



Instructional Systems Development (ISD)

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ISD -- A Systems Approach To Training

"ISD" stands for **Instructional Systems Development**. Some other names that are used to describe the systems approach to developing training include TSD (Training Systems Development), SAT (Systems Approach to Training), and CRT (Criterion Referenced Training).

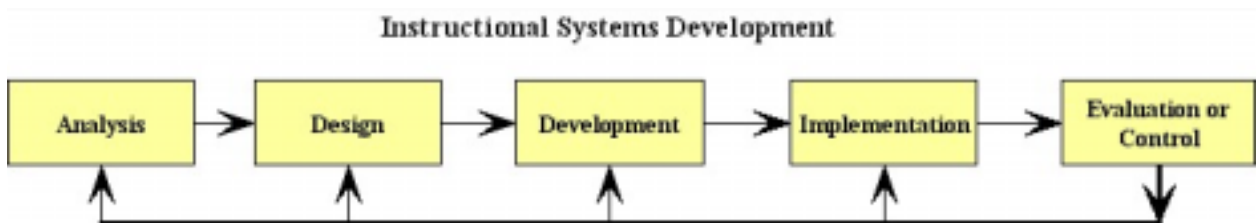
A system is made up of parts that function as a whole to produce some results. The parts of a training course (the whole) include the classroom instruction, tests and handouts, practical exercises, tests, laboratory sessions, audio and video media, and processes that bring about improvement in the system.

Fundamentally, there is one systems approach to training development, with many models to represent it. Different authors and organizations have devised models that differ in wording and degree of detail. Still, the differences among models are usually superficial.

One model that illustrates the basics of the systems approach is shown on the next page. As you can see, this model has five phases: analysis, design, development, implementation, and evaluation. The broken lines and arrows show that you may go back and forth between phases during development to make changes as they become necessary. The lines and arrows leading from the evaluation phase to all the other phases mean that if you find a problem in a course during the evaluation phase, you will need to go back in the process to correct the difficulty.

Advantages of a Systems Approach

- Is a logical process for dealing with problems of training development;
- Considers the realities of constraints on time, money, and so on;
- Ensures correspondence among materials (for example, test items match what was presented for learning; text agrees with information in videotape; all materials support program objectives);
- Focuses training efforts on the knowledge and skills learners need to do their jobs;
- Consistently produces well-trained employees when qualified training professionals are used;
- Provides for program evaluation, revision, refinement, and improvement;
- Allows for working evaluation into training plans from the start; and
- Allows for development of documentation plans before training begins.



Analysis Phase

Sometimes we think we know the training needs of our organization and its employees before we do an analysis. So when training budgets are tight, the analysis phase of instructional systems development is often cut back-even cut out.

This leaves trainers and managers to use limited information - sometimes just intuition - for determining their organization's training needs. The purpose of the analysis phase is to collect enough accurate information for managers and trainers to make informed decisions. By identifying real training needs and priorities, the data collected will, in the long run, save the organization money because expenditures of money, time, effort, materials, and equipment will be aimed at the right targets.

And, training programs based on adequate data collection and analysis are more likely to have the support of training participants, supervisors, and managers because their needs and goals will be identified, considered and, for the most part, met and accomplished.

FRONT-END ANALYSES

The analyses carried out at a project's start are called front-end analyses. They include:

- **Needs Analysis:** Analysts use surveys, interviews, observations, or a combination of these to determine possible training needs. Managers, line supervisors, workers, or customers might be asked questions seeking information on product quality, services, production efficiency, and so forth-whatever could point to areas where training or organizational change is needed.
- **Problem Analysis:** Once a problem is identified, the first step towards finding a proper solution is to find its cause. Surveys, interviews, and observations help an analyst narrow down and eventually isolate a problem's cause(s). Ultimately, the solution may not be training. Low product quality, for example, may be the result of poor equipment maintenance rather than poor assembly. Among the reasons for poor maintenance might be untrained or inadequately trained maintenance technicians-poorly written maintenance procedures, an insufficient number of maintenance personnel, low maintenance personnel morale, or a combination of such causes.
- **Goals Analysis:** Goals analysis should identify the important goals of all people who have a legitimate interest in the training program's outcomes. Unless a training program is designed with the goals of managers, line supervisors, and training participants in mind, they may not cooperate in fulfilling their roles in the training program. To accommodate their goals, there may need to be more than one goal for a training program.
- **Population Analysis:** This analysis describes the people who are to participate in the training program. To develop an effective program, a developer needs to know such learner characteristics as:
 - education;
 - experience;
 - special physical needs;
 - cultural differences (from one another or from the program's developer or its prospective implementers);
 - language skills.
- **Resource Analysis:** This type of analysis is conducted to identify what resources will be available and useful to program developers and instructors/facilitators. These resources include-but are not limited to-space for classes, labs, workshops; media such as off-the-shelf

training materials, computers, actual job equipment or mock-ups/simulators, books, periodicals, audio- and videotapes; and subject-matter experts.

