resource or method specialists. And they observed that teaching is becoming more a team process. Their questionnaire found the most used technologies involved transparencies and 35mm slides. The least used were the electronic technologies such as TV or videotapes and audio tapes. Filmstrips and films were intermediate in useage. They confirmed my belief that schools and colleges of agriculture, natural resources, and life sciences have been known historically to be progressive and interested in effective teaching. They also confirmed that the educational technology movement is under way.

Another Remedial Resource

Deane Turner, Career Development and Placement Officer of our College of Agriculture, tells me 62 percent of the College of Agriculture students come from a metropolitan or non-rural area. In other words only 38 percent come to the College with the experience we had been depending on in developing our curriculum. Most students lack history, appreciation, understanding, and terminology of agriculture we once considered built-ins. We constantly search for remedial materials to inform the urban student. One such resource is the excellent film entitled "Generations of the Land" (Screen Scope Inc., Suite 2000, 1022 Wilson Boulevard, Arlington, Virginia, 22209). This 16mm, sound, color film presents the depth and breadth of America's No. 1 industry, Agriculture.

Resource Tidbits

Hope Reports Perspective states that 15,390 non-theatrical films were produced in 1977. Nearly three out of every five of these films were made by or for business and industry. Films made by or for higher education account for only 6 percent, government 16 percent, and elementary and secondary education 7 percent. As many as 478,000 of America's 3.35 million business establishments use some form of audiovisual communication each year . . . Some publications that may interest you have recently been published by the Association for Educational Communications and Technology, 1126 16th Street NW, Washington, DC, 20036: **Educational Technology, Definition and Glossary of Terms, Volume I; College Learning Resources Programs, A Book of Reading;** and **Criteria for Planning the College and University Learning Resources Center.** All three relate to what we as teachers should be familiar with, the utilization of resources in the teaching-learning process...Educational technology is being defined as a complex, integrated process involving people, procedures, ideas, devices and organization, for analyzing problems and devising, implementing, evaluating and managing solutions to those problems involved in all aspects of human learning. I suggest this really is the definition of the activity called **instructional** development. . .The Division for Instructional Development of the Association for Educational Communications and Technology has recently initiated a **Journal of Instructional Development.** Some feeling for this emerging field can be had by persuing the first two issues.

NACTA

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Competency Based Instruction For Training Research Managers In Developing Asian Countries

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Abstract

A competency-based system for both planning and instruction is offered to meet the need for non-formal training of indigenous research managers in 10 developing Asian countries. Site-specific diversity of trainee characteristics, skills needed, and resources available can be accommodated in the system and individualized teaching materials (modules) developed. Modules can be exchanged and modified for use at other sites.

Introduction

A formidable challenge for post-secondary agricultural educators is to devise and implement regional training programs to meet a variety of needs in less developed countries. Where similar specific skills are needed by agriculturalists from a large sector of one country, or from a number of countries, non-formal regional training can be both accountable and economical. A regional plan precludes duplication of training efforts, affords shared costs, and establishes an infrastructure that may be retained for future training needs and as a network for future cooperation and exchange between participants.

The non-formal nature of the training eliminates the need for formal requirements and course credits, allowing participants to upgrade immediately-needed specific skills regardless of their previous educational backgrounds. In addition, trainees can be brought together at convenient and appropriate sites not just at formal educational institutions. For example, trainees interested in transfer of agricultural technology could be brought to a rural training base near farm communities. Research management trainees could meet at a research institute for on-site observation of the management process. Cooperative implementation by several countries results in economy of effort and cost.

Although it can be seen that there are numerous advantages to such regional training, the constraint of **diversity** persists. This diversity in trainees is greater than what is usually found in the formal classroom. A major prerequisite, therefore, in planning and instruction for non-formal regional training programs in less developed countries is that they accomodate **diversity.**

