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A New Paradigm of ISD?*

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DO WE NEED A NEW PARADIGM OF ISD?

There is a lot of talk lately about new paradigms. The word "paradigm" is rapidly becoming one of the most used (if least understood) words in the current vocabulary. And now they want to apply it to Instructional Systems Design (ISD)? What in the world for? Many would argue that ISD has been very successful the way it is—both parts of it: ISD process models (see Gustafson 1991) and ISD product models, better known as instructional-design strategies and theories (see Reigeluth 1983).

But ISD's middle name is "systems." We know that every system is a subsystem in a larger system. And we know that when the larger (super) system changes in significant ways, the system itself must change in equally significant ways for it to survive, because it must meet the needs of its supersystem in order for the supersystem to continue to support it (Hutchins 1996). So if ISD's supersystem were undergoing a paradigm shift, then (and only then) would ISD need to search for a new paradigm shift or else risk becoming obsolete.

ISD'S SUPERSYSTEM

So, is ISD's supersystem changing dramatically? What is its supersystem, anyway? To oversimplify a bit, it is all those systems that we serve—every context for application of ISD, including K-12 schools, higher education, corporations, health agencies, the armed forces, museums, and other institutions in the private, public, and "third" (not-for-profit) sector. So let's take a look at some of the ones to which we contribute (and on which we depend) the most.

Corporations are undergoing massive restructuring (Hammer and Champy 1993) that certainly fits the definition of a paradigm shift. In the Agrarian Age, businesses were organized around the *family*: the family farm, the family bakery, and so forth. In the Industrial Age, the family was replaced by the *bureaucracy* as the predominant form of business organization. Now, as we evolve deeper into the Information Age, corporations are doing away with many of the middle levels of the bureaucracy and are reorganizing based on holistic processes rather than fragmented departments (Hammer and Champy 1993). Hence, they are organizing as teams that are being given considerable autonomy to manage themselves within the purview of the corporate vision, rather than being directed from above.

Increasingly, other organizations in all three sectors (private, public, and nonprofit) are undergoing similar transformations (see, for example, Osborne and Gaebler 1992). Table 1 shows some of the "key markers" that characterize the differences between Industrial Age organizations and Information Age organizations.

*This chapter is an elaboration of an article of the same title in *Educational Technology*. It is included here with permission of Educational Technology Publications.

Table 1

Key Markers That Distinguish Industrial-Age and Information-Age Organizations

Industrial Age	**Information Age**
Standardization	Customization
Bureaucratic organization	Team-based organization
Centralized control	Autonomy with accountability
Adversarial relationships	Cooperative relationships
Autocratic decision making	Shared decision making
Compliance	Initiative
Conformity	Diversity
One-way communications	Networking
Compartmentalization	Holism
Parts-oriented	Process-oriented
Planned obsolescence	Total quality
CEO as "king"	Customer as "king"

These fundamental changes in the supersystems we serve have important implications for ISD. Employees need to be able to think and solve problems, work in teams, communicate, take initiative, and bring diverse perspectives to their work. Also, "people need to learn more, yet they have less time available in which to learn it" (Lee and Zemke 1995, 30), and they need to demonstrate impact on the organization's strategic objectives (Hequet 1995). Can our systems of education and training meet those needs by merely changing the content—what we teach—or do we need to make more fundamental changes? To answer this question, we must take a closer look at our current paradigm of training and education.

THE CURRENT PARADIGM OF EDUCATION AND TRAINING

Table 1 indicates that our current paradigm in education and training is based on *standardization*, much like the mass-production of Industrial Age manufacturing, which is now giving way to customized production in the Information Age economy. We know that different learners learn at different rates and have different learning needs. Yet our current paradigm of education and training entails teaching a large group of learners the same content in the same amount of time. Why? Because this allows valid comparisons of students with each other, which met an important need of the Industrial Age: *sorting students*, separating the laborers from the managers. After all, you couldn't afford to—and didn't want to—educate the common laborers too much, or they wouldn't be content to do boring, repetitive tasks, nor to do what they were told to do without questions. When you really think about it, our current paradigm of training and education is not designed for learning; it is designed for sorting (Reigeluth 1994).

