Learning Lab Technology and the Instructional Design Process: Fashionable Fad or Pedagogical Tool?

In this article, the author considers whether instructional design (ID) is yet another fashionable fad or a legitimate pedagogical tool for use in learning labs. In discussing the various applications of this "non-mechanical" technology, the author provides a review of the basic ten components of the instructional design process and considers how research and theory have influenced it. It is the author's contention that instructional design is a useful tool for learning lab directors who are faced with assessing, developing, and implementing new technologies and resources in the learning lab.

As the 1980s wind down, so has our love affair with designer products. Fashion no longer demands that we wear designer jeans or drive designer cars. In fact, the less name-conscious among us now seem to be forsaking their "Calvins" to slip into their "501s" and zoom off in their "XTs." The designer definitely seems to be taking more of a back seat.

Within education over the last 20 years, the design of instruction has also been much in fashion. Instructional Design (ID) has been called yet another educational fad, destined to disappear with the hula-hoop, EST, and prominently displayed designer labels. Yet, there are those who claim that ID is a valuable heuristic which can bring order to the haphazard development of instructional programs and resources. Within most learning labs or resources centers, however, there is little evidence that this non-mechanical technology—as ID has been called by some—is being used extensively.

Has ID fallen out of fashion with language educators along with Calvin, Werner, and others? Or is ID a useful heuretic—thus far, largely untapped—for the day-to-day development of language learning resources?

Where is ID Used?

While ID is not fully accepted by all educators, growing evidence suggests that ID is being used successfully. Having made its way into many Colleges of Education, ID has won support from researchers like Snelbecker (1987) who have examined ID skills useful for the classroom teacher and suggest how teachers can use design techniques effectively.

Studying the politics of successful ID projects in higher education, Lawrason (1978) found that commitment by the institution and faculty rewards were the most potent success factors. In a later study (1984), he cites the potential for a wide range of ID applications in the Liberal Arts by means of interdisciplinary courses, faculty development programs, and the adoption of the new interactive technologies.

In addition, several recent studies indicate that ID continues to be an essential element in the development of complex instructional computer and video applications (Allred & Locatis, 1988; Morrison & Ross, 1988; and Dede & Christopher, 1988).

Many major language learning development projects have used ID techniques, particularly those involved in the development of computer-assisted language learning (CALL). Clark (1988) of the Defense Language Institute calls for the use of sound ID principles to help match specific

learning goals and specific learners to optimum instructional strategies. His procedures involve consideration of the whole instructional system, that is, the live teacher, print materials, out-of-class, non-technological experiences, and CALL. Clark outlines both research and development strategies for integrating CALL into a full curriculum based on sound evaluation of goals, learners, and instructional strategies.

ID seems to have achieved its greatest acceptance in the business world, where training professionals have transformed it into "performance technology." Design principles are being used extensively to develop training programs and to handle the demands of the new information technologies which are rapidly being implemented in many offices and places of work. A new journal, *Performance Improvement Quarterly*—premiering in 1988—features articles on learning and ID (Gagné, 1988), on practical applications such as "job aides" (Richards, 1988), and on improving performance without training (Bennett, 1988).

What Research Is Being Done on ID & Its Effect?

While the use of ID seems widespread, research studies exploring its efficacy in improving learning are not. Many in the field spend energy getting resources "on line" instead of publishing their successful results. A further stumbling block to ID research is the nature of the ID process itself. Involving the manipulation of many variables, ID is unlike most educational research which attempts to isolate a limited number of controllable variables in limited focus experiments. Such "isolation of variables" methodology is inappropriate for the overall evaluation of a complex, multi-variable process like ID.

Scholars have made various recommendations for more and different kinds of ID research. Wilkinson (1978) recommends techniques for studying the cost effectiveness of instructional projects. Hannafin (1986) laments that level of research, commenting that there are more people questioning why the lack of research instead of doing it. He suggests more study of topic selection, methods, involvement of business and education, and a wider dissemination of results.

Despite the difficulties in obtaining hard data from traditional research approaches, evidence from the work of various practitioners of successful ID applications is growing. Increased use of ID in business, medicine, and the military—as well as traditional education—would seem to indicate that many who have undertaken ID find it useful and effective in achieving their learning objectives.

What Is ID?

