noteworthy projects in the history of
educational broadcasting have accompanied major national educational reform movements. The instructional television project in Samoa brought an updated curriculum to these Pacific islands, which, up to that time, did not really have a modern educational system. The school television project in El Salvador was designed, in part, to provide new curricula for vocational educational programs on the secondary level. Both of these projects were successful in helping initiate the expansion of each country's education system. And, in both cases, with assistance from the United States, the new curricula were effectively introduced via the medium of television (Schramm, 1977).

5.39 Educational broadcasts can effectively introduce course material that addresses major problems within a country, such as health care, nutrition, infant care, birth control, disease control, pollution, and so on (Perraton, 1982). Broadcasts can also be developed to make an existing course more relevant to the conditions in a particular country. Broadcasting can update material by furnishing the latest developments, which textbooks may not cover or may contain outdated information about.

5.40 In most developing countries, both teachers and students can benefit tremendously from programming that exhibits sound pedagogical approaches. As previously discussed, the instructional methods used in most Third World classrooms tend to lack variety and imagination. In fact, any program that provides some sights or sounds from outside the Third World schoolroom will help enliven the coursework. But carefully conceived media programs can do much more than this. They can structure learning experiences in dynamic ways.

Discovery-Oriented Approaches

5.41 One interesting technique that broadcasts can model for teachers is a discovery-oriented approach to learning. Information is presented to the students, but they themselves must figure out the reasons why this is so. The teacher does not simply explain the material, but poses questions to help pupils think for themselves. This instructional approach develops the students' ability to think, surely a more critical skill than the far more common school task of merely memorizing material.

5.42 The discovery approach has been successfully applied by the aforementioned primary school science television programs of Japan. Each program is carefully developed to teach a few key concepts along with one principal theme. The television teacher presents a given set of phenomena. He or she then proceeds to question the class as to what is really happening and why. Throughout the lesson, relevant information is presented that helps the student determine what the key ideas or underlying principles may be. Not until the very end of the television lesson, after pupils have had an opportunity to think about the materials, are the concepts finally explained by the teacher (Tiene and Urakawa, 1983).

5.43 This type of program has been highly successful in Japanese elementary schools. Similar programming could play a key role in helping
to turn schools into places where children are stimulated to think, rather than places where students are asked to remember facts that may not be especially important to them.

Sound Instructional Design

5.44 Another way in which broadcasts can both provide really sound lessons for students and also model excellent pedagogical technique for teachers is to develop lessons which follow principles of good instructional design. The Nicaragua Radio Mathematics Series was prepared by a highly qualified team of educators from Stanford University, who developed the programs following the standard procedures for instructional development. This included analyzing the skills involved, setting specific learning objectives, creatively devising activities to accomplish these objectives, obtaining various types of feedback, and revising material accordingly.

5.45 The project's "research driven" design, as it was called, included several key steps. First, students were pretested at the beginning of the term to determine initial achievement levels in the subject. These results helped determine which skills should be dealt with first in the instructional sequence. A detailed "scheme of work" was drawn up, which identified key skills, established a long series of instructional objectives, and related them to the series of radio lessons being developed. Throughout the project, "embedded tests" enabled the instructional designers to monitor achievement levels and to determine what revisions were needed to convey certain concepts more effectively. This data was used in the development of future lessons, a process that the Stanford group liked to call "feed forward" (a takeoff on "feedback").

5.46 This "formative evaluation" of materials, combined with appropriate adjustments in lesson design, was perhaps the key to the widely acknowledge success of this particular project. Its effectiveness was demonstrated at the end of the school year by a "summative evaluation" of student achievement levels, which indicated significant gains for radio students above and beyond those attained by pupils of the same age in other Nicaraguan classrooms.

5.47 The Nicaragua Radio Mathematics Project established a model for instructional radio which was later applied successfully to other settings and subjects. A "mastery learning" approach was taken wherein a fundamental skill was presented thoroughly, until the group was ready to move on to the next level. One way this was accomplished was through carefully planning the lessons, so that learning proceeded in small increments. Another technique employed was what came to be described as a "distributive" approach to learning. Material on a given concept or skill was dispersed throughout the instructional sequence, so that students could be exposed to it repeatedly. This repetition of key elements of the course was found to be instructionally very effective.
5.48 Another key aspect of this model was the student participation elicited during the radio lessons. Students were asked to verbally respond to the radio voices, to sing along with music, to clap with a beat, etc. They were also asked to write down answers on worksheets. Getting students to react to the lesson material encouraged an active orientation to the learning process. It also helped the pupils obtain immediate feedback on how they were progressing. After asking for a response, the "radio teachers" would supply the correct answer for the class, so students would know if they were right or not. Since the learning increments were small, as previously noted, most of the time the majority of the group verbalize (or record) the correct answer. So the radio scripts also could fairly safely include some positive reinforcement for the group, complementing them on knowing the answer. Following the traditional tenets of instructional development manuals, this kind of ongoing, immediate feedback with constant encouragement became a key component of the Nicaragua model for developing effective radio lessons.

5.49 Notice how this instructional model encourages teachers to use sound pedagogical principles. Clear objectives are established for each lesson. The instruction proceeds in small steps which even pupils of low aptitude can generally follow. Students are encouraged to participate actively during the lesson. They receive immediate feedback for their responses. A positive learning atmosphere is created by ongoing encouragement. These practices are critical elements of any well designed instructional sequence. If teachers throughout the developing world would effectively implement these techniques in their own lessons, levels of student achievement might well rise, as they did during the Nicaragua Radio Mathematics Project (Friend, Searle, and Suppes, 1980).

Alternative Instructional Models

5.50 Another feature of the Nicaragua project that seemed to contribute to its success was the variety of lively activities written into the programs, including skits, songs, riddles, jokes, etc. Many Third World classrooms can be characterized by stale pedagogical approaches; the typical teacher lecture or textbook work period. In many cases, there is little to relieve the monotony of this daily routine. Media projects, like the one in Nicaragua, can bring some entertaining learning activities into the classroom. For students, this is often a welcome break from an otherwise highly regimented existence. For some teachers, hopefully, the engaging activities used on the broadcasts will spark an interest in introducing similar kinds of experiences into the curriculum.

5.51 Media programming has a significant role to play in suggesting alternative modes of instruction to the teachers of the developing world. A variety of interesting activities can be enacted on a program, to demonstrate how they might be attempted in the classroom. Discussion is probably the most important of these. But formal debate can be stimulating. Games of different types can liven up the classroom. Simulations can be highly instructive. Demonstrations can effectively clarify procedure. Obviously, many possibilities can be presented on
broadcasts, so that teachers can expand their repertoire and are encouraged to use their imagination in developing classroom activities.

5.52 The presentation of various sights and sounds should be an extremely significant aspect of a young person's education. If education is to be relevant to later experiences in life, it is important to bring vicarious experiences into the classroom via media. Often it is difficult for children to grasp certain concepts, without having had some basic experiences associated with the topic. This is especially true for children in remote areas of the developing world, where experiences have been limited to a small area, perhaps comprising only a single village. How does a teenager from an island in Indonesia, for example, conceive of a polar bear, the Sahara desert, or New York City, without having seen them? Media can be a "window on the world," and pupils in isolated regions need stimulating programs even more than those living in more developed areas, where young people have the opportunity to actually experience a great deal more.

5.53 To summarize, the authors feel, the only type of school programming worth developing for Third World countries is the kind that can deliver an effective set of lessons independently of the teacher and the text. The role of educational broadcasts includes redefining the curriculum, modeling worthwhile instructional approaches for teachers, and delivering expertly designed lessons of an engaging nature to pupils. If educational broadcasters do not attempt to fulfill these responsibilities in developing programs, then they should not waste the time, effort, and money that will be spent on them. They must proceed with a respect for the pedagogical power of these new media, and attempt to use them to their fullest potential.
VI. PRODUCTION TECHNIQUES

6.01 Up to this point, we have been exploring the many factors which can ultimately affect the nature of educational broadcasts. But we have not yet discussed the programming itself. How can instructional programs be most effectively designed to capture the attention of school audiences and teach them meaningful subject matter in dynamic ways, using the full capabilities of the particular medium involved? Furthermore, how can written materials be most effectively employed to support the instruction included in the programs? No matter how intelligently educational technologists handle all the other complex issues involved in implementing a large-scale media project, if the productions themselves lack appeal, or are instructionally weak, the whole process will be for naught. This chapter will explore how programming can most effectively use the enormous potential of the electronic media to teach. It will also examine the appropriate role of written material designed to accompany programs, as part of a comprehensive "learning package."

Problems

6.02 The difficulties in producing really exciting educational programming are essentially twofold. The first problem is not knowing how this can be accomplished. Third World countries have very little experience in this area. The second problem is not having the resources available to implement project plans. The resources of developing countries are, of course, limited, and they can rarely put into effect all they hope for. We shall explore both of these issues, with an emphasis upon how even impoverished nations of the Third World may be able to produce the kind of dynamic school programming that could strengthen their overall educational efforts.

The Unimaginative Use of Educational Media

6.03 Unfortunately, very few projects have managed to take full advantage of the radio or television medium to deliver instruction. These media have thoroughly revolutionized the role of entertainment in our daily lives. During the twentieth century, many people gained access through the mass media to entertainment which, in previous eras, was enjoyed only on special occasions or, in some cases, restricted to certain privileged groups. The enormous influence of these new electronic media lies in their ability to reach huge numbers on a continuing basis at minimal cost to the recipient. Their attractiveness also stems from their ability to communicate in exciting new ways. A radio broadcast can entertain us with creative combinations of speech, music, sound effects, etc. Television can provide interesting camera angles, use camera movement effectively, utilize special photography to reveal what the human eye cannot see, edit material creatively, and develop intriguing special effects through new cinematic and electronic techniques. When used imaginatively, these media can provide innovative auditory and visual perspectives.
6.04 It is difficult to conceive of a potentially more powerful set of tools for educational purposes. We have been furnished with the means to secure the students' interest, direct their attention, reveal things that their own senses cannot, and structure the presentation of this material however we think best. Yet, instructional radio and television programming has, more often than not, failed to excite students. It often has a reputation for being dull.

6.05 Educational broadcasters have often tended to perceive these new media in terms of their potential as powerful delivery systems, but have unfortunately failed to fully appreciate their potential as dynamic new forms of communication. For years, the majority of educational programs on radio and television were essentially classroom lectures transmitted over the air waves. The new media were used to largely disseminate traditional forms of instruction. Programs were not really productions, in the truest sense of the word. They did not use the production process (developed by the entertainment industry) which involved script development, finding talented performers, obtaining special footage, editing the material, etc.

6.06 There was a good reason for this state of affairs (besides the regrettable inertia that so often characterizes the field of education). Radio and television were basically "live" media, until the development of magnetic tape. Without the ability to save footage and edit it, actually "producing" shows was difficult. Instructional records and films were, of course, available for broadcasting purposes, but these generally played a secondary role within the traditional lessons that were being transmitted on a regular basis into the schools.

