ID Model for the Bell System Center for Technical Education

Symposium on ID Models—2

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Abstract. This paper discusses the seven-phase AT&T Training Development Standards (TDS) which serve as a model and guideline for the Bell System Center for Technical Education (BSCTE) course development. Some of the major topics covered include who does each of the steps, provisions made for noninstructional solutions, the role of evaluation, practical considerations of the model, and its unique features.

The Setting

The Bell System Center for Technical Education (BSCTE) in Lisle, Illinois, is the Bell System's major site for technical management training. The curriculum includes training in various technical disciplines including forecasting, engineering, business services, network operations, and technical planning.

To support this function, over 300 manager/administrators, instructors, course developers, and training technicians are employed at BSCTE. Typically the administrators at various levels of management are on rotational assignments from a Bell Operating Company. Many have had no previous experience with training but have held field or staff positions in technical disciplines. Most instructors and course developers are on rotational assignments of 2 to 3 years and are subject-matter experts (SME) in a technical discipline or job. The training technicians are often hired directly into BSCTE to serve as permanent staff members. They generally have a background in education or instructional technology.

As an indication of the scope of the operation, in 1979 BSCTE offered over 36,000 student weeks of training (number of students times weeks of training) and spent over 10 million dollars for course development activities.

The Model

The model used at BSCTE is displayed in Figure 1. It is a detailed systematic course development process developed by AT&T (1978, 1979), entitled *Training Development Standards* (TDS). This same set of standards is used throughout the Bell System to develop both craft and management training courses. At BSCTE, the model has been used to develop seminars, workshops, and courses ranging from 1 or 2 days to 12 weeks in length and offered to a variety of job populations. The model consists of seven distinct phases with specific activities and products.

Job Functions Within the Model

Phase 1 (Preproject Study) and Phase 7 (Follow-up Evaluation) are conducted by two staff groups of instructional technologists. In Phase 1, the technologist collects and analyzes data from the initial training requests to determine whether there is a need for training or whether there may be a more appropriate solution. These requests are generated from our clients, the Bell Operating

Author's Note. The AT&T Training Development Standards model discussed in this article was developed during the period from 1971 until the present. During that time a number of contributions from the field of instructional technology have been incorporated. Because these contributions are not specifically identified in the Training Development Standards themselves, they could not be referenced in this article. However, whenever possible the vendored training courses which are used to support the model have been referenced.