Yet, all educators can agree that different people learn at different rates. So, when an educational or training system holds time constant, achievement must vary, as has been the case in our Industrial Age educational system, ever since it replaced the one-room schoolhouse. The alternative is to allow learners as much time as they need to reach attainments. That would be a learning-focused system, which we show signs of moving toward. One could argue that we have held time constant because group-based learning represented economic efficiencies, which is certainly true. But when you consider that student assessment has typically been norm-based, and when you consider that teachers sometimes have an attitude of withholding some information from students to see who the really bright ones are, then it becomes clear that at least part of the reason has been to sort learners—in K-12 schooling, higher education, and corporate training.

But assembly-line workers acting as automatons are becoming an endangered species in the United States. The current corporate restructuring movement with its emphasis on quality

requires ever-increasing numbers of employees who can take initiative, think critically, and solve problems independently. To meet this need in industry and the call in education for lifelong learners, we now need a *focus on learning* instead of sorting. This means we need a focus on *customization*, not standardization. This is true in all contexts for ISD: corporations and other organizations, as well as K-12 schools and higher education. Merely changing the content will not meet this new need of ISD's supersystems.

Table 1 indicates that our current paradigm of training and education is also based on *conformity* and *compliance*. Trainees and students alike are usually expected to sit down, be quiet, and do what they are told to do. Their learning is directed by the trainer or teacher. But employers now want people who will take the *initiative* to solve problems and will bring *diversity*—especially diverse perspectives—to the workplace. Both of these enhance the ability of a team to solve problems and keep ahead of the competition. Communities and families also need people who will take the initiative and honor diversity. Changing the content is not sufficient to meet these new needs of the supersystems, for the very structure of our systems of training and education discourages initiative and diversity.

We could continue this process of analyzing how each of the key markers of our current paradigm of training and education (see table 1) are counterproductive for meeting the emerging needs of the Information Age, but the message is already clear: *the paradigm itself needs to be changed*. This is the focus of the emerging field called Educational Systems Design (ESD) (see Banathy 1991; Reigeluth 1995), which is concerned both with what kinds of changes are needed in education and training systems to better meet the needs of their supersystems and their learners (a product issue), and with how to go about making those changes (a process issue). So the next question is, does that mean ISD has to change?

To answer this question, it is helpful to distinguish between process and product, or means and ends, in ISD. The "product" issue is concerned with what the learning experiences should be like (after they have been designed and developed). *Instructional methods and theories* are the knowledge base that addresses this issue (see Reigeluth 1983). Instructional methods are the tools that teachers and designers use to facilitate learning, including both soft (e.g., strategies) and hard (e.g., media) tools. Instructional theories provide guidelines as to when and when not to use the various methods. The "process" issue is concerned with how we go about designing and developing those learning experiences. *ISD process models* are the knowledge base that addresses this issue (see Gustafson 1991). They are the methods that instructional designers use to create instruction, such as the activities represented in the ADDIE (analysis, design, development, implementation, and evaluation) model, including needs analysis, task/content analysis, and formative evaluation. Because changes in the desired product will require changes in the process to create it, let's start by addressing the question as to whether the paradigm of instructional theory needs to change.

IMPLICATIONS FOR INSTRUCTIONAL THEORY

From the above discussion, we have seen that the current paradigm of education and training needs to change from one that is focused on sorting to one focused on learning—from the Darwinian notion of "advancement of the fittest" to the more spiritually and humanistically defensible one of "advancement of all." This means that the paradigm of *instruction* has to change from standardization to customization, from a focus on presenting material to a focus on making sure that learners' needs are met—a "Learning-Focused" paradigm. This, in turn, requires a shift from passive to active learning. It requires a shift from decontextualized learning to authentic tasks. And, most important, it requires a shift from holding time constant and allowing achievement to vary, to allowing each learner the time needed to reach the desired attainments.

But to do this, the teacher can't teach the same thing to a whole "class" at the same time. This means the teacher has to be more of a "guide on the side" rather than a "sage on the stage." So, if the teacher is the facilitator rather than the agent of most of the learning, what

other agents are there? Well-designed resources are one, which is where instructional theory and instructional technology can play particularly large roles. But others include fellow learners (e.g., students or trainees), local real-world resources (e.g., practitioners), and remote resources (e.g., through the Internet). Instructional theories are needed to offer guidelines for the use of all these kinds of resources for the Learning-Focused paradigm of instruction. Furthermore, this paradigm requires that our definition of instruction include what many cognitive theorists refer to as "construction" (see Ferguson 1992)—a process of helping learners to build their own knowledge, as opposed to a process of merely conveying information to the learner. Instruction must be defined more broadly as anything that is done to facilitate purposeful learning.