6.07 In the case of television, not until the mid-1960s did sophisticated studio productions for educational purposes begin to emerge. At that time, Japan's NHK school division developed the innovative, discovery-oriented programming that has already been referred to in previous chapters (Nippon Hoso Kyokai, 1969). In the United States, the Children's Television Workshop cleverly took advantage of techniques used in television advertising to involve young viewers in its "Sesame Street" and "Electric Company" series (Polsky, 1974). These lively productions attained heretofore unprecedented levels of educational television viewership among young children.

The Demands of the Production Process

6.08 Even though the development of tape has made the implementation of complex production techniques considerably more feasible, school programming has, for the most part, failed to fully capitalize upon communicative power of the new media. This situation has been especially true throughout the Third World. The problem is basically that sophisticated media productions require a whole set of resources that may not be available.

6.09 The most fundamental requirement is probably the equipment necessary to develop such programming. A comprehensive list of specific items can be obtained from other sources (Zettl, 1983). But for radio, a
studio set-up would include the appropriate microphones, turntables, tape recorders, mixers, special effects audio "board," and a synthesizer for musical effects. For television, a multicamera studio set-up with special effects generating switcher, a portable video recording unit (portapak), lights, editing system, along with the audio equipment just mentioned, should enable qualified, talented personnel to produce some really worthwhile programs.

6.10 Chapter Three discussed equipment issues in detail, clarifying how difficult it has often been for developing nations to purchase, install, and maintain the hardware necessary to operate an effective instructional media system. Without the use of properly functioning equipment, it becomes almost impossible to produce professional-looking results.

6.11 One case in which equipment problems clearly frustrated production efforts was the Ivory Coast television project. This project had the potential to produce some excellent programming. It included some talented French educational television producers, who had logged several years of experience in the innovative Tele-Niger project. Funding levels were relatively high, so that the necessary equipment and personnel could be obtained. Circumstances looked quite promising.

6.12 Yet the administrative difficulties, mentioned in Chapter Two, so delayed construction of the television studio that production had to begin before the building was completed. Makeshift facilities were used instead and, consequently, the quality of the school television programming suffered. When the studio was finally finished, efforts were made to re-shoot these programs. But, by then, dissension against the project had already gained considerable momentum and even the most dynamic programming imaginable might not have saved it (World Bank Report: Ivory Coast, 1980).

6.13 The Ivory Coast experience demonstrates that even reputable production personnel cannot function effectively without adequate equipment. However, the converse is also true. No matter how sophisticated the equipment, high quality programming cannot be developed without qualified personnel. To further complicate matters, the media production process includes a number of relatively specialized functions. Project managers in developing countries often find it difficult to assemble a thoroughly qualified staff.

6.14 The most critical problem is generally finding a producer-director with the leadership qualities necessary to effectively supervise the production effort. Such a position demands a variety of talents. Organization skills are critical, for innumerable details must be dealt with in the course of a project. Creativity is essential. A director must also have social skills that enable him to work professionally with his staff, and with performers, to elicit their best efforts. He must have full command of the complicated set of activities going on during a shoot. Finding a person who is strong in all these respects can be difficult.
6.15 Someone must also provide guidance as to the educational merit of the programming. Production teams can benefit enormously from the services of educational advisers. Unfortunately, it is sometimes difficult to find educators who have some experience with media and can work effectively with broadcasters.

6.16 In addition to the producer-director, a television production crew generally also includes a technical director (to work the switcher or recorder), a floor manager, camera operators, a lighting specialist, an audio-person, a technician, and perhaps some additional staff to assist in minor ways (budget permitting). Radio requires fewer personnel; generally a director, some audio personnel, and a technician. In most developing countries, people with experience in these positions are difficult to find. So personnel must generally be trained to fill these positions, and this can be somewhat expensive and time-consuming.

6.17 Another entire set of personnel involved in media productions are the performers. Talented actors, musicians, and artists can greatly enhance productions. In addition, teachers and other "experts" may appear on the shows. Locating really capable people can be challenging, and sometimes their fees are high for the typical educational programming budget.

6.18 In addition to obtaining all the necessary personnel for a production, a variety of other arrangements must be worked out. "On-location" segments can be especially complicated to arrange. With television, if a studio is used, the sets must be constructed and necessary props must be obtained. With radio, appropriate sound effects must be inventively imitated. Producing an interesting program generally involves a great deal of effort (Zettl, 1983).

6.19 The reader can see another reason why radio was recommended in Chapter Three as the preferred instructional medium for the Third World. It demands far less equipment and a much smaller production staff than does television. With radio, the entire production process is simplified, so that the challenges described throughout this section become far easier to successfully surmount.

6.20 However, the critical question remains as to how impoverished Third World countries can possibly afford the costs associated with media production, be it radio or television. If developing countries needed to start from scratch in creating all their own programming, the situation would be extremely difficult. However, there are some shortcuts which we will discuss in the second half of this chapter.

The Role of Printed Material

6.21 Printed material has a critical role to play in any educational media series. Even when a broadcast holds up well on its own (as it should), written material can serve a number of key functions. In the form of a teacher's guide, it can clarify for the instructor how to most
effectively use the programming. As supplementary text material, it can reinforce the material presented on programs. Well conceived worksheets can provide opportunities for pupils to express what they have learned from a show.

6.22 Broadcasts, unfortunately, can flash by so quickly that certain students may find the material difficult to grasp. While productions should, of course, review material at appropriate points, and tapes can be rerun for review purposes, nevertheless media programming will never be as convenient as the printed page for studying at length or reviewing.

6.23 Too many broadcasts have lacked accompanying printed materials altogether. Sometimes they are simply not included as part of the original plan. At other times, they are given low priority, and fail to materialize when funds run out. Some projects attempt to cover the costs of printed materials by selling them to schools. However, this strategy generally results in lower utilization levels, especially in less affluent districts where the materials are most desperately needed.

6.24 Educational broadcasters may assume that teachers and students do not really appreciate written materials that supplement programming. There is some justification for this assumption. A number of years ago, an extensive, attractive teacher's guide was produced by the Agency for Instructional Technology in the U.S. for the "Thinkabout" series. Research was later conducted to see how influential the guides were in helping teachers effectively utilize the programs. It was discovered the few teachers took the time to even read through the entire guide. Most of them were simply interested in a brief overview of the programming, without additional embellishment (Sloan, 1980).

6.25 When accompanying written materials are really extensive, a very different problem can develop. The British Open University produced such fine texts to supplement their educational broadcasts that students began relying upon this written material, to the point where some of them considered the programming superfluous. In this case, the printed materials were so comprehensive and so clear that they began to overshadow the broadcasts. A required text that provides enough information for students to pass their exams can actually serve as a disincentive for them to turn on the programs.

6.26 In the Third World, printed matter designed to accompany broadcasts has faced other problems. The unreliable postal services in some countries make it difficult to count on the materials arriving on time, if at all. The Nicaragua Radio Mathematics Project deliberately limited the amount of worksheet material to be used with its broadcasts partially because its staff anticipated these kinds of delivery problems. In fact, although its programming was directed at three grade levels (1-3), only the first grade classes used worksheets, and these were generally limited to one per lesson. The radio programs were cleverly designed to teach mathematics without the need for paper and pencil; how well they succeeded will be described later in this chapter (Friend, Searle, and Suppes, 1980).
Perhaps an even more serious problem for Third World projects is the cost of printed materials. Developing countries are often in such financial straits that the additional expense for worksheets or teachers guides, above and beyond the costs associated with the programming, is viewed as exorbitant. At the moment, this issue has been raised in relation to the renewal of the Kenya Radio Language Arts Project. As inexpensive as the workbooks are by the standards of developed countries, they constitute a financial burden in Kenya.

Successful Strategies

One way for Third World nations to develop fine educational media programming is for them to imitate production models that have already proven themselves effective. The less developed countries generally lack sufficient resources to develop really professional instructional broadcasts on their own. Yet, experience has demonstrated that certain types of programming can be successfully adapted for use in other countries.

Which production models could most appropriately serve as prototypes for global adaptation? Two cases stand out as especially exemplary. Both involved an extensive research and development stage. Both used innovative production techniques. Both were very popular with their respective target audiences. Finally, both were proven instructionally effective in carefully designed experimental studies, where members of their audience demonstrated higher learning gains than a "control group" of children who were not exposed to the broadcasts. The model radio series is Nicaragua's Radio Mathematics Project (NRMP). The model television series are the two programs developed by the Children's Television Workshop (CTW), "Sesame Street" and "The Electric Company."

Educational Media Production Prototypes

In discussing a prototype series, it is important to differentiate those aspects of a series that may have nearly universal application from those which were far more specific to a given set of special circumstances. This section of this publication will attempt to clarify the key characteristics of those exemplary series which contributed most significantly to their success. For example, one key point is that considerable effort was expended on pre-production planning. Curriculum goals were carefully considered and clearly delineated. Specific learning objectives were established before scripting began, so that production technique could be developed within an intelligently conceived instructional sequence. In this way, clever, entertaining segments could be used to teach critical material, rather than merely becoming an end unto themselves.

CTW developed its own set of curricular objectives for young children just learning to read and compute. At CTW, a team of eminent educators after thorough deliberation and discussion, defined a series of critical learning skills for pre-school and primary school children. These capabilities included comprehending the symbolic representation of letters
and numbers, developing perceptual discrimination skills, understanding relationships, classifying, ordering, logical reasoning, and problem solving. Other goals were related to building self-esteem and encouraging positive social relationships. From these general goals, long lists of specific behavioral objectives were developed by teams at CTW consisting of child psychologists, learning theorists, early childhood educators, and instructional designers. These objectives were later used by scriptwriters to develop the programming (Lesser, 1977).

6.32 Based upon the Nicaraguan Ministry of Education's curricular goals for primary school mathematics, it was up to the instructional designers of NRMP developed what they called the "Scheme of Work." This was an overall game plan for later scripting that included detailed lists of mathematics skills, sequenced to match the lessons in the Nicaraguan primary school mathematics textbooks. Specific objectives were thereby established, which were imaginatively communicated through skits, songs, riddles, games, etc. Thus, the "Scheme of Work" served as the critical connecting link between particular computational skills and the radio scripts (Fossard, 1982).

6.33 So the production prototype includes careful clarification of critical objectives followed by an effort to comprehensively incorporate these skills and concepts into the scripts developed for the series. It is at this point that creative scriptwriters and television producers are brought into the process. Clear communication between them and the educational experts who developed the "Scheme of Work" is critical. Scriptwriters must fully understand what the programs are attempting to teach, so they can effectively utilize production technique to convey this material in lively ways.