A relatively new professional field, ID is a set of procedures for making decisions about shaping learning to achieve desired outcomes. Proponents have called ID an algorithm, a heuristic, a systems approach, and a technology. ID is not a learning theory, but it borrows ideas from various learning theories beginning with the behaviorist ideas of Skinner (1952), Gagné (1965), and others. Reigeluth (1983) surveys the contributions made by many learning theorists, beginning with Gagné-Briggs-Gropper to the cognitive approaches of Collins and Stevens, to the "algo-heuristic" theories of Landa.

In addition to the occasionally conflicting views of theorists, practitioners have added to the confusion of ID by using various terms and approaches when referring to their work. An "instructional designer" conducts the "front-end analysis" defining problems and suggesting the instructional solution. The "designer" then turns over the plan to the "client," leaving production of materials to technical staff. An "instructional developer," on the other hand, follows the project through all the stages of development from goal setting to evaluation, including production of the materials. A "performance technologist" is a recent arrival; he or she evolved in response to business applications when it became clear that instruction did not always solve all performance problems. As industry consultant, a performance technologist takes a broader view in the analysis of problems and may recommend organizational, personnel or other solutions besides training.

Be he or she instructional designer, developer, or performance technologist, all three use a similar process in reviewing a problem and recommending change. The ID process uses systems models similar to flow charts used by computer programmers. ID models range from simple ones with only three components to

complex ones with hundreds of interconnected boxes and critical decision points demonstrating ID alternatives.

Most ID proponents (Davies, 1971; Davis, Alexander & Yelon, 1974; Gagné & Briggs, 1974; Gerlach & Ely, 1980; Kemp, 1985) agree on ten basic elements in the process, illustrated in Figure 1.