Clearly, this represents a new paradigm of instruction that requires a new paradigm of instructional theory. But does this mean we should discard current instructional theories? To answer this question, let's consider some of the major contributions of current theories. If someone wants to learn a skill, then demonstrations of the skill, generalities about how to do it, and practice doing it, with feedback, will definitely make learning easier and more successful. Behaviorists recognized this and called them examples, rules, and practice with feedback. Cognitivists also recognized this, but naturally had to give them different names, such as cognitive apprenticeship and scaffolding. And, yes, constructivists also recognize this, and even radical constructivists walk the walk, even though they refuse to talk the talk. An analysis of instruction designed by some radical constructivists reveals a plentiful use of these very instructional strategies. Should we seriously consider discarding this knowledge? We don't think so, but is this knowledge sufficient to design high-quality instruction? We don't think that, either.

The important point here is that instructional designers and other educators should recognize that there are two major kinds of instructional methods: *basic methods*, which have been scientifically proven to consistently increase the probability of learning under given conditions (e.g., for given types of learning and learners), such as the use of generalities, examples, and practice with feedback for teaching a skill, and *variable methods*, which represent alternatives from which you can choose, as vehicles for the basic methods (e.g., it doesn't matter very much whether you use print, computer, or audiotape, as long as you use one of them). Although this greatly oversimplifies the relationships that exist between methods of instruction and the various conditions under which they should and should not be used, it is nonetheless an important distinction for designers to be aware of. And instructional theories are needed that provide guidance as to when to use these variable methods.

To provide this kind of guidance, we need a truly new paradigm of *instructional theory* that subsumes current theory—a paradigm through which flexible guidelines are offered about when and how learners:

- should be given initiative,
- should work in teams on authentic, real-world tasks,
- should be allowed to choose from a diversity of sound methods,
- should best use the powerful features of advanced technologies, and
- should be allowed to persevere until they reach appropriate standards.

The Learning-Focused instructional theory must offer guidelines for the design of learning environments that provide appropriate combinations of challenge and guidance, empowerment and support, self-direction and structure. And the Learning-Focused theory must include guidelines for an area that has been largely overlooked in instructional design: deciding among such variable methods of instruction as problem-based learning, project-based learning, simulations, tutorials, and team-based learning. Tables 2 and 3 show some of these kinds of approaches that Learning-Focused theory might encompass. And we need flexible guidelines for the design of each of those approaches to instruction.

Table 2

Mid-Level Strategies

Apprenticeship: an experiential learning strategy in which the learner acquires knowledge and skills through direct participation in learning under immediate personal supervision in a situation that approximates the conditions under which the knowledge will be used.

Debate: a formally structured discussion with two teams arguing opposing sides of a topic.

Demonstration: a carefully prepared presentation that shows how to perform an act or use a procedure; accompanied by appropriate oral and visual explanations and illustrations; frequently accompanied by questions.

Field trip: a carefully planned educational tour in which a group visits an object or place of interest for first-hand observation or study.

Game: an instructional activity in which participants follow prescribed rules that differ from those of reality as they strive to attain a challenging goal; is usually competitive.

Group discussion, guided: a purposeful conversation and deliberation about a topic of mutual interest among 6-20 participants under the guidance of a leader.

Group discussion, free/open: a free group discussion of a topic selected by the teacher, who acts only as chairman; learning occurs only through the interchange among group members.

Ancient symposium: a group of 5-29 persons who meet in the home or private room to enjoy good food, entertainment, fellowship, and with the desire to discuss informally a topic of mutual interest.

Interview: a 5- to 30-minute presentation conducted before an audience in which a resource person(s) responds to systematic questioning by the audience about a previously determined topic.

Laboratory: a learning experience in which students interact with raw materials.

Guided laboratory: an instructor-guided learning experience in which students interact with raw materials.

Lecture/Speech: a carefully prepared oral presentation of a subject by a qualified person.

Lecture, guided discovery: a group learning strategy in which the audience responds to questions posed by the instructor selected to guide them toward discovery (also called recitation class).

Panel discussion: a group of 3-6 persons having a purposeful conversation on an assigned topic before an audience of learners; members are selected on the basis of previously demonstrated interests and competency in the subject to be discussed and their ability to verbalize.

Project: an organized task performance or problem solving activity.