Maximizing the Instructional Effectiveness of Production Technique

6.34 The power of the electronic media lies to a large degree in their ability to communicate realistic experiences, both authentically captured and artistically staged. The vicarious experience that students can obtain from media accounts for both the intrinsic appeal and potential effectiveness of educational productions.

6.35 Radio can provide drama, poetry, games, riddles, jokes, sound effects, and music. The visual dimension of television offers even more exciting possibilities. Television camerawork models certain perceptual processes. Zoom-ins and close-ups may help us perceive detail. Zoom-outs can literally "expand" our vision. Horizontal and vertical movements can survey a situation. Furthermore, editing technique, in either radio or television, can help structure material so that it is presented to the learner in an interesting, easily comprehensible way (Millerson, 1983).

6.36 The electronic media furnish educators with a dynamic way of communicating information that is far more appealing to most pupils than reading. While it is a shame that so many students fail to take full advantage of the reading skills they are taught in school, it is equally
unfortunate that radio and television rarely fulfill their full educational promise in the classroom. The media are instructional tools of enormous potential, especially when technique is intelligently and creatively used to maximize learning (Bryant and Anderson, 1983; Chu and Schramm, 1967; Jamison and McAnany, 1978).

6.37 Instructional strategies can be developed through production technique at a number of different levels. On the one hand, clever overall production treatments can be devised to teach entire segments of the curriculum. Simultaneously, a variety of media "gimmicks" can help focus the audience's attention.

6.38 The creators of "Sesame Street" devised some extremely imaginative treatments for teaching basic phonics and arithmetic. The animated character "Letter Man" appealed to young children as a cartoon superhero, and simultaneously provided ongoing opportunities to introduce the sounds associated with the letters of the alphabet. The "Count," a Dracula-like muppet, delighted children with his slightly scary and silly antics. True to his name, he also specialized in counting, thereby reinforcing the names of the numbers and reciting them in their proper sequence. Both of these characters appeared in the series on a regular basis, providing ongoing opportunities to present important materials in an entertaining way (Lesser, 1977).

6.39 The people at CTW also developed plot sequences that lent themselves to the teaching of certain skills. On "The Electric Company," a soap opera style sequence facetiously entitled "Love of Chair" was included at the end of every episode, week after week. Mimicking the "cliffhanging" conclusions of the soap opera genre, it invariably posed a series of questions at the end, about what was going to happen on the next show. This final section modelled questioning approaches for primary school children, emphasizing a series of sentences beginning with "wh" words (like "who," "what," "when," and "where"). These words were simultaneously flashed as subtitles across the bottom of the screen, to reinforce the use of this kind of interrogative pronoun.

6.40 The NRMP programs also used certain characters and story lines to good advantage in teaching mathematics skills. Sequences were developed in which a set of characters encountered a series of predicaments in a number of different shows. This continuity of characterization and plot line helped maintain student interest, while the arithmetic challenges dealt with in each episode modelled mathematics problem solving approaches (Fossard, 1982).

Maintaining Appeal

6.41 While these general treatments served as handy "pedagogical vehicles" for certain types of instruction, more specific production techniques were employed within each episode to focus attention. For example, on both the NRMP and CTW programs, audio cues were used extensively. The theme song which opened and closed each show gradually became familiar to
the students and helped to immediately involve them. Songs performed
during the programs were often used to reinforce material, especially when
the lyrics were written specifically to review key ideas. Sound effects
were found to be one of the most effective of all attention-getting
devices. So not only were they used to establish atmosphere, but they were
very deliberately inserted into programs at those critical moments when key
material was being presented. Silly noises, buzzers, horns, drum rolls,
and so forth were especially characteristic of "Sesame Street," which had
been described at one point as an educational "Laugh-In."

6.42 In fact, both "Sesame Street" and "The Electric Company" developed
a lively visual format much like that of the "Laugh-In" series, which
was very popular on American television in the late 1960s because of its
fast paced, zany approach to comedy. Clever camerawork characterized CTW's
programs and included extreme close-ups, sudden tilts, and fast zooms. In
addition, a variety of innovative cinematic techniques were used, including
slow-motion, stop-action, speeded up sequences, reverse motion, and
pixilation (where a series of stills were combined to create a herky-jerky
sense of movement). Fast paced editing of these sequences further contrib-
uted to a sense of non-stop visual bombardment that typified many of the
sequences on CTW's programs (Polsky, 1974).

6.43 This visually dynamic approach was successful in maintaining high
levels of attention even with very young children, whose attention spans
tend to be short. Camerawork helped direct their attention to specific
aspects of the material. The special effects often helped emphasize the
nature of certain processes. For example, time lapse photography could
demonstrate how a plant grows. Visual gimmickry was not only entertaining,
but instructionally advantageous.

6.44 Since attention is a prerequisite for learning, considerable
effort was devoted to developing productions that would maintain pupil
interest throughout the entire broadcast. Using a variety of research
methods, both NRMP and CTW explored what factors most successfully helped
involve children in the material.

6.45 One of the most effective means of sustaining interest is to
provide considerable variety. Segments were short. Animation was
interspersed with puppetry and live performances. Special film clips were
included. Quickly changing topic and format proved an effective way to
maintain high attention levels.

6.46 A second factor that proved significant in securing the attention
of young children was humor. Consequently, amusing characters were
developed and they were written into various comic adventures. Special
audio and visual effects that made characters appear to act in bizarre ways
also contributed to the lighthearted overall tone of this programming.

6.47 A third element that enhanced both the appeal and the
instructional effectiveness of the programming was repetition. Certain
segments were repeated on succeeding programs, but with a new twist each
time. Young children seemed delighted to see and hear certain familiar sequences, almost as if they were "old friends." Producers took advantage of this situation by breaking up certain skits into a number of short episodes that they then dispersed throughout a series of succeeding programs. The NRMP instructional designers described this approach as "distributive" learning, since the material from a given sequence was distributed across several programs.

6.48 However, this is not to imply that school programming can be disjointed. It must be stressed that this technique was carried out within the framework of a very well organized learning sequence. Students were simply given an opportunity to build upon what they had already been exposed to.

6.49 There were several advantages to this production strategy. One was that it kept segments short, which was appropriate given the limited attention span of the young children in the audience. A second benefit was that subject matter could be broken up into discreet segments that young children could reasonably be expected to digest. Finally, the repetition was pedagogically beneficial, because it helped reinforce material that the children had previously been exposed to (Fossard, 1982; Lesser, 1977).

Overcoming the Limitations of the Medium

6.50 Another variable that the research literature in educational media has shown to be instructionally effective is the eliciting of an active response on the part of students who have tuned in. Both NRMP and CTW were aware of this finding, and their productions were designed to encourage active participation on the part of their audience. Children were asked to clap, sing along, answer aloud, draw a picture, write something down, and even to occasionally dance around the classroom. In this way, it was hoped that one of the unfortunate limitations of broadcasting, its unidirectional mode of communicating, might be overcome to a certain extent.

6.51 The Nicaraguan project was especially intent upon developing what its directors later termed "interactive radio." The time allotted for student responses to the radio was carefully clocked through observation in classrooms, so that the performers paused, and then continued, as if they actually could hear the group's reaction. The radio came as close as possible to approximating a "live" presence in the room. Pupils did, in fact, react enthusiastically to the programs, and their active orientation to the programming has been considered one of the key elements in the instructional success of this series.

6.52 After students answered questions posed by the radio voice, they were immediately given the correct answer. This immediate feedback was another key component of this educationally effective programming. Students received instant information about how well they were comprehending the material. In general, the instantaneous feedback that media can provide is superior to that of a textbook, which, at best can furnish answers on another page (which students may look at before they even attempt to respond).
6.53 How can it be certain that the class has, in fact, responded correctly to questions posed? The answer to the potential problem of pupils being rewarded after incorrect responses was to carefully plan the scripts so that the cognitive leaps were small. A mastery approach to learning was used, wherein the majority of the group could be expected to correctly answer a given question. Consequently, positive reinforcement almost always followed mass group responses that were largely correct. Those pupils who answered incorrectly realized their mistake anyway, because of the feedback provided by the program (not to mention their having noticed that most of their fellow students had probably responded differently) (US AID, 1986).

6.54 A key aspect of the NRMP and CTW projects was the use of research as an integral part of the production process. This "formative" research helped determine what production approaches were most successful in gaining attention and conveying material. Researchers worked closely with producers so that research results would be clarified and could thereby be taken into consideration in the development of future scripts. The special relationship that developed at CTW between researchers and producers will be discussed in greater detail within the next chapter (on research and evaluation). Likewise, the "feed forward" model developed by the Nicaragua radio project will be examined more fully. For now, however, suffice it to say, that a dynamic working relationship between producers and researchers, wherein formative research is used extensively in the development of educational programming constitutes a critical component of the successful production prototype.

6.55 Another topic that will be thoroughly explored in the succeeding chapter will be the importance of developing and administering tests to see if the programming was effective. Both the NRMP and CTW projects have built their successful reputations upon the achievement gains ultimately demonstrated by students who heard (or saw) the programming. Both projects were designed, from their inception, to be tested rigorously, so that their effectiveness could be documented (or disproven). Experimental conditions were established, wherein the test results of children who were exposed to the programs could be compared with similar groups of children who had not experienced them. When the performance of the media groups did, in fact, turn out to be superior, a degree of credibility was established for these production models.

The "Prototype-Adaptation" Model

6.56 In the course of this chapter, a "prototype-adaptation" model for Third World educational broadcasts has been proposed. Why should countries use programming developed elsewhere, rather than designing their own? Surely, a nation should best be able to determine what programming would be most appropriate for its own school children. How can material developed for a particular audience be expected to communicate effectively with another group of entirely different cultural background? These are legitimate questions. However, both NRMP programs and CTW's "Sesame
Street' have been modified and successfully used in a number of other countries.

6.57 As already mentioned on a number of occasions, NRMP became the prototype for several other USAID educational media projects, including the Radio Language Arts Project (RLAP) of Kenya and the Basic Skills Pilot Project (BSPP) of Thailand. These projects have documented student achievement gains comparable to those achieved in Nicaragua, despite the fact that student groups in both Kenya and Thailand are of vastly different cultural background than the original target audiences in Central America (US AID, 1985).

6.58 Likewise, imitations of "Sesame Street" have been developed in a number of other countries. These adaptations include France's "1 Rue Sesame," Germany's "Sesamestrasse," and Mexico's "Plaza Sesamo." So successful has the Sesame Street model become overseas, that a new international division of CTW had to be established. CTW International has assisted countries in the development of their versions of "Sesame Street." It has also established a project called "Open Sesame" which makes footage available overseas which it considers essentially "culture-free" (Mayo and Nelson, 1979). The Mexican adaptation has been tested extensively and, while results in the field are less conclusive, results obtained under laboratory conditions indicated that Mexican children who viewed the programs improved their language and mathematics skills (Holtzman and Reyes-Lagunes, 1981).