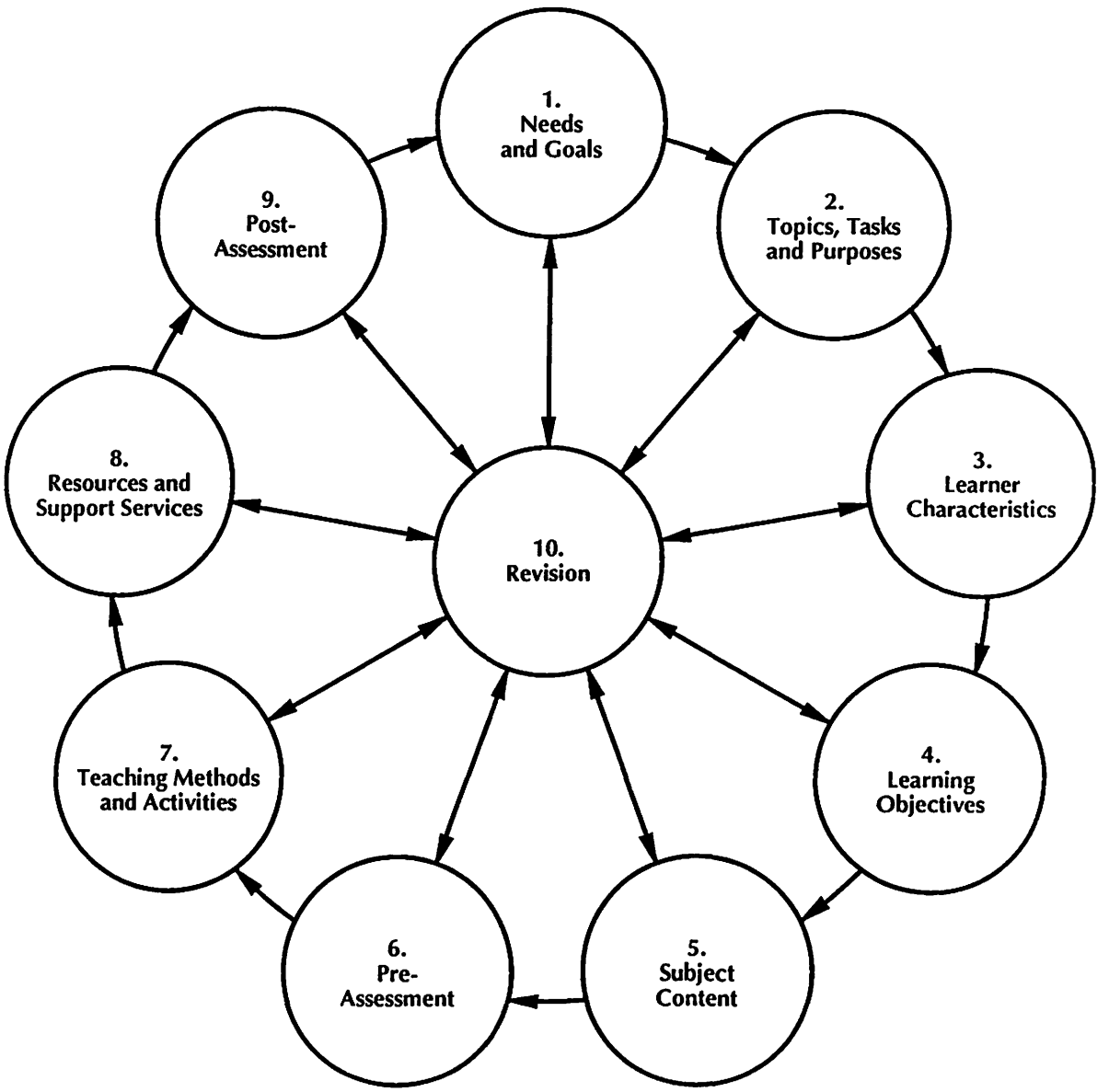

Figure 1: Basic Instructional Development Systems Model

Each of the ten of the instructional processes is tied to the others; decisions in one are affecting decisions in all areas. Sometimes, the constraints of pre-ordained curricula, lab procedures or existing materials make open-ended decision-making difficult. Cyclical and reiterative, ID does not always progress in a linear fashion. Nevertheless, most ID begins with a consideration of the basic needs and goals.

Needs and Goals

The first task in ID involves the clarification of overall needs and goals within a larger educational program. In a conversational language class, for example, one goal for students would be to speak clearly and comprehensively in a variety of conversational contexts.

Topics, Tasks and Purposes

A second design component involves determining the broad content and clarifying the general purposes. Here, for example, the language educator would review overall curricular needs and decide which topics to cover. In a conversational French course, topics may include a variety of basic conversational contexts: asking for information from a shopkeeper, talking informally with family or friends, or critically discussing books, plays, or films.

Learner Characteristics

A third crucial task for the designer is to examine student or learner characteristics. Information on pre-skills, overall intelligence, interests, socioeconomic backgrounds, age, maturity, and motivation levels is important for developing effective learning experiences. Students with no prior language experience require different motivation and treatments than those who have had some language exposure at home. Also, knowing students' interests can help construct examples that can arouse their interest and help them learn.

Learning Objectives

The focal point of instructional design is the definition of learning objectives. Objectives, unlike goals, must relate to specific learning tasks described in terms of actual student behaviors.

To avoid confusion, objectives should include a reference to a *criteria* of acceptable performance, as well as an indication of the *conditions* of that performance. For example, a clearly defined final objective for a conversational French class might be as follows: "Given a short, 30-second video cue of a native French speaker requesting directions on how to get to a specific location, the learner should be able to construct and deliver a verbal response. An acceptable response should be made within two minutes and should describe how to arrive at that desired location with 90% accuracy in vocabulary and structure." In the statement of this objective, "construct" is the concrete and observable action; the conditions appear in the "given" clause; and, the criteria for time and accuracy follow the task.

Essential to the writing of objectives is an ability to apply various levels of learning—listed by Bloom (1956) and Krathwohl et al (1964) in their taxonomies. Language learning, like all learning, involves three basic types of knowledge, each with various levels.

For example, for learners to develop pronunciation skills in a second language, they must develop *psychomotor skills* which involve movement of the tongue, mouth, face, and even additional body language. Learning a language also requires development of many *cognitive skills*, ranging from the recall of information to the recognition of sounds and patterns and onto higher order skills such as the creation of new speech patterns.

A third level of learning involves *affective skills*, attitudes and values. One of the primary goals of language learning is to help students appreciate other cultures and peoples. Instructional activities, practice examples, and media choices all affect this goal positively or negatively. While most teachers will cite "appreciation" as an important objective, dull repetitive lab exercises can sabotage the achievement of appreciation. By stating all the types of learning objectives at the outset of instructional planning, designers can avoid inconsistencies between the objectives and the methods and resources employed to achieve them.