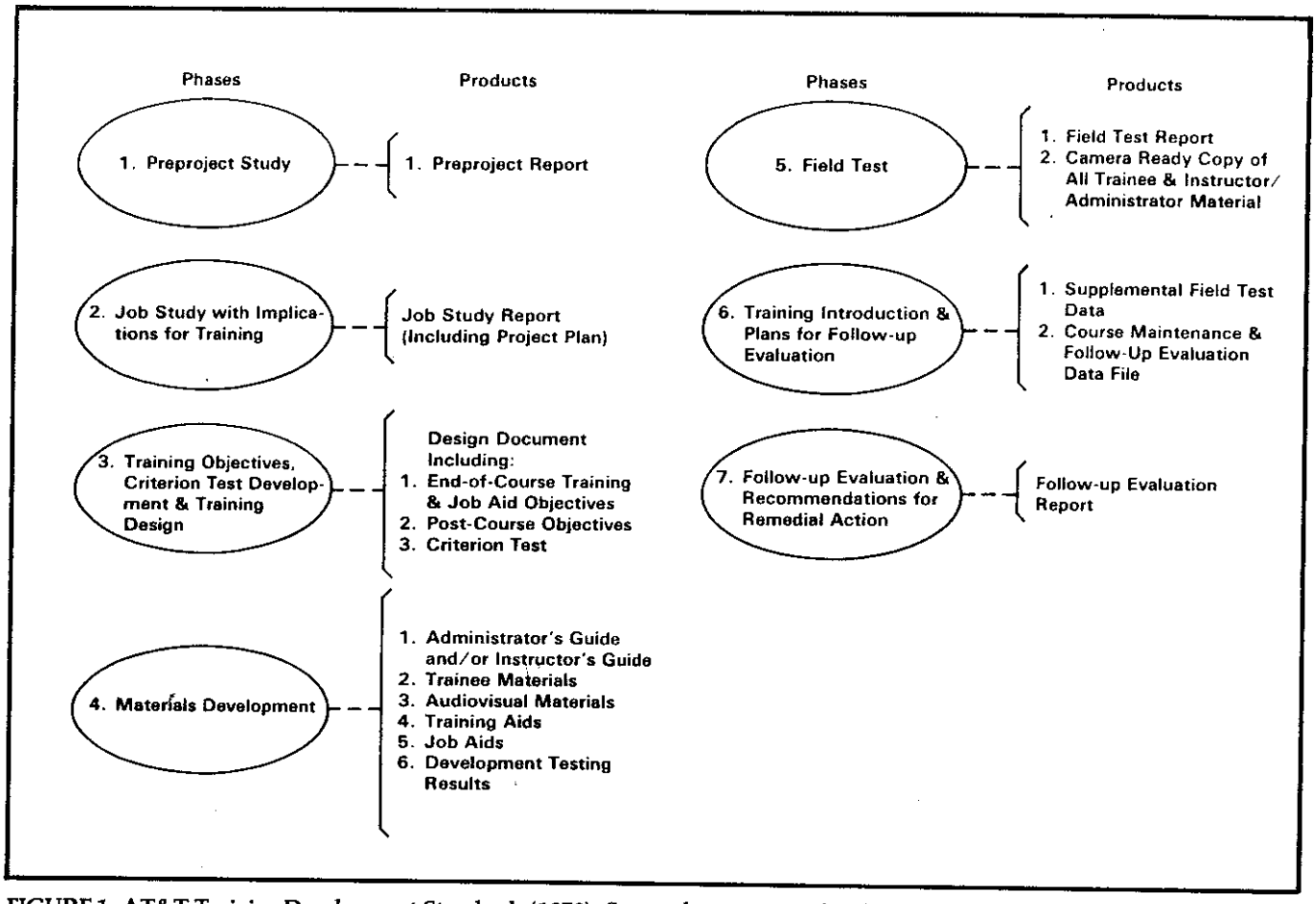

FIGURE 1. AT&T Training Development Standards (1979). Seven-phase training development model used by BSCTE.

Companies. They generally focus on one problem area which impacts at least one job and often several different jobs. The target populations may range from less than one hundred to several thousand. The technologist studies the causes of the performance problem to determine whether it is caused by a lack of skill or knowledge. In a number of instances (40 to 50%), the technologist recommends nontraining solutions based on environmental causes for the performance deficiencies. In such cases, the nontraining recommendations are referred to the appropriate organizations and further course development activities are curtailed. This cost-effective screening activity saves the Bell System thousands of dollars each year in inappropriate training solutions.

The scope of this problem identification can involve one course development effort or several courses in the same discipline. However, whole-course curriculum development generally is established through a separate study called a "Curriculum Planning Study." This study is also performed by the instructional technologist, but it has a much greater scope and involves different techniques and resources. The end product is a "road map" of the courses in the particular curriculum or discipline with a suggested training path for job incumbents depending upon their background, experience, and needs. The derivation of the curriculum road map helps to identify potential gaps and redundancies which then can be addressed by performing a Preproject Study in the specific problem area.

Instructional technologists conducting Preproject Studies are trained through the PRAXIS Corporation's Performance Analysis Workshop (1973).

In Phase 7, the technologist collects and analyzes data on an existing training course to determine whether or not the training content matches the current job. Often a judgment is also made about the value of continuing the training without change, revising it, or dropping it. At this point the technologist also examines the impact of any nontraining recommendations made in conjunction with the development of the training course.

Training for Follow-up Evaluation is provided through the Bell System's Follow-up Evaluation Workshop. This course provides hands-on assistance in designing and developing the data collection and data analysis instruments as well as guidance on how to follow the process.

The assignments of Phases 1 and 7 to separate staff groups of instructional technologists rather than course developers is a unique feature of BSCTE's use of the model. One of the purposes is to avoid the potential bias that course developers might bring to problem identification or evaluation of their own project. The technologist does not have a vested interest in the outcome in either phase. This staffing arrangement also provides maximum resource efficiency. These specialized staff members are able to react quickly to requests and to perform studies simultaneously without "switching gears" to other course development activites.