Team project: a small group of learners working cooperatively to perform a task or solve a problem.

Seminar: a strategy in which one or several group members carry out a study/project on a topic (usually selected by the teacher) and present their findings to the rest of the group, followed by discussion (usually teacher-led) of the findings to reach a general conclusion.

Quiet meeting: a 15- to 60-minute period of meditation and limited verbal expression by a group of five or more persons; requires a group of people who are not strangers to each other; is used at a point when the leaders or members feel that reflection and contemplation are desirable.

Simulation: an abstraction or simplification of some specific real-life situation, process, or task.

Case study: a type of simulation aimed at giving learners experience in the sort of decision making required later.

Role play: a dramatized case study; a spontaneous portrayal (acting out) of a situation, condition, or circumstance by elected members of a learning group.

Think Tank/Brainstorm: a group effort to generate new ideas for creative problem solving; thoughts of one participant stimulate new direction and thoughts in another.

Tutorial, programmed: one-to-one method of instruction in which decisions to be made by the tutor (live, text, computer, or expert system) are programmed in advance by means of carefully selected, structured instructions; is individually paced, requires active learner response, and provides immediate feedback.

Tutorial, conversational: one-to-one method of instruction in which the tutor presents instruction in an adaptive mode; is individually paced, requires active learner response, and feedback is provided.

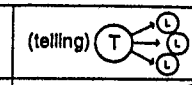
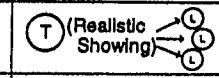
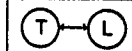
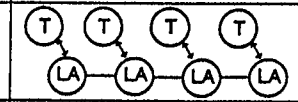
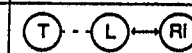
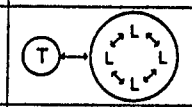
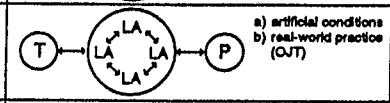
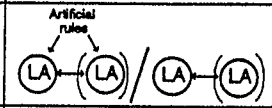
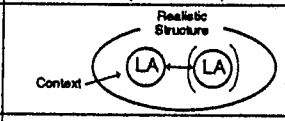
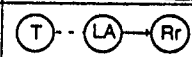
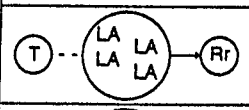
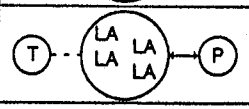
Socratic dialogue: a type of conversational tutorial in which the tutor guides the learner to discovery through a series of questions.

Note: There are many variations of these approaches, and different approaches are often used in combination.

Source: From Dorsey, Olson, & Reigeluth 1988.

Table 3

Alternative Methods for Instruction

Methods:		Strengths:
Lecture/Presentation		Efficient Standardized Structured
Demonstration/Modeling		Eases Application
Tutorial		Customized Learner Responsible
Drill & Practice		Automatized Mastery
Independent/Learner Control		Flexible Implementation
Discussion, Seminar		Meaningful, realism, owned, customized to learner
Cooperative Group Learning		Ownership Team-building
Games (artificial rules)		High Transfer High Motivation
Simulations		
Discovery • Individual		
• Group		
Problem Solving/Lab		High Level Thinking in Ill-structured problems

T = Teacher (Live or Automated) L = Learner RI = Resource (Instructional) - - - = Indirect Involvement

P = Problem LA = Learning Activity Rr = Resource (raw) ⟩ = Direction of Control

Source: From Molenda 1995.

Furthermore, as the world becomes more complex, learners need more skills for complex cognitive tasks, such as solving problems in ill-structured domains. Instructional theories to date have focused largely on simpler procedural tasks in well-structured domains. Only recently have researchers begun exploring instruction for complex cognitive tasks (see Spiro, Feltovich, Jacobson, and Coulson 1992; Leshin, Pollock, and Reigeluth 1994, 82-100, 230-44), and much work remains to develop powerful guidelines for designing instruction for this important type of learning.

For ISD to remain a vibrant and growing field that will help meet the changing needs of our systems of education and training, we desperately need more theorists and researchers working collaboratively to develop and refine this new paradigm of instructional theories. Formative research (Roma and Reigeluth 1995) represents one possible methodology for developing such theories, because it focuses on how to improve existing theories, rather than on comparing one theory with another (as experimental research does) or on describing what happens when a theory is used (as naturalistic qualitative research does).

Clearly we do need fundamental changes in instructional theory. But does this mean we also need fundamental changes in the ISD process?