6.59 What are the advantages of using an existing prototype? First of all, the series has already been proven instructionally effective. It is a tremendous challenge to achieve the kind of educational impact that the NRMP and CTW projects were able to attain. Few other educational series have succeeded so dramatically, and many have been quite disappointing. When successful models already exist, it seems foolish not to use them and learn from them. There is no need for every country to "re-invent the wheel" when it comes to educational programming.

6.60 Besides, Third World countries stand little chance of replicating such outstanding efforts on their own. They rarely have the resources to develop this type of programming. In addition to a lack of qualified personnel, equipment, and materials, there is the question of funding. USAID's Nicaragua radio project cost approximately 4.5 million dollars to develop (US AID, 1986). The CTW series were even more expensive (Polsky, 1974). Poor countries find such sums very difficult to come by.

6.61 Yet, the adaptation costs of a project similar to Nicaragua Radio Mathematics have been estimated at only several hundred thousand dollars. The recurrent costs per year of maintaining the project would be about $50 - $200 per student (US AID, 1986). The developmental costs clearly constitute the major financial burden associated with a project. If these expenses can be substantially reduced through the use of already existing prototypes, then Third World countries may more realistically be able to consider investing in instructional broadcasting systems. Adapting a
Confronting the Challenges of the Third World Media Production

6.62 Even if they can eliminate most of the expenses involved in the developmental phase of an instructional media project, developing countries must still manage to competently produce the programs and to successfully transmit them to students. How can Third World countries overcome the difficulties they have traditionally faced in trying to produce high quality educational programs?

6.63 Having adequate equipment available for production purposes may be a less problematic issue for developing countries, as increasingly inexpensive new models with more sophisticated capabilities are introduced each month. Especially in the field of video, equipment is rapidly becoming less expensive, lighter, and able to produce higher quality footage. Although, in most cases, a variety of new features have been added, basic operations have generally become easier to execute, because of automated systems. Consequently both in terms of expense and ease of operation, media production equipment is becoming increasingly reasonable.

6.64 In fact, the availability of inexpensive, lightweight video and audio equipment provide new opportunities for Third World educational media producers. A crew can now more easily go out into the field to record interesting material of educational value. Some of the costs associated with studio productions, which generally involve more personnel and equipment, can perhaps be eliminated by documentary footage with a television portapak (or audio-recorder).

6.65 One interesting production strategy for Third World nations might be the extensive use of indigenous talent. Most developing countries have a rich artistic tradition. What better way to adapt a set of scripts to a different cultural setting than to invite performers who are well versed in traditional art forms to participate in the series? This would help make the material relevant to students, for whom the traditional arts have probably been a meaningful part of their upbringing. It would also provide opportunities for those attempting to preserve indigenous forms of artistic expression to showcase their talents. For producers, this strategy would provide a source of talent at minimal expense. Finally, extensive interpretation of material in terms of the nation’s own traditions might also help prevent objections from xenophobic political factions which might otherwise oppose the importation of foreign educational models.

6.66 While less developed countries must fully utilize those resources they do possess, it is also important for them to try to tap some of the expertise in the industrialized world. Actually, colleges in developed countries are presently graduating more media production majors than will be able to find interesting positions in the field. Young college graduates could help with educational media projects in the Third World, in Peace Corps type programs. This would give these aspiring young media
professionals some valuable experience, and would simultaneously furnish some highly trained personnel for developing countries.

6.67 However, this type of program must include an effective orientation program that properly prepares young people for life in less comfortable surroundings, with people who may differ considerably from those they grew up with. If these media interns do not understand the nature of the circumstances they are about to encounter, the experience may well be disappointing for all concerned. Only those candidates who are mature enough and who are sufficiently prepared should be sent into a developing country under such a program.

6.68 Another intriguing possibility would be a special program to help provide high quality media footage for Third World educational media producers. There currently exists a wealth of professionally produced audiovisual footage in the developed countries, which could serve to greatly enhance the educational productions of the developing world. Rather than retaping similar material, it would be far easier to borrow already existing footage to edit into new programs.

6.69 Such a scheme could take advantage of recent advances in information storage and retrieval technologies. Given the immense storage capacity of laser discs, it would seem conceivable that whole "libraries" of audio and video materials could be stored on a number of discs to be shipped to various countries with the aid of a computerized cataloging system, an extensive collection of interesting raw footage could then be drawn upon by educational broadcasters to help them produce their shows. While under normal circumstances, the economics of such an arrangement might remain prohibitively expensive for Third World countries, perhaps foreign assistance organizations could help subsidize such a plan. Technically, it is already quite feasible, and it could greatly expand the capability of developing countries to produce dynamic instructional programming.

**Effectively Providing Written Support Materials**

6.70 As discussed earlier in this chapter, supplementary written materials can serve a number of important functions in an educational media project. Some projects have relied upon already available printed material, rather than trying to produce their own. This was largely the case with the Nicaragua Radio Mathematics Project. The sequence of programs was carefully coordinated with mathematics texts used in Nicaraguan classrooms. Consequently, the textbooks reinforced the material presented on the broadcasts (and vice versa).

6.71 This is basically an effective strategy, but there are some inherent difficulties associated with it. Textbook shortages are typical of Third World classrooms, so that pupils cannot always easily obtain a book to read or study. Often, available texts are outdated, so that current information presented on broadcasts contradicts textbook descriptions. Perhaps the most serious problem, however, is that the
textbooks which a nation has adopted may not provide the most appropriate material for its students. Textbook revision is urgently needed in many developing countries. In these cases, using existing texts as the basis for the material covered on instructional media programming would obviously be ill-advised.

6.72 Written materials accompanying broadcasts can be instrumental in effecting curriculum changes. In the case of the Japanese primary school science television programming (mentioned in Chapter Four), the student workbooks published by NHK to supplement the broadcasts later became the models for a revised set of Ministry sanctioned textbooks, which adopted the discovery approaches used on television programs (Tiene and Urakawa, 1983). So the design of written material to supplement broadcasts can be very important.

6.73 How should such materials be designed? It appears that teachers' guides should be short, so that teachers will bother to read them. In a few pages, they should not only describe the programs, but should also suggest appropriate discussion questions and activities.

6.74 Experience also demonstrates that student materials can be short, yet still be effective. This has been the case with NRMP and its spinoff projects. A critical feature of these materials is the opportunity for pupils to answer questions, so that they become actively involved in the learning process and can later receive some feedback as to whether or not they understand the material.

6.75 To overcome the delivery problems experienced in the Third World, projects should try to publish all their printed material before the broadcasts begin and deliver it all in one packet. Sometimes this is impossible, because the printed materials are being developed along with the programs. But in subsequent years, these projects should follow this procedure, so as to reduce delivery problems to a minimum.

6.76 Written materials for the Third World should be inexpensive. Costly elaborate graphics should be avoided, especially since simple diagrams and drawings can be just as instructionally effective. Often the key to making print materials cost-effective is achieving sufficient economies of scale. The greater the number of copies, the more reasonable is the cost per copy, since much of the overall expense is not the paper, but the expenses associated with the development of the material. In situations where the number of pupils served is sufficiently large, sometimes it might be economically advantageous for a project to purchase its own small printing press. This would also provide more control over the process, allowing far more flexibility in revision, duplication, timetables, etc.

6.77 Educational media productions for the Third World can benefit enormously from the successful experiences of past projects. One approach would be to adapt the actual scripts from an especially effective series,
translating the language and revising certain segments to suit the new cultural context. Another approach would be to produce new programming by following the same process that previously successful series did, and by imitating the production techniques used in the programs.

6.78 Both the Nicaragua Radio Mathematics Project and the Children's Television Workshop have produced exemplary educational programming that has been successful adapted to other cultural settings. The prototypes they have established for educational radio and television can be used as the basis for future educational broadcasts in the Third World that build upon these successful experiences in a way that is relevant to particular circumstances and conditions.
VII. FEEDBACK AND EVALUATION

7.01 One important feature of the successful series discussed in the previous chapter was the existence of effectively operating feedback systems within the project. As they developed the programming, producers had the benefit of ongoing information about how their material was being received by the target groups. For researchers were testing the programs in a variety of ways, in order to determine which approaches most effectively held children's attention and most dynamically conveyed the material.

7.02 In addition, the instructional effectiveness of these productions was documented by a series of tests which demonstrated that the achievement levels of classes exposed to the programs were higher than levels attained by comparable groups of pupils that did not receive them. Only through carefully designed evaluation efforts can the true merit of educational media productions be accurately assessed. Feedback and evaluation systems can play a critical role in establishing successful instructional series.

Problems

7.03 Unfortunately, few educational media projects over the years have included meaningful evaluation schemes. The importance of specific feedback has rarely been fully appreciated. Evaluation has often been an afterthought, rather than an integral part of the initial plan for developing worthwhile broadcasts. Sometimes, projects have no research component whatsoever. In other cases, research activities are minimal. Rarely is there an attempt to obtain data on an ongoing basis, so that the impact of the productions can be monitored.

7.04 Why has this situation prevailed? First of all, the value of research may not be fully appreciated. Especially since they are advocates to begin with, those involved in an educational media project may not fully appreciate the need for an objective set of measures whereby the effectiveness of the programming can be demonstrated to the many skeptics who will challenge its worth. But, without reliable documentation of positive results, the project can be fairly easily dismissed by its detractors.

7.05 Although sometimes a final series of tests are built into the overall project plan, it is highly unusual for a project to include data collection during the production process. Yet, this so-called "formative" evaluation can prove extremely helpful in the design of the programs. Too often producers assume they can anticipate the reactions of their target audience without checking the actual responses. In some cases, these producers have little experience in the field of education, so that their "instincts" as to what approaches will effectively teach are not an especially valid basis for instructional programming design. Actual data on student responses can help provide a legitimate set of guidelines for scripting.
Even when project directors realize that evaluation schemes might benefit a project, they may hesitate to include them because of a lack of funds. Producing and distributing the programs take first precedence, and the vast majority of available funds are generally directed to these ends. Research is viewed as desirable, but not as essential as other more critical aspects of a project.

The Lack of Rigorous Testing

Another problem with much of the evaluation that has been conducted during educational media projects is that its validity is questionable. First of all, personnel with expertise in testing procedures are often difficult to find, especially in developing countries. While foreign consultants can be brought in, their fees are generally very costly. Consequently, designs often lack a scientific basis whereby the educational effects of media programming can be reliably compared with other approaches.

Furthermore, even when the original research design has some merit, it is very difficult to eliminate a variety of possible confounding factors. Even the most well-intentioned evaluation efforts can become contaminated by factors beyond the control of the experimenters. It is simply very difficult to effectively implement vigorous research designs, especially in Third World countries where the poorly developed infrastructure can frustrate attempts to properly disseminate, proctor, and collect the test materials.