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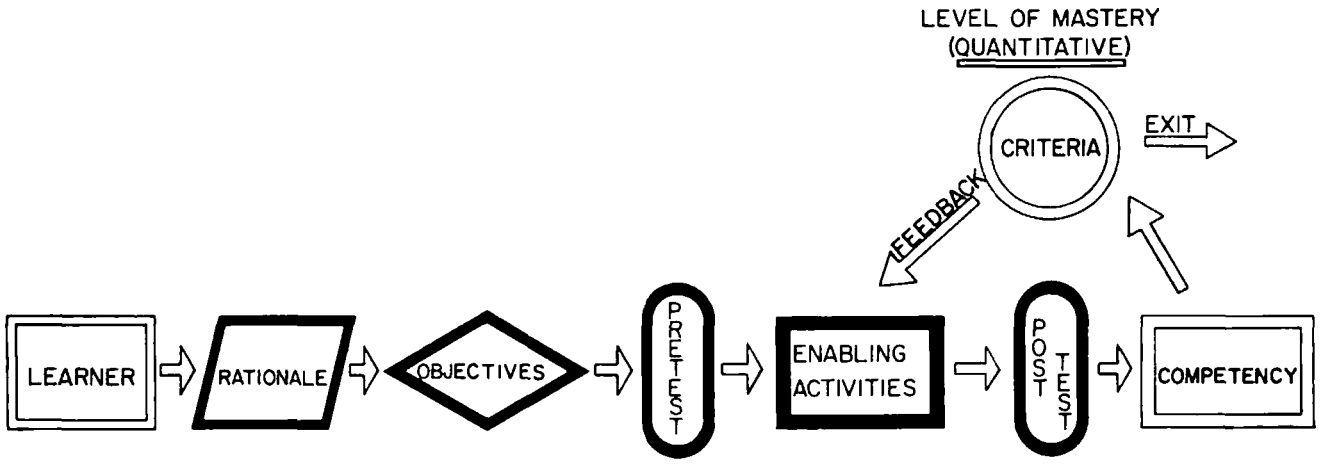
FIG. 1. COMPETENCY-BASED INSTRUCTIONAL SYSTEM PARADIGM



The Competency-Based Paradigm

One system, heretofore used principally in the formal classroom, which lends itself for use in training programs in less developed countries, is the competency-based instructional system[2]. It borrows the concept of "management by objectives" from managerial science and transposes and modifies it to "teaching by behavioral objectives." This concept in training programs for less developed countries is a further transposition of the concept to non-formal developmental education and includes a planning function.

In the competency-based paradigm (Fig. 1)[3], the objectives of instruction, skills, or behaviors to be acquired, are formulated with consideration of the learner's (trainee's) educational background and preferred ways of learning. The objectives are set forth initially as behaviors to be performed and evaluated at a defined level of mastery under specified conditions after passing through the system.The trainee is advised of the rationale (the value of proceeding through the system). He then takes a pretest. If he demonstrates that he is competent in the stipulated objective, he is channeled to objectives which he has not mastered. If he fails the pretest, he selects and engages in one or more of the designated enabling activities (e.g. lecture, panel discussion, slide tape), and is evaluated in the posttest by demonstrating the required skill. If he fails the posttest, he engages in an alternate enabling activity until the objective of the system is met. If he succeeds, he moves on to other objectives.

The competency-based system is individualized and accountable. The instructional materials, or modules, can be reused, or modified for use by different trainees.

Need for Non-Formal Regional Training in Asia

This instructional paradigm has been proposed as the basis for planning and instruction in a non-formal regional training program to upgrade agricultural research management capability for 10 Asian countries.[4] At a meeting of research administrators and scientists from Thailand, the Phillippines, Malayia, Japan, Taiwan, Sri Lanka, Burma, and Bangladesh, it was pointed out that agricultural research findings were not being applied. Long-term integrated planning of agricultural research efforts were often lacking. There was duplication of personnel, projects, and facilities, and insufficient exchange and dissemination of innovations within and between countries. In other words, it was felt that Asia's share of the US $957 million spent annually for agricultural research in less developed countries — in Latin America, Africa, and Asia — was not being wisely managed. It was explained that a major constraint to optimal research management capability was that less advanced countries were dependent on external managers from more advanced countries who were not attuned to the needs and social tenor of the countries in which they were working. But the less developed countries had neither a cadre of indigenous managers nor training programs to provide them.