IMPLICATIONS FOR THE ISD PROCESS

The ISD process is currently conceived in many different ways by different people and organizations (Gustafson 1991). Most large companies have their own ISD process model. But the predominant characterization of the ISD process is as a series of steps within the basic framework of the ADDIE phases: analysis, design, development, implementation, and evaluation. But do these models reflect how ISD is actually done by experts? More important, do they reflect how it should be done? And most important, are they appropriate for designing the new paradigm of instruction? We believe "No!" becomes progressively louder for each of these questions. But does this mean we should discard the current knowledge about the ISD process? We don't believe that, either. We believe many of the same activities are required, but that they must be combined with other activities and reconfigured into a new kind of process model.

First of all, the current paradigm of ISD models conceives of a single dimension of activities over time, as reflected by the ADDIE phases. The first significant change, in our view, is that the ISD process should be viewed as (and is, in fact, even now intuitively performed by ISD experts as) two dimensions of activities, one of which is nested within the other. The broader dimension is a *series of decisions* about what the instruction should be like, such as deciding what to teach, what sequence to teach it in, what media to use, and so forth. Each of these decisions should be preceded by its own appropriate types of analysis. It is not useful to think in terms of completing all the analysis activities before doing any design activities. We like to think of this change as "just-in-time analysis." Much of the rationale for this is that each decision you make is likely to change the nature of subsequent options, such that it is often impossible to know ahead of time what type of analysis to do (what types of information to collect) for making all your later decisions.

For example, there are many different ways to sequence instruction: historical sequence, procedural sequence, hierarchical sequence, and so forth. Each type of sequence is based on a different type of relationship within the content. Therefore, each requires a different type of content/task analysis to design the sequence, such as chronological analysis for the historical sequence, a procedural-prerequisite analysis for the procedural sequence, and a learning-prerequisite analysis for the hierarchical sequence. Until you have made the decision as to what kind of sequence to use, it is senseless to conduct a content/task analysis.

Furthermore, each decision can and should be evaluated as soon as possible after it is made ("zero-delay evaluation"), to find weaknesses in it and ways of improving it. And organizational change concerns (including implementation, organizational change, and management) should be anticipated and dealt with throughout your analysis, synthesis, and evaluation activities ("ongoing change"), because performance problems almost always require organizational changes as well as changes in the knowledge and skills of individuals. Your evaluation should also look at your process activities (analysis, synthesis, evaluation, and change), as any good reflective practitioner would do.

Consequently, we believe the new paradigm of ISD models will characterize the ISD process as an *iterative series of ASEC cycles* (Analysis-Synthesis-Evaluation-Change) for progressive sets of instructional decisions. Table 4 shows one possible such conception. During a single ASEC temporal progression (left to right in one row of table 4), there is likely to be frequent recycling from synthesis back to analysis, from evaluation back to synthesis or analysis, and from change back to synthesis or analysis. Similarly, during the temporal progression of decisions (the top-to-bottom progression in table 4), there is likely to be frequent revisiting of earlier decisions to adjust them to later decisions and insights. Some ISD experts undoubtedly already perform their work in this manner, but the predominant mindset about ISD entails a one-dimensional rather than two-dimensional temporal progression.

Table 4

A Sample Two-Dimensional Temporal ISD Model

ORGANIZATIONAL CHANGE:				
	Analysis	Synthesis	Evaluation	Change
1. Intervention Decisions	1.1	1.2	1.3	1.4
INSTRUCTIONAL DESIGN:				
	Analysis	Synthesis	Evaluation	Change
2. Fuzzy Vision of Ends and Means	2.1	2.2	2.3	2.4
3. Scope and Sequence Decisions	3.1	3.2	3.3	3.4
4. Decisions about what instruction to select and what to produce	4.1	4.2	4.3	4.4
5. Approach Decisions	5.1	5.2	5.3	5.4
6. Tactic Decisions	6.1	6.2	6.3	6.4
7. Media Selection Decisions	7.1	7.2	7.3	7.4
8. Media Utilization Decisions	8.1	8.2	8.3	8.4
DEVELOPMENT AND EVALUATION:	Plan	Do	Check	Change
9. Prototype Development	9.1	9.2	9.3	9.4
10. Mass Production of Instruction	10.1	10.2	10.3	10.4
11. Evaluation of Worth and Value	11.1	11.2	11.3	11.4
ORGANIZATIONAL CHANGE:	Analysis	Description/ Development	Evaluation	Change
12. Implementation, Adoption, Organizational Change	12.1	12.2	12.3	12.4

The numbers represent different activities that compose the ISD model. These activities are not just steps; they are usually also composed of heuristics.