Even when experimental results are valid, they may not include certain types of information that can be most useful. Formative evaluation may not successfully investigate what program producers most urgently need to know. Summative evaluation may fail to provide the kind of data that the policy makers consider most critical.

For example, often tests that measure achievement levels in classrooms using media fail to obtain results on the same tests from comparable "control" groups that did not experience the programs. Without a point of reference, it is difficult to ascertain the real instructional effectiveness of the productions.

The Critical Cost-Effectiveness Issue

An even more important piece of data is the relative cost-effectiveness of media instruction. In many cases, special educational projects successfully instruct pupils, yet they are too expensive to be considered on a large-scale basis. If a project does not provide an educational return that is commensurate to its cost, then few government officials are likely to take it seriously.

Several of the aforementioned issues arose during the instructional radio pilot project in the Philippines, which has been alluded to in
both the introduction and Chapter Four. This experiment was a well-financed effort to obtain scientifically reliable data on a variety of instructional approaches. It was conducted by the reputable Institute of Mass Communication (IMC) at the University of the Philippines. Yet, its findings were later criticized as lacking certain important pieces of information. One concern was that no tests of listening abilities had been conducted, despite the fact that radio (an auditory medium) was involved. Another was that cost-effectiveness data was never obtained for a control group that used conventional approaches to instruction (Middleton, 1985).

7.13 The eventual outcome of this pilot study also highlights the importance of the cost-effectiveness issue. As described in Chapter Four, generally the groups of pupils receiving radio instruction scored higher on achievement tests than did groups using textbooks. However, the decision was made to substantially increase the textbook supply rather than implement a large-scale school radio project. Why? The reasoning was that, despite its instructional superiority, radio was more expensive than improving the student-textbook ratio to levels tested during the pilot. School radio was simply deemed cost-ineffective.

7.14 This conclusion on the part of the Philippine government raises another issue. Sometimes research can be interpreted in a variety of ways. In the Philippine case, a significant factor, which seems to have been overlooked, was the issue of how many students were involved. Given the number of pupils in the pilot project, radio was not cost-effective. However, the cost per pupil for radio instruction drops precipitously with increasing numbers, since most of the total budget is consumed by heavy initial outlays for equipment, personnel, etc. When sufficient "economies of scale" are achieved, school radio can become more cost-effective than purchasing and shipping large quantities of textbooks. This possibility may have been overlooked by Philippine officials, who, like so many officials throughout the developing world, were not especially attuned to the potential of educational broadcasts.

7.15 Finally, even when reliable, relevant results are obtained, policy makers may still ignore them. Or they may even manage to suppress findings, perhaps because the results are not to their liking. Some of the studies conducted in the Ivory Coast were never made public, and no official explanation was ever given for why they never appeared.

Successful Strategies

7.16 The establishment of a comprehensive overall scheme to obtain relevant feedback at each stage of an instructional media project can help enhance the appeal and instructional effectiveness of the programming (Salomon and DelCampo, 1981). First of all, the planning process can benefit enormously from input provided by representatives of various groups involved in the project. The implementation phase can be facilitated by ongoing "formative evaluation" that helps improve the programming. The final step of the process, a review of its effectiveness, can best be determined through an experimentally rigorous "summative evaluation."
independently developed in the initial stages of the project and carefully carried out at its conclusion.

7.17 Program planning committees have been an important factor in the success of Japan's elementary school broadcasts, for some time (see discussion of this programming in Chapter Four). These groups include representatives from NHK (Japanese Broadcasting Corporation), the Ministry of Education, colleges of education, and the public schools. So committees that review school broadcasting scripts will invariably include producers, ministry officials, professors of education, school administrators, and teachers. Thereby, feedback on the proposed programming is regularly solicited from all parties concerned with its content.

7.18 Producers can hear ministry officials' comments on the relevance of a given program to the official curriculum. They can listen to academics analyzing the pedagogical merit of a show. Finally, and often most significantly, they can hear teachers describe how they feel their students will respond to such a program.

7.19 Simultaneously, of course, the producers, scriptwriters, and researchers of NHK can explain their objectives in designing a particular program, so that their clients in the educational establishment may come to appreciate what they are trying to accomplish. In general, the NHK's committee system can help foster an important dialogue between key participants that facilitates the development of carefully conceived programming, responsive to the needs of the classrooms.

The Role of Formative Research

7.20 "Formative research" has played a significant role in the success of some of the most noteworthy educational media projects to date. The educational division of NHK, the Children's Television Workshop, and the Nicaraguan Radio Mathematics Project all used this type of research to develop their outstanding programs.

7.21 Formative research is expressly designed to help scriptwriters and producers devise the most appealing and instructionally-effective programming possible. Ideally, those involved in conceptualizing the shows will collaborate with researchers in identifying the key issues to be investigated, so that their studies will provide precisely the kinds of feedback necessary to assist in determining which production treatments most successfully maintain high attention levels and convey material effectively.

7.22 In Japan, the NHK has used the "program analyzer." Students are given a button to press when they are "interested" in a program they are watching. This reaction is recorded as a line graph that can be used to check interest levels throughout a given educational program (Akiyama, 1983).
7.23 The Children's Television Workshop pioneered the use of distractor techniques to measure levels of interest. As children watched CTW pilot sequences, a slide show or another television program was run simultaneously in the room. Observers noted when the children were watching the CTW material, as well as when they turned instead to the competing program. This technique was especially appropriate for CTW's productions, because they were developed for the home market, where viewers can turn the channel when they lose interest (Palmer, 1974).

7.24 CTW also used some special equipment that measured precisely where on the television screen the eyes of a viewer were looking. With this system, they were able to determine precisely which aspects of the visual presentation were drawing the most attention. This information was helpful in a variety of ways. One good example was in determining how to most effectively display the text on the beginning reading series, "The Electric Company," so that viewers would concentrate on it at appropriate moments; "cartoon balloons" were the most effective cuing device tested (O'Brien and Silverman, 1973). CTW researchers also developed a list of interesting attention-measurement techniques which would involve the use of special equipment (Mielke and Bryant, 1972).

7.25 These laboratory studies were very helpful in determining what types of sequences most effectively held the viewer's attention. But field observations of attention levels have also been an important facet of formative research efforts. In Japan, NHK researchers and producers have regularly visited classrooms to observe pupil reaction to their broadcasts. CTW had many groups of children watch this program pilots and questioned them about their reactions. CTW also had mothers of "Sesame Street" viewers keep ongoing written accounts of how the children reacted to the show.

7.26 The observation techniques used by the Nicaragua Radio Mathematics Project were especially significant because of the "interactive radio" model which that project team hoped to establish. As mentioned in Chapter Six, the idea was to script programs in which the voice coming over the radio reacted to the class, as if the speaker were present in the room and could hear the children's responses. Thereby, the "radio teacher" could develop an exchange of comments similar to the interaction that normally occurs between a "live" teacher and her class. In order to achieve this effect, the timing of the radio teacher's (or performer's) remarks was critical. Classroom observation enabled the project developers to successfully time the radio personality's comments in such a way that young pupils in Nicaragua enthusiastically responded to it, and it seemed to answer naturally and appropriately. This lively new approach to radio instruction proved far more appealing and educationally effective than the traditional style of school broadcasts, in which students passively just listened to the lesson (Friend, Searle, and Suppes, 1980).

7.27 Formative research also includes an analysis of how instructionally successful the pilot materials seem to be. Researchers at the NHK's Broadcasting Culture Research Institute conducted a variety of
studies in which different production treatments were used to teach the same material. One of their most significant findings was that the use of questioning techniques on a program encouraged more conceptual thinking and longer retention on learning. These researchers also examined specific production techniques, to determine their instructional impact. For example, they found that written captions were instructionally very effective, especially with elementary school children (Tiene, Akiyama, and Kodaira, 1986).

7.28 The Children's Television Workshop used some innovative approaches to determining the comprehensibility of certain sequences. Researchers would "freeze" a frame of video and ask children questions about what was happening and why. They would also replay certain segments without the audio and ask their subjects to explain what was going on. Another interesting research technique was to ask children to role play what they had just seen (Palmer, 1974).

7.29 The Nicaragua Radio Mathematics Project researchers hoped, at first, to use student worksheets to monitor comprehension levels as the series progressed. Yet, they found that the scores were artificially high because pupils shared answers and their teachers helped them. Consequently, they developed separate special tests that they periodically administered themselves. Results on these "embedded tests" helped producers plan future scripts ("feed forward").

The Significance of Summative Research

7.30 To distinguish it from "formative research," the term "summative research" has been applied to the traditional form of evaluation, in which the results of a particular approach are tested to see if it is superior to previous techniques. This type of research was a critical factor in the success of both the CTW and NRMP programming, for their productions proved instructionally effective in carefully designed experimental studies.

7.31 The final evaluation of the NRMP project was carefully designed by research specialists from Stanford University. The study was conducted at the end of the first year of broadcasts and it discovered that the radio groups scored significantly higher than conventional mathematics classes in all three of the grade levels involved. These positive results so encouraged the U.S. Agency for International Development that it proceeded with other instructional radio projects patterned after Nicaragua's Radio Mathematics. The two principal spinoff projects are the Radio Language Arts Project (RLAP) of Kenya and the Basic Skills Pilot Project (BSPP) of Thailand (RLAP is described in Chapter Four and BSPP in Chapter Six). Like NRMP before them, both of these series of radio programs proved to be more instructionally effective than conventional instruction when students were given achievement tests (US AID, 1985).

7.32 Like the NRMP research, the CTW testing was very carefully conceived. In fact, it was carried out by an independent agency which has a very strong reputation in this field, the Educational Testing Service...
ETS designed both the Scholastic Aptitude Test (SAT) and the Graduate Record Exam (GRE), probably the most important tests taken by an American student who aspires to a university education. Tests were developed to measure achievement levels in the language, mathematics, and logical reasoning skills taught on CTW programs. Groups of youngsters who watched "Sesame Street" showed higher gains than groups that did not, and the more regularly they watched, the greater these gains were. The test scores of high ability children from low socio-economic status families who watched heavily surpassed those of some children from privileged backgrounds who did not see the programs (Ball and Bogatz, 1972; Bogatz and Ball, 1974). Though less convincing, similar results were recorded for "The Electric Company" series (Ball, 1974). Although this body of research was later questioned by some researchers who applied extremely strict standards of probable error (Cook, 1975), it is generally considered the strongest documentation available for the effectiveness of educational television. These positive research findings definitely contributed to the national attention eventually commanded by these two CTW programs.

7.33 In fact, the international reputations of both NRMP and CTW have rested upon these research findings that documented their success. Positive evaluation results are probably the strongest argument in favor of using instructional media. Without reliable, meaningful evaluation schemes, it is difficult for educational media projects to justify their continued existence.

7.34 However, as the Philippine pilot project demonstrated, even when achievement test scores show learning gains for classes using school media programming, they do not guarantee that the project will be adopted (or continued). The critical measure is usually cost-effectiveness.