Phases 2-5 (Job Study, Design, Materials Development, and Field Test) are

conducted by a course development team consisting of one or more subject-matter experts/course developers and one training technician. The team begins by studying the job or portion of the job found to be deficient in Phase 1. After data is collected and analyzed, information is generated including additional performance deficiencies and their causes *not* identified in Phase 1; detailed procedures for tasks with deficiencies; skills and knowledge required to do the job; entry-level skills and knowledge; job aids if appropriate; and evaluations of existing training courses. The final product is a list of training and nontraining recommendations which focuses on the performance deficiencies and skills and knowledge lacking in the target population. The training recommendations become the primary information in the design of the course. The nontraining recommendations are referred to the appropriate organization for resolution.

Training on Job Study techniques and procedures is offered in the Bell System's Job Study Workshop. Job aids' training is offered in Harless' Basic Instructional Design Workshop (1978) and the Bell System's Performance Aid Development Workshop.

Design of the instruction in Phase 3 involves writing behavioral training objectives, developing tests to measure them, and developing lesson strategies and specifications. The design becomes the blueprint for actually developing the course materials. A variety of media options are available to BSCTE development teams including videotapes, audiotapes, slides, overheads, and easels. To assist in the selection, staff media consultants are used as well as the AT&T Training Media Guidelines (1976). In a number of courses, the basic strategy is to provide priming through lecture and discussion and/or self-paced materials, then hands-on practice through group case problems. This is particularly effective because BSCTE has complete laboratory facilities with the same equipment used in the job environments.

Training in the Design phase includes Harless' Analysis and Instructional Design Workshop (1978) and Mager and Pipe's Criterion Referenced Instruction Workshop (1979).

Phases 4 and 5 involve Materials Development and Field Test. The development team produces the instructional materials designed in Phase 4. Each BSCTE course uses an Instructor or Administrator Guide, Student Work Binder, Student Reference Binder, and Course Binder. The Instructor/Administrator Guide documents in scripted outline format the words as well as actions that should take place in the classroom. In addition, the guide includes notes on how to prepare for the lesson. The Student Work Binder contains such items as the course objectives, lesson summaries, note-taking guides, and exercises which the student will use during the course and retain as a performance aid. The Reference Binder contains many necessary technical references that are required during the course. The Course Binder is an administrative tool containing the history of the development, inventory of course materials and media items, tests, exercises, and so on. The instructor retains and updates this binder throughout the life of the course.

During Materials Development, the course materials are developmentally tested and revised even before Field Test. This may be done on a lesson-by-lesson basis and/or in the form of a whole-course tryout. The testing is generally done with a small group of target students rather than a full class. Developmental testing at this point reduces the number of major changes after the Field Test.

Phase 5, the Field Test, is conducted with a representative sample of the target population under realistic conditions. This may require conducting several sessions of the course. At BSCTE the developer or instructor conducts the course and the training technologist monitors and analyzes the results. At this point, the course objectives rather than the students are being assessed, so it is particularly critical to establish carefully the criteria for success prior to the test. After the data have been analyzed, necessary revisions are made in the materials.

Training in Materials Development and Field Test is provided through Harless' Analysis and Instructional Design Workshop (1978), Mager and Pipe's Criterion Referenced Instruction Workshop (1979) and Mager's Instructional Module Development (1977). In Phases 2 through 5, the course developer and training technician are functioning as a team. The course developer who is an SME is responsible for the technical subject-matter content of the material, and the technician is responsible for the instructional quality of the course design and materials. This type of team assignment is another unique feature of BSCTE. It allows both members of the team to bring their own expertise to the development of relevant efficient training products. It also is more efficient than attempting to train either member in the expertise of the other.

In addition, there are two other job functions involved in course development activities. The Training Manager and the Project Manager are primarily responsible for administrative activities such as budgeting and scheduling. They also serve as consultants in the training development process and as reviewers of the products.

Phase 6 (Training Introduction) is conducted by instructors/administrators who are also subject-matter experts. A large percentage of BSCTE instruction is group-paced and instructor-led because of the volatility of the technical materials being taught; however, there are self-paced courses and programs available. This mode of delivery has been most effective in courses where there was a wide range of entry level skills and/or several different target populations.

The instructors/administrators are responsible for documenting necessary course maintenance items, particularly technical changes that will affect the training materials. When significant redevelopment of a course is required, it is reassigned to the developing organization at whatever phase is most appropriate.