- **Constraints Analysis:** Training, like life, involves tradeoffs, so a developer needs to know the constraints on a training program as well as available resources. Usual constraints include limitations in: budget, availability of resources, and availability of the time of training participants or instructors/facilitators. A designer must consider all known limitations from the outset and plan around them. For example, if the best lecturers on a particular topic live in places distant from most of an organization's training locations, videotaped courses may be a preferable alternative to paying lecturers' expenses for repeated trips to training sites. If the problem isn't lack of money, but lack of lecturers' time, teletraining by videoconference might be the solution.
- **Job Analysis:** Before people can be trained for a new job, someone must identify the duties and responsibilities included in the job. A job analysis yields a breakdown of job responsibilities. Consider the job of retail cashier: its major responsibilities might include greeting customers, taking cash for purchases processing charge purchases, keeping inventory, and recording information for delivery of purchases. Job analysis data will help an instructional designer determine the objectives and goals for a training course.
- **Task Analysis:** A tasks analysis breaks down job responsibilities into tasks and also reveals the skills and knowledge job holders need to complete each task. For example, a retail cashier's responsibility for taking cash for purchases may include the task of making change.

To perform that task requires recognizing denominations of money and knowing how to subtract a purchase amount taxes, and fees from the cash tendered or how to enter purchase-related sums into a computerized cash register.

Task analysis information is the foundation on which developers base a training course's written objectives and selection of content. Job performance standards too are founded on task analysis data.

Design Phase

The design phase is the main planning stage of instructional systems development. In this phase, the developer will be:

- Writing objectives;
- Developing test items;
- Determining the sequence and strategies for training.

WRITING OBJECTIVES

Objectives state the expected outcomes of training. They define exactly what learners should be able to do when their training is completed. Objective writing is the first step because it is critical to know what training is supposed to accomplish.

As Dr. J. Marvin Cook, Coordinator of Graduate ISD Programs at the University of Maryland in Baltimore County says, 'If you're going on a trip, you'd better know your destination before you leave or you might head in the wrong direction. In training, the objectives are the destination. You must identify the objectives of training up front to determine the most direct way to reach your goals.' As noted earlier, objectives are

developed from task analysis data. And, the job performance standards that later act as evaluation criteria also derive from task analysis information.

DEVELOPING TEST ITEMS

The second design step is development of test items.

Determining evaluation criteria and methods early in the design phase allows a developer to answer these questions about objectives:

- Are they testable? Well-written objectives call for a learner to demonstrate observable, measurable actions. Objectives may, for example, call on the learner to "state," "list," "operate," or "repair" something. Objectives shouldn't use verbs like "understand" or "appreciate." These are not acceptable because they describe a learner's internal state, which cannot be observed.
- Does the organization have the resources to test the objectives? Objectives that, if not met, involve safety risks (for learners themselves, their co workers, or customers) may have to be written to indicate that a learner must first succeed in a test on a simulator or a mock-up before using actual equipment. Another consideration would be whether, even though safe, a test on actual equipment might interrupt other workers' schedules by tying up vital machinery.
- Does the objective test skills needed on the job? Sometimes objectives really test a person's ability to describe work rather than ability to do it. By looking at objectives in terms of how they will be tested, developers may identify subordinate (but still important) skills and knowledge overlooked during task analysis. But, the developer's main chore in this step is to identify and correct poor objectives before training materials are developed to support them.
- Sometimes it's appropriate to have learners develop simple skills then build on those to learn more complex skills.

DESIGNING THE SEQUENCE AND STRATEGIES

The sequence of training should be in accordance with a logical order of learning. Frequently there is more than one logical order in which to learn a task. Then the developer must choose the sequencing method most suited to the interplay of learning tasks and training participant characteristics.

Usual sequences are:

- **Step-by-step.** If a task is always done in a certain order (and especially when order is critical to safety), step-by-step sequencing may be used. Changing a tire is an example of a task best presented this way. The skills involved are rather elementary, but if a tire changer forgets to set the parking brake or put out safety flares, a simple task becomes a dangerous one.
- **General overview to detailed learning.** If training participants learn how an entire system/process works before they learn its separate tasks, they'll have a better understanding of why various procedures are needed.
- **Known to unknown.** Before training participants tackle new learning, it may be helpful to have them practice skills or review knowledge they already have.