7.35 The NRMP never had an opportunity to demonstrate its potential cost-effectiveness, because the revolution in Nicaragua brought an end to the project before it could expand beyond its initial pilot stage. However, what is really impressive about NRMP is the extremely cost-effective nature of the adaptation costs involved in developing similar projects in other countries. As described in Chapter Six, it has been estimated that the budget for redesigning these radio mathematics programs for another setting would be less than one tenth the original research and development costs. In addition, estimated recurrent costs, once a project is established, would be quite reasonable.

7.36 CTW hired a reputable polling organization to determine the popularity of "Sesame Street" in the early 1970s. With this data and budget figures for the series, a cost for each American pre-school viewer per day was calculated and it was less than a penny (Carlisle, 1978). This information, although only a rough estimate, gave the public some sense of what kind of educational bargain a successful media program can be, when sufficient "economies of scale" are attained.
Evaluation and Policy

7.37 The researchers who supervise evaluation efforts generally have academic backgrounds, and often hold university positions. The primary objective of such academic research is to draw some conclusions that may expand the knowledge base in a given area. Ideally, these findings can shed light on some general theory about the field. However, this perspective, derived from a "pure research" model, may be inappropriately applied to the evaluation of an instructional media project.

7.38 For, as pointed out earlier in this chapter, policy makers have been known to ignore research findings, even when the results are significant. If officials who must decide the future of media projects find research results difficult to comprehend, ambiguous, or irrelevant to their concerns, these decision makers are likely to disregard the findings.

7.39 Unfortunately, the traditional academic style of research report tends to be difficult to read. It generally alludes to previous studies of an obscure nature. It often includes the results of rather esoteric statistical treatments. Much of this material will undoubtedly be unfamiliar to government officials. Academic researchers also tend to make carefully qualified statements, which fully consider a variety of complex ramifications. But this rhetorical style may leave policy makers uncertain as to what course of action the report is recommending. Finally, researchers accustomed to testing theoretical hypotheses may fail to accurately identify practical issues that decision makers are most deeply concerned with.

7.40 Whenever possible, researchers should consult with those who will be making critical future decisions about the project before designing their studies. In this way, officials can be included in the evaluation process, and may even develop some personal stake in the results. The concerns of key policy makers should be addressed as part of the evaluation plan, so that the results will be relevant to these officials and may have some impact on the future of the project.

7.41 One final concern about project evaluation is the issue of funding. How high a percentage of a project's budget should be spent on evaluation? Most projects fail to invest enough in obtaining valuable feedback, be it of a formative or summative nature. However, the research component of a project need not involve an exorbitant investment. Small, carefully controlled studies are not only less costly than large-scale evaluation schemes, but, in addition, they can be just as informative. Effective sampling procedures can both enhance reliability and reduce costs.

7.42 To summarize briefly, successful instructional media projects have recognized the importance of feedback. Formative evaluation can help enhance the quality of the programming. Summative evaluation can document the degree to which it succeeds instructionally. All research endeavors should use an experimentally valid methodology, so that their findings are
considered reliable. Cost-effectiveness data on a media project can be especially important in determining its fate. Finally, policy makers should be included in the evaluation process, so that information that they consider significant can be obtained. If research designs follow these guidelines, their findings are likely to have some meaningful impact upon the project and its future.
VIII. GENERAL GUIDELINES

8.01 A large-scale educational media project is an extremely complicated undertaking that must be intelligently integrated into a complex set of circumstances. This publication has explored the various challenges faced by those involved in major projects of the past. Before proceeding to speculate about how new technological developments may affect the future of educational media, the authors wish to encapsulate their recommendations for future projects, based upon the experiences of the past few decades.

8.02 Before reviewing specific points, one very general set of recommendations should be emphasized. The conditions within a country should be carefully examined before a major instructional media project is even considered. In certain cases, circumstances mitigate against the introduction of such a project. Because large-scale media programs can involve a considerable financial investment on the part of the host country, only those plans with a reasonably high chance of success should be undertaken. A particularly difficult situation within a nation's education sector might seriously interfere with a project's chances.

8.03 Ideally, the pre-planning stages of any project would include a careful education sector analysis, to pinpoint critical national needs which an instructional media effort might address. Such an analysis would closely examine what functions a media project might appropriately serve, within the context of the overall educational system (World Bank, Education Sector Policy Paper, 1980). Would it mainly be developed to expand the educational system? Would it help improve the overall quality of instruction? Would it be designed primarily to redress inequities in educational opportunity? Would it hope to provide instruction on a more cost-effective basis?

8.04 It is theoretically conceivable that a project could accomplish all of these goals simultaneously. However, this would be extremely unusual. Expanding the system often involves higher costs, because the nation's infrastructure is less fully developed the further into the rural areas it attempts to penetrate. Improving the quality of instruction is also generally expensive, because it involves greater allocation or concentration of educational resources to do so. Finally, equalizing opportunity can also raise educational costs, because extra resources must be provided for the disadvantaged. In Third World countries, where budgets are heavily constrained, establishing sensible priorities for the educational sector is especially important.

8.05 A set of appropriate objectives for the project should be explored and established clearly in advance. Too often educational technology has been viewed as a potential panacea for solving almost any pedagogical problem. The unrealistic expectations that develop can eventually sour into a negative backlash. To avoid another instance of this recurring syndrome, realistic goals should be clearly defined from the project's inception.
8.06 Clear objectives can also help keep the project on its proper course. Sometimes self-interested parties can attempt to redirect the project for their own purposes. Project mismanagement can leave a program without a clear sense of direction. Unforeseen events will invariably interfere with the progress of the project. Precisely because so many factors can potentially frustrate efforts to attain certain goals, it is all the more critical that objectives be carefully considered and clearly articulated from the very start.

Analyzing the Educational Context

8.07 The socio-political context of the host country should be carefully examined, so that various possible ramifications of the proposed project are anticipated in advance. For example, language barriers can severely limit the effectiveness of a project. Likewise, insensitivity to regional patterns of culture can lead to wholesale rejection of the programming among certain sectors of the population. A lack of awareness about local concerns can also alienate audiences.

8.08 Flexible approaches to producing and disseminating educational programming can help overcome the challenges of trying to communicate with a multicultural population. Providing different ethnic groups with their own radio stations can assist them in adapting programs for their own needs. At the very least, programming can be translated into the local dialect. In addition, however, some low-budget productions dealing with local issues may even be possible, if studio facilities are included in the radio complex.

8.09 In some cases, government policy deliberately discourages the use of minority group languages for educational purposes, often in hopes of establishing the preeminence of a "national language." However, in many cases, minority populations are poorly versed in the national language and it makes little sense to expect broadcasts in an unfamiliar language to have much impact. If a government insists upon an arrangement of this kind, then perhaps that project should be reconsidered.

8.10 While broadcasting subject matter in an unfamiliar language is generally an inefficient approach to instruction, broadcasting lessons to teach the language itself can help break down linguistic barriers, so that future programming for minority groups in the national language is better understood. The Radio Language Arts Project of Kenya represents a successful model for teaching another language via radio (in this case, English).

8.11 Another critical issue to be examined prior to introducing a large-scale instructional media project is how it is to be managed. Countries with especially complex, conflict-ridden, inefficient administrative systems should generally be considered bad risks. Many promising projects have failed to meet expectations because of mismanagement.
Likewise, construction contracts should go to a low bidder, but project planners should also try to deal exclusively with reputable firms. Hiring contractors with less reliable records of performance has led to construction delays, defective workmanship, and cost overruns on a number of past projects.

One strategy for overcoming administrative problems is to establish an independent commission to oversee the project. However, such a commission should attempt to establish liaisons with key officials in the government, if it hopes to implement its plans. For without some influence within the existing power structure, it is very difficult to accomplish anything significant.

Close ongoing supervision of the project by outside consultants can also help prevent mismanagement. Intensive training sessions can help top project officials develop administrative skills. Introducing computerized services may also facilitate more efficient overall project management.

In general, because administrative conditions are so often problematic throughout the Third World, it makes sense to try a pilot project to determine the feasibility of the overall plan, before proceeding with any large-scale project. If difficulties arise, the project can be modified accordingly, or perhaps abandoned altogether.

The potential resistance to an educational media project from within the educational establishment itself can be substantial. Particularly, controversial has been the use of underqualified personnel to supervise classrooms in which most of the instruction was delivered via media.

This opposition generally arises from well established forces within the teaching profession; ministry officials, union leaders, academicians from teachers colleges, etc. Conversely, the teachers struggling in the impoverished ghettos and rural regions often very much appreciate the assistance that effective educational broadcasts can provide. It is to these latter groups that programming should be targeted.

Educational broadcasts for teachers themselves can prove effective in a number of ways. Underqualified teachers have upgraded their general education. Methods courses have encouraged new pedagogical approaches in the classroom. Curriculum reform movements have even occasionally been spearheaded by media programming.

However, it is extremely unrealistic to expect large numbers of teachers to listen to broadcasts, unless appropriate professional incentives are provided. Such rewards might include salary increases, promotion, advanced levels of certification, awarding of degrees, etc. If media projects do not provide meaningful opportunities for teachers to advance professionally, they should not expect to have much impact.
Developing Effective Educational Media Programming

8.20 Over the past few decades, a number of Third World countries have experienced difficulties in installing, operating, and maintaining the equipment involved in educational media projects. There is generally a shortage of qualified technicians in these countries. Spare parts are difficult to come by. In some cases, receivers in rural schools are in relatively inaccessible locations, so that repairing them is a major undertaking. Ongoing equipment malfunctioning has unfortunately characterized some projects. Very costly investments in equipment have sometimes proven disappointing, when the overall system ends up functioning rather poorly.

8.21 A simple inexpensive technology should be used for media projects in developing countries. Therefore, radio is generally the appropriate choice over television. Radio has already proliferated widely across the globe. It can communicate effectively with illiterate audiences. It is technically far simpler than television, so that it is much easier to install, operate, and repair. It has proven to be instructionally effective, when programming is well designed. Finally, it is far less expensive than television to produce, transmit, and receive (general estimates say one-fifth the cost).

8.22 Another major problem faced by instructional media projects has been that the programming winds up being underutilized. One reason for a disappointing response to broadcasts has been that the material is supplementary in nature. "Enrichment" approaches to educational media programming are rarely taken very seriously by teachers.

8.23 Educational media systems are expensive investments for developing countries, and should be used for maximum effect in the classroom. Programming should be designed to convey critical aspects of the curriculum in fully articulated lessons. Alternative instructional approaches to the standard lecture should be included. In fact, preferably, large-scale media projects should be part of a national effort to improve educational standards.