Instructor training is provided in the Bell System's Instructor Training Workshop and administrator training in Mager and Pipe's Criterion Referenced Instruction Workshop (1979).

Noninstructional Solutions

There are several points in the model where noninstructional solutions (changing the job environment or learner's attitudes) were considered. As previously mentioned, during the problem identification in both the Preproject Phase and Job Study Phase, nontraining recommendations are often made to the appropriate organization or department. In addition, during the Job Study, decisions are made about developing performance aids instead of formal training to correct identified performance deficiencies.

During the Follow-up Evaluation of a training course, it may also be appro-

priate to determine whether or not the nontraining recommendations from the Preproject or Job Study have been carried out effectively.

Evaluation

The Follow-up Evaluation Phase has been described in some detail. It is the principal evaluation activity in the model in which data are gathered to determine whether or not the needs identified in the Preproject Study have been met and the training content matches the current job. However, formal Follow-up Evaluation Studies are not performed for every course because they are expensive and not always cost-effective. Generally, if specific problems or concerns with a course are identified, a Follow-up Evaluation will be recommended and funded. In addition, BSCTE has its own quality management system to evaluate the quality of all training products. Data are collected on conferee achievement, conferee feedback, instructor observations, and course material evaluation. Managers review this data to determine what ongoing course maintenance is required.

Conferee evaluation results are maintained by a measurements and evaluation group. This group provides guidance on test construction during the course development and later provides an administrative system to implement, score, and analyze the results.

Unusual Features of the Model

Throughout this article some outstanding features of the TDS model and BSCTE's application have been cited. Several other features should be noted. The TDS model is a guideline as well as a standard. Flowcharts and corresponding narrative descriptions detail the process to follow, the decisions to be made and the explanations of how to perform the activities. Another section of the TDS, the Reviewer's Standards, contains detailed checklists to "measure" the products of the activities. In this way the TDS provides guidance on how to proceed through the course development activities as well as providing a means to measure what has been produced.

The TDS is not report-oriented, as one might expect. It requires a great deal of documentation but it is "working" documentation which the team must produce in order to proceed through the activities. The reports required as part of the formal course documentation do not call for any additional items that were not part of the "working" documentation. No formats for these reports are dictated so it becomes the decision of a particular organization or manager as to what will be required. Most BSCTE managers have suggested a short narrative to guide the reader/reviewer through the "working documentation." This saves time and effort required for creating additional documentation that doesn't contribute to the course development process.

The most important feature of the TDS model is its *universal application to training in the Bell System*. The TDS is based on principles of systems development technology as applied to instruction. These principles are not unusual; however, the details of the model have been tailored to requirements that are unique to the Bell System.

For example, when studying jobs during Phase 2 (Job Study), there are three different and distinct paths of activities to follow depending upon which Bell System environment is being examined. In examining an existing job with deficiencies, the data collection activities as well as the sources and types of data will differ from those of a new mechanized system that hasn't yet been tried. These differences in environments have been built into the TDS model because no single process would be appropriate in the varied types of Bell System environments.

Because of its universal application in various Bell System training organizations, TDS has provided a common language and element of credibility between and within organizations. This applies to an organization like BSCTE, because development activities are conducted in four different divisions. A common model assists in the communication and support between divisions.

Practical Considerations—Constraints

The practical consideration of dealing with project constraints is built into the TDS process. Typical constraints include lack of time, human resources, funding, methods, and documentation. There are activities in many phases that call for documenting and analyzing possible constraints for their impact, then making decisions about curtailing certain activities as a result.

A good example occurs in Phase 2—Job Study. The TDS activity for determining the entering skills and knowledge of the target population is to develop and conduct a diagnostic test to measure the skills and knowledge possessed by members of the target population. Because there may be constraints on diagnostic testing, such as time, budget, available test subjects, and available equipment, the activity preceding the diagnostic test is included to determine the effects of constraints. The result of this determination may be to modify the diagnostic test or to eliminate it completely. The important considerations here are that the constraints have been examined, the risks weighed, and a decision reached. Whenever constraints need to be considered, they are documented so that others can also evaluate the decisions made during a project. In addition, training/information sessions have been offered to managers and course development teams to discuss the practical applications and how to deal with constraints within the context of the model.

To conclude, the TDS model helps BSCTE to systematically develop training products within the constraints of its own unique Bell System environment.

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