At this point, a developer selects overall training program strategies. Details will be worked out later during the development stage when specific materials are put together. But, for now, the developer makes general decisions about:

Training method(s): Will the course include on-the-job training, classroom instruction, lab or workshop instruction, or self-instruction?

Training media: Will the course use textbooks, consumable workbooks, computers, interactive videodiscs, or audio or videotapes?

The strategies selected must match a course's stated objectives. For example, a course on computer repair shouldn't rely heavily on pencil and paper activities. Learners would need opportunities for hands-on computer repair practice, or else they wouldn't be prepared to pass a job-related evaluation at the course's end.

Development Phase

During the development phase all training, documentation, and evaluation materials are selected, written, or otherwise produced. These may include:

- **Training materials:**
 - instructor guides (including lesson plans and a run-down of resources)
 - training participants' guides
 - textbooks, manuals, workbooks, and handouts
 - non-print media (computer software, audio- and videotapes, equipment mock-ups, models, etc.)
 - trainee evaluation materials (such as tests, lab exercises, or assessment checklists)
- **Program evaluation materials**
 - training program evaluation plan (when and how to distribute/collect course evaluation forms, what to say before they're distributed, and so on)
 - course evaluation forms
 - supervisors' forms for evaluation of course participants' post-training job performance
- **Training documentation**
 - training participants' records system (class attendance forms, evaluation forms, lists of participants' completed education/training)
 - course documentation (written objectives, authorship/responsibility for course material, lists of instructors/facilitators and their qualifications)

TRAINING MATERIALS

Using off-the-shelf materials may save a great deal of development time. Whether previously purchased ready-made materials are selected for the specific course, whether material is cut and pasted from previous courses' in-house-developed materials, or whether new materials are bought from outside vendors, it is imperative that materials support course objectives.

Remember that it isn't necessary to use entire tapes or texts if only parts of them meet learner needs. And, let these facts guide your selections and decisions:

- Training participants' evaluation materials must evaluate a their ability to pass job related objectives and performance standards.
- Lesson plans and instructional media (texts, tapes, and so on) must focus on the learning necessary to pass the tests of objectives-not on "nice-to-know" material that has little effect on job performance.

TRAINING EVALUATION MATERIALS

Records of course evaluation need to be kept by the course developer/evaluator or someone else in the training/human resources department. This data will serve as the basis for future course revision. Evaluation forms should be easy to understand and require a minimum of time to complete. Plans should be made to ensure their completion and collection, otherwise a low response rate will offer incomplete, possibly invalid, information.

TRAINING DOCUMENTATION MATERIALS

Training records can be kept in paper files or on computer. The amount of documentation required will depend on the size of your organization and the types of work its employees do.

Organizations whose employees work with dangerous equipment or whose performance may affect public safety need to keep detailed training records. And, organizations in industries regulated by government or private regulatory commissions also require extensive documentation.

Implementation Phase

In the implementation phase, the course is taught and participants' learning is evaluated. Most of the design and development work is completed by this time. But, instructors/facilitators should be on guard for problems with course materials or design, and should include information about these in their course evaluation reports.

If a course is not working as planned and participants are not progressing satisfactorily, changes must be made during implementation. Sometimes a course will be successful in training one group but fail in training another-say, if the training population has changed since the course was last taught but the training department was unaware of this.

Once this kind of information is uncovered, it should be carried over into the course evaluation phase so adjustments will be made in future course offerings. But in the meantime, "first aid" is needed so current training participants' needs are met. The course instructor(s) must overcome participants' immediate learning problems, or participants' time will be wasted, they won't be prepared for improved job performance, and they may be discouraged about participating in future training. Fortunately, in the systems approach, a good deal of information is gathered and alternatives are considered-so, if the reality of what's happening in the training setting demands some adjustment, the change is usually manageable.

Evaluation Phase

This phase is the catalyst for course and program revision. Through analysis of course evaluation data and feedback of information into the development cycle, a course (or a program of related courses) can continue to evolve as the training population changes or new training needs emerge.

For evaluation purposes, it isn't enough to depend solely on training participants' end-of-course evaluation forms. That form has its uses: it depicts the course design, instructor, and materials as training participants' see them when the course is still fresh in their minds. But, it doesn't indicate to what extent training helped participants perform their jobs better.

So, since training's main purpose is to improve job performance, evaluation by participants needs to be supplemented. Before-and-after-training measures and observations of such things as:

- Employee performance;
- Department performance;
- Employee turnover rate;
- Customer comments on products and services will give training developers-and an organization's upper management-a more complete, accurate picture of training's value in improving employees' job performance.