8.24 Low classroom utilization levels have also been indicative of the dry, unimaginative approaches taken by many of the Third World's school media programs. Much of the programming lacks appeal. Unfortunately, livelier programming approaches are generally more expensive to produce, and funding in developing countries is invariably limited. Furthermore, in most cases, personnel in Third World studios have had little experience in producing programming with high production values so they do not know how to take full advantage of the medium.

8.25 One possible solution to this problem would be for developing countries to adapt highly professional programming developed in an industrialized country, which has a proven history of success in effectively teaching its audience. This process of adapting a "prototype"
series has already been successfully accomplished with two very strong series, the Nicaragua Radio Mathematics programming and "Sesame Street." Thereby, Third World countries can save the developmental costs of a project, which are usually a substantial proportion of its budget. In this way, they can also provide programming for students that is both exciting and instructionally sound.

8.26 Feedback about how instructional programming is received in the schools is rarely obtained in any systematic way, as an integral part of most educational media projects conducted in the developing world. Again, both a lack of funding and a lack of expertise mitigate against these projects including an effective research component.

8.27 However, effective communication within a project is essential. Researchers should provide ongoing data about reactions to the programming, so that producers can improve future broadcasts. At the end of the series, a comparative evaluation of the project's effectiveness, carried out with as much scientific rigor as possible, is the best way to gauge its merit. Without this kind of experimental evidence, it is difficult for supporters of educational media to effectively argue their case.

8.28 There are no simple solutions to the complex challenges involved in attempting to introduce large-scale educational media projects in Third World countries. The problems associated with such efforts will doubtless continue, and may even intensify, in the coming years. However, perhaps the suggestions reviewed in this chapter will help those involved in future efforts of this kind to avoid some of the mistakes of the past and to think creatively about how to effectively use media to educate people throughout the world in the next few decades.
IX. THE FUTURE OF EDUCATIONAL MEDIA

9.01 The future of educational media appears extremely promising. In recent years, a series of exciting new technological developments have significantly expanded and enhanced the instructional potential of television. Likewise, computer technology has advanced at a remarkable pace, and should play a key role in the future of educational technology.

9.02 The developed nations of the world have already begun to experience the impact of these technologies upon the areas of education and training. However, it remains to be seen how rapidly and how extensively these developments will affect the Third World. Their potential impact upon the developing world over the next few decades and on into the twenty-first century will be the central issue of this concluding chapter.

The Instructional Capabilities of the New Video Technologies

9.03 In the post World War II era, television has arisen as the predominant broadcasting medium throughout the developed world, and recent advances will surely further expand its influences. These developments have proceeded simultaneously on a number of fronts, so that each stage of the educational television process will be affected, including the production, distribution, storage, and presentation of instructional video programming.

9.04 Television production equipment is becoming more compact, of higher quality, and less expensive each year. With the arrival of light, inexpensive portapaks that can shoot footage of reasonably high quality, television production is no longer the sole prerogative of well-financed broadcasting units. Even Third World countries may soon find that this versatile equipment can provide worthwhile educational video material on a cost-effective basis. In fact, eventually, it might facilitate the kind of small-scale local production that could help various ethnic groups in pluralistic societies create educational programming that effectively addresses their own particular circumstances.

9.05 Satellite broadcasting has revolutionized the way programming can be distributed. The transmission "footprint" of a satellite in geosynchronous orbit can cover thousands of square miles and thereby reach even the most remote locations. As more powerful satellites are developed, receiver dishes will become smaller and more affordable. Satellite transmission may soon make educational broadcasting feasible in even the least accessible regions of the developing world, including areas where the topography formerly made broadcasting very difficult. Developing countries with mountainous regions and extensive archipelagos might especially benefit from these capabilities.

9.06 Because of its considerable expense, satellite transmission is an inappropriate broadcasting strategy for local needs. Before deciding to use a satellite, a nation must identify a substantial audience to be
served. Because the geographical expanses covered by satellite transmissions are so immense, larger school audiences are possible. This immense coverage can create more cost-effective "economies of scale" which, in certain cases, may make satellite transmission an economically feasible proposition.

9.07 Cable television has also had a substantial impact upon television broadcasting. First of all, it provides higher quality reception than traditional open-air transmission. Since reception difficulties have often plagued school broadcasting efforts in the Third World, this improvement could prove significant in future projects. But even more important than enhanced picture quality is the fact that cable transmission offers extensive multiple channel capability. With the use of optical fiber, over one hundred channels are possible. This enormous expansion of available "air time" should be particularly advantageous to instructional programming efforts, which have often found it difficult to obtain sufficient time in the broadcasting schedule (especially at convenient viewing hours). Multichannel school cable systems could provide a much more extensive schedule of educational broadcasts than is presently possible, perhaps even providing separate channels for different subjects or different grade levels. With huge amounts of available air time, school programming could even be repeated many times during the day to overcome the scheduling difficulties faced on the secondary level.

9.08 In the near future, cable's influence upon schools is likely to be felt only in urban areas of the Third World, since laying cable in rural areas is financially unfeasible. Remote schools are more likely to receive multichannel transmissions via satellite or microwave transmission. Another use for cable is to distribute programming within the school to different classrooms on a closed circuit system.

9.09 The best way to overcome scheduling problems is not through cable systems, but by tape recording programs for convenient utilization at a later time. Like video portapaks, videocassette recorders (VCRs) in the developed countries have recently become so economical that there is a thriving home market for them. Furthermore, a variety of helpful features have been developed. Automatic recording systems make obtaining specific programs even easier. Sophisticated playback features like search, slow motion, and freeze frame, are available, along with remote control devices. These capabilities can help teachers (or students) more easily locate particular pieces of footage and then examine the material more carefully. Especially as schools begin to build their own tape libraries, the proliferation of VCRs throughout school systems should make television an increasingly popular medium in classrooms.

9.10 While presently not a recording device, another video storage medium, the videodisc, offers other advantages in the presentation of instructional material. Freeze-frame capabilities on a laserdisc system are far superior to that of tape, so that still frames of visual material can be clearly presented. Since one sixty-minute disc can hold 108,000 still pictures, the convenience for educators, in terms of storage
capacity, (over slide trays, for example) is obvious. Furthermore, a particular piece of footage can be accessed much more rapidly and accurately on a disc than on a tape, so that attention levels can more easily be maintained during a learning sequence. Discs are also more durable and compact than videocassettes. If recording on disc even becomes as easy as tape recording, it may become the predominant video storage and playback device. The instructional potential of the videodisc medium is enormous, and hopefully by the next century, it may begin to assist in the education of students in developing countries.

9.11 One final factor that should enhance the presentation of video material for instructional purpose in the future will be increasing screen size. Up until recently, the small size of the television picture tube was a distinct disadvantage in large group situations. However, promising new developments in projection systems and liquid crystal screen technology should change this situation. Larger, flatter screens of high resolution will become available in the next few decades. They will have significantly higher resolution than today's large-screen systems. As with videodiscs, these screens may not appear in Third World schools for some time. Yet, with the capability of more clearly providing visual material to large audiences, video will further strengthen its potential as an extremely dynamic instructional device.

9.12 Teacher prejudice in favor of the print medium may remain for some time. The vast majority of today's Third World teachers were educated almost exclusively through books, and their tendency to rely upon texts will persist. Yet, the increasingly pervasive presence of the electronic media throughout developing societies will begin to change this situation. The “video revolution” will eventually reach the Third World, and its influence upon education will become increasingly more significant (Gross, 1986; Whitehouse, 1986).

The Microcomputer: A New Force in Education

9.13 Just as television technologies have advanced remarkably in the past decade, the eighties have witnessed the rise of an entirely new technology in the schools: the microcomputer. Miniaturization of integrated circuits into silicon "chips" has evolved to the point where increasingly powerful computers can be contained in decreasingly smaller units. The instructional versatility of the microcomputer makes it an enormously exciting educational technology.

9.14 Dynamic educational software run by a microcomputer can teach a wide variety of different subjects. Instructional sequences can be carefully organized and presented so that each important step is covered. Students can respond to questions on a keyboard and obtain immediate feedback, helpful review, and encouraging reinforcement. Lively graphics and audio can enhance the lesson.

9.15 A microcomputer can also facilitate educational activities in a number of different subject areas. It is, of course, a rapid, accurate
calculator, which can help mathematics students to expand their horizons. It can also serve as a word processor, to assist students with their writing. With word processing, not only is editing more convenient, but accompanying software is even available to check spelling. Computer graphics packages are available that create colorful, detailed graphics, and art students can begin to work in this new medium. The microcomputer's audio capabilities can be utilized for music instruction. This new technology can assist in the teaching of every subject area.

9.16 Via telephone lines, microcomputers can also be used to access large databases in huge mainframe computers. Not only is there a vast quantity of information available, but given certain descriptors, the computer can efficiently isolate exactly which material the researcher is interested in and print out these references in a matter of minutes. This capability has not yet been capitalized upon, even in the schools of the most highly developed countries. Yet, it has tremendous potential in the long run, and, because it can provide valuable information across great distances, it might someday help educators in remote regions conveniently tap amounts of information that would previously could only be found in large libraries located in metropolitan areas.

9.17 The microcomputer can be extremely valuable for record keeping purposes. For it can not only store data, but efficiently manipulate it. In fact, the initial use of microcomputers on educational media projects has not been in the classroom, but as an administrative tool to help manage activities effectively. Given the administrative difficulties incurred in a number of educational media projects of the past (see Chapter Two), the computer could make a substantial contribution in this area. Just a few relatively inexpensive microcomputers at the disposal of the project director could potentially raise overall levels of efficiency.

9.18 Finally, a microcomputer can be used to control a video tape recorder or videodisc player. This configuration, generally described as "interactive video," can become a powerful teaching machine which adds the possibility of dynamic realistic moving visuals to the carefully planned, interactive instructional sequences presented by the computer. This convergence of the new video and computer technologies has enormous instructional potential.

9.19 While computer technology may not penetrate Third World schools for some time, the trends in computer education in the developed world over the past few years have been encouraging. Never has a new technology so rapidly proliferated throughout the schools. Microcomputer prices have dropped precipitously since the late 1970s, so that machines considered "state-of-the-art" only a few years ago can presently be purchased at bargain rates. Some of this inexpensive outdated equipment might be used to help usher in the "computer age" within Third World school systems sooner than one might think (Bork, 1985; Cannings and Brown, 1986).
Educational Technology and the Third World

9.20 The new video and computer technologies have the potential to substantially strengthen educational efforts in the developing world. First of all, they can provide access to huge amounts of information; otherwise unavailable to Third World schools. Television can provide hours of powerfully realistic documentation. Computer databases contain a phenomenal number of instantaneously accessible pages of text, including the most current material available. These dynamic, new media are the channels through which the information "explosion" is reverberating around the world.

9.21 However, these new learning technologies can do much more than simply serve as delivery systems. Structuring information for young pupils so they can grasp its significance is as important as providing it. For otherwise, the information explosion can overwhelm us. Or we can receive distorted impressions based upon an inappropriate sampling of material.