Subject Content

Defining objectives and listing subject content go hand in hand. Again, an understanding of the taxonomies of learning is useful. Broad topics defined in **Topics, Task and Purposes** are now analyzed more closely in order to break down content into logical components and sequences. Task analysis can be time-consuming; nevertheless, it is an essential part of the ID process to insure that all steps of the learning task are included.

Pre-Assessment

Before instruction begins, pre-assessment measures can determine the type of instruction learners require. This might include reviewing existing student records of achievement, aptitude or background. If stated objectives call for a specific improvement in learning levels over the period of instruction, designers need to construct actual pretest measures along with post-assessment measures.

Teaching Methods and Activities

At this point, the designer must prescribe appropriate teaching methodologies that are consistent with the stated objectives, the nature of the content, and the needs of the specific learners. Here, too, the familiar constraints of space, resources, and finances may impinge on decisions about the use of individualized methods, regular classes, large groups, or a combination of these. Creative use of existing constraints to develop various methodologies appropriate for achieving a desired end for specific learners is a challenge for the teacher, the designer, and the lab director.

If conversational competencies are the stated objective, the designer must provide opportunities for regular conversations. While lab exercises can help at basic levels, the instruction must also include dialogues with other students, the instructor, or native speakers.

Resources and Support Services

The eighth design component covers a host of additional decisions and activities. The designer must choose to use existing materials or produce new ones to achieve the desired objectives. Production or purchase decisions are based on the objectives desired, the academic content, the methods selected, and the learners involved. With clearly stated objectives, designers and teachers can integrate any new resources into the instructional program.

After purchasing or producing resources, the designer needs to arrange all support services for using them, be it in the classroom, special media theater, or self-study lab. Environmental conditions for the use of the desired resources must be consistent with objectives. Faulty equipment, uncomfortable and inflexible rooms, or disorganized support staff and procedures can sabotage achievement of instructional objectives in spite of a very efficient design plan.

Post-Assessment

In this step, the designer evaluates the progress of learners after the instruction in relation to the initial objectives. Assessment of learner performance is not primarily to assign grades; it is to determine the success of the design process. If the learners have not achieved the prescribed goals, any number of problems may exist. Perhaps, the objectives are not clear or inappropriate for the learners in question. Perhaps, steps were overlooked or missed in the task analysis resulting in omission of important information for the learners. If this happens, the design team reviews all components of the process to determine potential problems or inconsistencies.

In addition to formal testing, designers also use unobtrusive observations to determine the success of various aspects of the instructional process. Observing how learners use and react to programs can give clues to their success or failure. If students use the materials with little prompting from the teacher—completing exercises and activities—the program could be termed more successful than one which students avoided.

Revision

The last component of ID—although discussed last—does not necessarily occur only at the end of the project. Revision is a reiterative process which can happen at any stage in the design or throughout. Feedback obtained through testing and observations may lead to revision at any point during development. The overall purpose of revision is to maintain congruence among all elements of the instructional process, from goals to teaching strategies and resources used to the evaluation of the learner.

The Influence of Research and Learning Theory

To design effective resources, designers must not only know basic learning theory but they must also be able to monitor new developments in a wide range of research areas. Useful resources

include texts by Reigeluth (1983), Martin & Briggs, (1986), and Snelbecker (1974). Articles in these texts demonstrate the many relationships between human psychology and learning theory, together with the use of instructional design principles for the development of learning materials.

Using this information and new discoveries as they appear in the ID process is no easy task. Although behavioral science provided the basis for early instructional design, ID now borrows information from a variety of sources. Schiffman (1986) cites the works of many cognitive theorists who have advanced our understanding of how humans perceive, process, store, and retrieve information. She also notes that factors such as socioeconomic status, IQ, sex differences, cognitive styles, motivation, and creativity affect the way people learn.

Research has spurred advancement in many other areas relating to the ID process itself. Schiffman recommends that designers use information on human capabilities, tasks and learner analysis, testing and measurement, media selection and production, diffusion of innovation, evaluation, system analysis, team consulting and interpersonal skills, and overall project management.