The Planning Stage

The regional training program founded on the competency-based paradigm would first use the three elements of learner or trainee, objectives, and enabling activities as shown in Fig. 1, as a framework for an inventory in the **planning stage,** from which instructional materials or modules could then be designed in the **instructional stage.**

The first step of the planning stage, which has already been taken in Asia, is assessment of the priority skills to be upgraded in each country. This skills inventory would later be refined into the behavioral objectives of the modules in the instructional phase. In Asia a survey of 1,063 top level administrators, middle level managers, and researchers representing 99 organization in the 10 countries revealed that there were both shared and unique training needs. Six countries reported that among the 3 top-ranked skills required was the need for improved competence in "Research Project Planning and Implementation." Two countries only reported a priority need to upgrade "Communication Skills."[5] A second inventory would establish the profile of the prospective

trainees. It would include job description, educational background, preferred learning modes, professional attitudes, and language ability. During the planning stage, characteristics of all trainees involved in the program would be considered in grouping trainees for instruction. Profiles of the members of each training group would be considered again in designing the specific instructional modules.

After completing the trainee profiles and assessing skills needed (described respectively as learners and objectives in Fig. 1) an inventory would be made of possible training sites and teaching resources (e.g. resource personnel, libraries, audio-visual facilities.) The skills inventory would be consulted to suggest particular environments appropriate to special training needs. For example, a group to be trained in management of an agricultural research station would suggest the need for on-site location, or preferably a site near both a field station and agricultural college to take advantage of teaching resources from both facilities. If demonstration followed by trainee trial was deemed more effective than demonstration alone to train participants in efficiency studies, a research institute where trainees would have ample opportunity to observe and evaluate would be preferably to a site where only a lecture or audio-visual presentation were available.

Trainee profile, skill needs assessment, site resources, enabling activity options, and costs and logistics would be collated. A training group with similar needs would then be assigned to a site where there were optimal facilities for the specific training required. This approach to planning is thorough and considers all elements involved in training.

Finally, a taxonomy of mastery levels for the cognitive[6] and affective[7] domains completes the inventory. This would guide the development of institutional objectives so that appropriate criteria for learning outcomes from the training could be established.

The Instructional Stage

With the planning phase completed and trainees assigned an appropriate site, the instructional phase would begin. Instructional materials or modules would be designed for a specific group of trainees. From the inventories compiled during the planning stage, the skills required, trainee profiles, and site resources for each training group would be assembled. Data for each training group would then undergo a separate matching process, similar to the planning stage. The inventory of skills required would be restated as behavioral objectives which could be demonstrated as an output of instruction. Related behavioral objectives would be grouped to serve as the nucleus of a module. These objectives would then be matched to suit the trainee's desired level of mastery as suggested in the taxonomies provided. The rationale, pretest, and posttest, not included in the planning stage, would be formulated and included as part of the system design. Enabling activities from the composite list of options would be selected on the basis of compatibility with trainee profile, objectives sought, and site available. For example, if the objective was to solve problems of communication with superiors in a large agricultural institute, on-site observation, case study, library search, or role playing might be selected from the list of enabling activities. Immediacy of effect, novelty, or appropriateness for the objective would determine its selection. The inventory and matching process assures that every available option is considered in module design. Diversity, which often has been a constraint, becomes an attribute to be used creatively by educators designing modules best suited to the trainees' needs and abilities.

Conclusion

A common constraint for educators working in training programs for less developed countries is the paucity of appropriate written and audio-visual materials, of finances and personnel, as well as the variability of the trainees' profiles within and between training groups. Therefore, what is needed is a framework for organizing and designing instruction that capitalizes on what is available and that accommodates diversity. It can be said that within the organizing framework of the competency-based paradigm, there is sufficient flexibility to adjust to the trainees' demands and to allow elbow room for a creative educator to exercise originality in selecting compatible elements. The quality of the instruction ultimately rests on the judgment and imagination of the educator designing the instructional system.

The system proposed here for use in agricultural research management training in Asia illustrates one of many possible uses for the paradigm in less developed countries. A similar approach could be used for example, in training subsistence farmers to use innovative techniques in rice culture, to prepare villagers for accepting change, or to orient expatriates to new working environments. The competency-based approach affords economy, accountability, and creativity in non-formal regional training programs. Given this paradigm as an organizing concept, the great variety of skills required, the variability of teaching resources, and the diversity of trainee characteristics become more manageable.

Footnotes

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