9.22 Television can be used to effectively clarify, emphasize, and stimulate. Careful scripting that organizes the material is, of course, essential. Camerawork can focus attention appropriately. Editing technique can create a dynamic message that moves at an appropriate pace. Special effects, including graphics and cuing devices, can help punctuate key points. Video can be an instructionally very powerful medium, especially in some of its new configurations (videodisc, teleconferencing, "interactive video," etc.). Hopefully, Third World countries will take advantage of these new technologies to expand awareness and not allow television to become solely or predominantly an entertainment medium.

9.23 Computerized data can truly overwhelm the student because of its sheer volume and variety. Database software can help students select just the material they are interested in, with the use of key "descriptors." Also, the computer is probably the most effective teaching machine ever invented because of its interactive capabilities. Computer programs can take pupils through carefully structured learning sequences, in which they are provided with ongoing feedback as to how well they are performing. Really sophisticated programs can be designed to adjust to the learner's own individual level, providing remediation, if he is having trouble or advanced placement, if he is very quickly grasping the material. Thus, not only does the computer's remarkable memory storage capacity provide extensive amounts of data, but its logic circuits also enable it to present material in instructionally effective ways.

9.24 Finally, the new communications technologies can effectively transcend physical barriers and vast distances, so as to reach remote regions, where the quality of education may be especially low. The vast stretches of the developing world, which, until recently, were largely beyond the influence of a modern "industrialized culture" emanating from the United States, Europe, and Japan, are nowadays experiencing its influences through the media. Radio has penetrated even some of the most
desolate areas, bringing with it the voices of Western leaders, rock-and-roll, and Coca-Cola commercials. While the desirability of all this is debatable, the fact remains that it is happening, and that these new communications technologies can be used to educate, as well as entertain. Via media, schoolchildren in rural areas can vicariously experience whole new worlds, which they would otherwise never be aware of. The potential of new telecommunications systems to equalize educational opportunity in these otherwise disadvantaged regions is enormous.

9.25 Yet, the likelihood that these advanced communications technologies will soon become available in the less developed areas of the world is slim. For one thing, they are simply too expensive. Television and computer hardware is, however, rapidly proliferating throughout the homes and schools of industrialized societies, so that the technological gap between them and the Third World nations is ever widening. The quality of the education that a child can receive in the developed world may thereby become increasingly superior to what is available in less developed regions.

9.26 If disparities in levels of educational opportunity worldwide are in fact increasing, then international assistance organizations should be trying to redress this situation. Their function in the international arena includes facilitating the growth of education in underdeveloped areas, so that the potential human resources in these regions are capitalized upon. One dynamic strategy to improve educational standards would, of course, be to take advantage of new media for instructional purposes.

9.27 The critical question is how to assist in appropriate ways. It obviously does not make sense to simply ship complex, expensive new pieces of hardware into poorly developed regions, unless the proper conditions exist. As recent experiences in several Third World countries have demonstrated, premature introduction of complex teaching technologies can result in failure, frustration, and wasted funds. Yet, conversely, to neglect these societies altogether because they are not prepared to deal with new delivery systems would be equally irresponsible.

9.28 Our review of the experiences worldwide with educational media over the past few decades would indicate that the use of instructional technology has considerable potential. Certain projects have proven highly successful and cost-effective. Yet, each effort must be preceded by a careful analysis of the present situation within the particularly country, should begin on a small scale, and should proceed cautiously. The factors discussed in the first few chapters of this publication are especially significant. The cultural and linguistic situation should be thoroughly understood, so that the potential effects of certain types of broadcasts can be gauged. The administrative structure should be examined, so that weaknesses can perhaps be compensated for. The degree of support for a media project within the educational establishment should be explored, so that project officials will have some sense as to who will assist them and
who will need to be persuaded that the project is worthwhile. The degree
to which the infrastructure will support certain hardware configurations is
another important issue.

9.29 In some cases, perhaps, a thorough analysis will reveal that
problems within a country may be too great for a major investment in educational media to be worth the risk. If so, perhaps a small-scale project
might at least help move part of the nation's educational system in more
progressive directions and might also help clarify what should be done in
the future. However, if a large-scale project does seem advisable, the
information obtained from initial assessments can be used to formulate
appropriate strategies.

9.30 Regardless of the circumstances, international assistance organi-
izations should be making a sincere effort to consider precisely how new
technological developments can further the educational efforts of develop-
ing countries. They should help introduce instructional technologies that
a given country is ready for. In most cases, as emphasized in Chapter
Three, the appropriate medium would presently be radio. Yet, future plans
could be developed so that more complex technologies are gradually intro-
duced in a systematic way, so as to steadily enhance the instructional
impact of educational media systems within the Third World. These plans
should proceed on two levels. One thrust would examine where the intensive
application of instructional technology could effectively assist a particular aspect of a nation's educational effort, be it in agriculture,
health, science, etc. This "special project" approach is more likely to
produce meaningful results than a less focused, more widely dispersed
attempt to expand educational media activities.

9.31 Yet, the larger picture must also be considered. A carefully
conceived long range plan to integrate new media into the educational
structure of a developing society in stages, over a period of time, could
reap a number of significant benefits. For example, it might help foster
the nation's overall technological development. Sometimes media projects
bring a particular technology to a region for the first time. They can
help expand the economy of these areas. Media projects invariably train
new technicians, and people with specialized skills are desperately needed
in developing countries. In general, educational media systems help build
the kind of communications infrastructure that enable developing countries
to modernize.

9.32 Students who are exposed to new technologies in the schools can
gain an appreciation of how they work and how they may influence the
development of their country. Computers, for example, are becoming rather
ubiquitous in developed societies, and schools are being asked to include
"computer literacy" in their curricula. The mere presence of modern equip-
ment in Third World schools can help convey what technological sophistica-
tion exists in other parts of the globe. But, more importantly, it may
also provide pupils with a sense of what modernization implies for their
own country.
9.33 A phenomenon of disastrous proportions which is affecting nations throughout the Third World is the accelerated urbanization of society. Populations are gravitating towards major cities, where opportunities exist that cannot be found in rural areas. These demographic trends have led to the rise of abysmal slums ringing the capitals of the developing world.

9.34 One possible means of decelerating this phenomenon is to develop the rural sectors so that people are encouraged to stay. Until recently, however, these regions have been so inaccessible that such a plan seemed hopeless. Now, even very remote areas can be linked via modern telecommunication systems to the more highly developed urban areas. The capability of receiving and transmitting large amounts of data on an ongoing basis via two-way satellite or microwave linkages can afford new opportunities for regions which previously were simply too far from the hub of activity to expect to be seriously considered as sites for new development projects. A decentralization effort of this kind would still involve some enormous obstacles. Yet, the existence of new telecommunications systems offers some possible options, as Third World policy makers weigh various strategies for dealing with the serious problems of increasing urbanization.

9.35 Perhaps, an even more serious problem faced by many of the developing countries is the fact that they are not really nation states with an identity as such. Generally, the geographical borders of Third World countries were rather arbitrarily established by the Europeans' powers during the colonial era. Often, these countries include collections of different indigenous peoples, who have little affinity for one another (and who, in some cases, have considerable animosity towards each other). Consequently, today's Third World societies sometimes have little cohesion, with various groups struggling to maintain their own cultural identity. Seldom is there a strong sense of nationhood that overrides these parochial loyalties. It is therefore very difficult for the society to mobilize itself on a national level or to even coordinate nationwide programs effectively. A cohesive social fabric and mature sense of nationhood are generally important prerequisites for development.

9.36 The industrialized nations established their national identities prior to the twentieth century, often after a considerably lengthy struggle. With national stability came the opportunity for economic development. Today's developing societies are attempting to accomplish, in a short time period, what the developed nations may have taken decades or even centuries to attain. This task is a formidable one, and it is possible that educational mass media can play a significant role (Futagami, 1981).

9.37 However, the impact of the mass media will vary, depending upon the situation. Educational media can be used to solidify the dominance of a particular political faction or ideology. Conversely, it can provide a forum for different groups within a pluralistic society. For example, as discussed in the first chapter, the selection of the language used on educational broadcasts can be very significant. In certain countries, the most populous and powerful group will attempt to impose its language upon
the nation's minorities, in an effort to establish its pre-eminence. Minority groups, however, in general, struggle to continue using their own languages, especially within the schools.

9.38 These two different roles of an educational media system in national development seem diametrically opposed to one another. Yet, perhaps both are necessary aspects of the process of building a more cohesive social fabric. A national educational broadcasting system, can of course, help unify a country by promoting a single dominant language or group of languages, with which everyone can communicate. It can also present historical material about the nation, which attempts to give schoolchildren a sense of their country's identity. The playing of the national anthem, celebration of holidays, speeches, and other patriotic gestures, can be broadcast into the schools on a regular basis to encourage identification with the nation. A national network can provide a set of common experiences for children throughout a society that will encourage national unity.

9.39 Yet, providing airtime for various minority groups may also be important. There is, of course, the possibility that separatists may exploit the media for their own purposes. However, a strong national identity can arise from a diverse population, if the strengths of each group are celebrated. When each major ethnic grouping feels its traditions are respected and its concerns are taken seriously by those in power, then national harmony becomes a possibility. If different groups are given access to the mass media, they are more likely to feel this healthy sense of participation in public affairs.

9.40 Educational media projects can help provide this type of opportunity. It was recommended in Chapter One that radio broadcasting facilities be provided for the schools of various minorities within a country, for exactly this purpose. While radio is the more pervasive and influential medium at the moment, eventually television will also play an important role in clarifying the national identity of Third World countries.

9.41 The new video technologies may some day provide more exciting opportunities than previously available for groups to produce and air programming that asserts their own particular set of ideas and values. The decreasing cost of portable television recording units should encourage production. The growth of multichannel television systems will eventually provide greater opportunities for such material to be aired. With the gradual introduction of new communications technologies, perhaps the continued vitality of certain linguistic and cultural groups can be fostered, as a by-product of their increased accessibility to the media. These trends may also strengthen cooperation between various groups, so that national unity is strengthened.

9.42 It is difficult to predict the future course of educational media development throughout the world. But it is clear that new communications technologies have enormous instructional potential. It is also clearly
necessary that international assistance organizations provide the capital, the expertise, and the ongoing support needed by nations hoping to establish effective educational media systems. In reviewing the past experiences and exploring future prospects of instructional media, this publication has hopefully provided some helpful suggestions for policymakers with the foresight to consider these exciting new opportunities afforded by technology to develop the minds of vast numbers of young people and adults throughout the world.
REFERENCES


World Bank Reports.


Indonesia: Sixth Education Project Completion Report, June 1980.
   First Education Project Progress Report, February 1975.
   First Education Project Completion Report, May 1980.
Pakistan: Adult Literacy Project Completion Report, March 1980.