Schiffman (1986, p. 17) demonstrates the influence of theory and research by adding them as a new component within the classic ID model. She shows how both have influenced design decisions in the areas of task and learner analysis, testing and measurement, and media selection and production. Academics and developers in language learning must keep up with recent advances in language and linguistic theories and methodologies. Successful ID depends upon integrating new and useful information gleaned from research into the development of practical applications.

Why Engage in ID at All?

Many learning lab directors might well ask how one could expect them to spend so much time on planning and developing instructional materials. Laboratory staff, particularly those not on the faculty or in teaching positions, might argue that they do not always have access to academic decision-making; they often find they are only consulted when departments are ready to order new resources or equipment. Faculty have already made the critical academic decisions, often without much thought to implementation.

Laboratory staff need to be included in team efforts to acquire and develop language materials from the earliest stages. For their benefit, they need to understand the basic needs and goals of any program developed and implemented within the lab. For the benefit of faculty, lab personnel also have much to contribute to discussions with their teaching colleagues about various alternative methodologies and resources. ID can bring both groups together to make better decisions about language resources.

Many new technologies are now available for language learning. They include improved computer-driven audio labs, computer-assisted language learning, interactive audio and video, and foreign TV programming via satellite transmission. Integration of these resources make instructional design skills even more essential. The complexities of planning any methodology involving technology require reliance on expertise from a range of support staff. ID can provide an organized means of obtaining information from all those involved in designing, producing, and implementing new materials and technologies.

Without a logical decision-making process to determine goals, specific objectives, classroom and lab activities, such exciting technologies can become yet another "white elephant" in the lab. As lab directors have learned too often before, just having new equipment on site will not necessarily assure its use. New hardware and software must be an integral part of any effective academic program. The only way to do so is through a systematic approach in which teachers and designers together consider all components of the instructional process. To prescribe a new learning lab or interactive video without looking at the overall goals and needs of the language program is pedagogically and economically risky.

The ID Team

Instructional design must be a team effort. While creativity in the artistic and academic worlds focuses on the individual, ID requires

both input and skill from a group of people. Good ID depends on at least three main types of team players for input: The **designer** is responsible for guiding the process, writing up goals, determining objectives, and prescribing the instructional solution. The **subject matter expert**—usually a teacher—is responsible for academic content. The **media or computer consultant** programs and produces the actual materials.

Depending upon the size of the project, the development and production staff may involve evaluation and media use specialists. The measurement expert is responsible for designing instruments that measure the achievement of learning objectives. If the program is designed for use in a learning lab or resource center, media or lab support staff are responsible for the development of procedures for access and use of new materials and equipment.

Just as no construction project—replete with architects, clients, engineers, decorators, and the various tradespeople needed to construct a project—can proceed without a common blueprint, so ID teams must have an agreed-upon instructional design or "blueprint" in order to communicate with each other. Often the ID team develops the design of the project together through consultation with each other throughout the process. Mismatches in objectives, methods, media, learning environments, and evaluations are more likely to occur when developed independently by various individuals rather than cooperatively by team members.

Why ID Belongs in the Learning Lab

While all lab directors may not become professional instructional designers, there is much in the ID process that can assist them in the performance of their routine duties. Lab staff can use basic ID skills to work on development projects along with faculty and other media and computer professionals. Lab directors need to know how the materials used in their labs interrelate with the complete instructional mission of the faculty and learners they serve.

Secondly, in many institutions, lab directors may be the only ones available to work on design projects. Some directors may serve as subject matter experts; some as media and computer program producers; some as hardware consultants; some as library information specialists or all of the above. ID can be valuable in bringing about various tasks and providing structure and direction for the interaction of faculty, administrators, and other professionals. Furthermore, lab directors can be valuable resources to faculty, especially those with little training in the preparation and planning of instructional resources.

A third reason for ID belonging in the language lab is its use in evaluating new technologies. ID can be useful in sorting out current technological fads from legitimate and useful new developments in instructional hardware and software. The design process provides guidelines to help in the evaluation of new products and implementation of such products in learning and pedagogy. The language lab director can use design concepts in the on-going task of assessing, developing, and integrating promising technologies or teaching approaches into effective language learning programs for the lab and the classroom.

ID is beyond being another educational fad. Good ID is essential in the development of any new resources destined for the learning lab. ID has proven itself a useful educational tool that belongs in our schools, colleges, and learning laboratories.

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