The second significant change we foresee is that the ISD process will be broadened to include greater attention to *impact on the instructional system's supersystems*. In the case of corporate training systems, greater attention will be paid to corporate performance (often called "performance technology") and societal impact (see the "Business Impact ISD Model" proposed by Molenda, Pershing, and Reigeluth in 1996). For K-12 and higher education, greater attention will be paid to the needs of the broader community or society (and its various organizations) that the educational institution serves, as well as to the learners' needs; and greater attention will be paid to organizational changes that will help the institution and its instructional system to meet those needs. Again, the concern for systemic change in education, or Educational Systems Design (ESD), is a reflection of the need for this change in ISD (see Reigeluth 1995).

The third significant change we see flows out of the second: the ISD process should *include all "stakeholder" groups*, so that their interests, values, and perspectives can be accounted for in the instructional design and organizational changes. The stakeholders are all those people who have a stake in the instructional system under design. In a corporation it might include the trainers, trainees, and their managers; higher-level managers; stockholders; and customers. In a school system, it might include the teachers, students, administrators, parents, local businesses, and social service agencies. There are many times and ways the stakeholders should be involved during the process, but the net result should not only be valuable input from these groups, but also the "output" of a sense of *ownership* over the resulting instructional system, which is an important aspect of the implementation/change dimension of ISD.

The fourth significant change we foresee is that the ISD process should have a visioning activity shortly after the needs analysis. This activity should entail having all the stakeholders for the instructional system under design come to consensus on a fuzzy image of what the instruction will be like, both in terms of *ends* (how the learners will be different as a result of it) and *means* (how those changes in the learners will be fostered). This is an opportunity for all the stakeholders to share their values about both ends and means and to reach some consensus, so that there will be no major disappointments, misunderstandings, or resistance when it comes time for implementation. The practice of thinking in the ideal about what the instruction might be like often unleashes creative approaches that are all too often lacking in many ISD products. And this vision should be continually revisited, revised, and elaborated throughout the design process. This kind of visioning activity was advocated by Diamond (1980), whose ID model included the step of "imagining the ideal" immediately after completing the needs analysis. Diamond found a number of practical benefits in this approach, not the least of which is that it gets the design team excited about a solution.

The fifth significant change we foresee is that the ISD process will make much greater use of the notion of "user-designers" (Banathy 1991). This is a natural progression beyond Burkman's (1987) notion of "user-oriented ID" in that it goes beyond measuring and incorporating relevant potential user perceptions—it entails having the users play a major role in designing their instruction. Users are primarily the learners and the facilitators of learning (which would not be confused with the current concepts of students/trainees and teachers/trainers). Rather than viewing this role through the lens of the current paradigm, as students and teachers working on our current design teams, we could imagine several scenarios.

In one scenario, design teams (including all stakeholders) create flexible, computer-based learning tools, like intelligent tutoring systems, that learners can use—while they are learning—to create or modify their own instruction. This concept is like adaptive instruction, except that the learners have the capability to request the computer system to use some instructional strategies, as well as the computer deciding on some strategies based on learner input. As Winn put it:

> This means that the role of instructional designers will involve less direct instructional decision-making and more concentration on the mechanisms by means of which decisions are made (Winn 1987). . . . It follows that the only viable way to make decisions about instructional strategies that meshes with cognitive theory is to do so during instruction using a system that is in constant dialogue with the student and is capable of continuously updating information about the student's progress, attitude, expectations, and so on (Winn 1989, 39-41).

Learners are able to make decisions (with varying degrees of guidance) about both content (what to learn) and strategy (how to learn it) while the instruction is in progress. The work of Dave Merrill and associates on "transaction shells" (Li and Merrill 1990; Merrill, Li, and Jones 1992) could well lead to this type of tool and has shown that such a tool is feasible to create.

A major shift in the paradigm of ISD that this scenario of the concept of user-designers represents is the notion that much of the analysis that is now done by a designer for a whole "batch" of learners well ahead of the actual instruction will soon be done during the instruction. The computer system will continuously collect information from an individual learner or a small team of learners and use that information to present an array of sound alternatives to the learners, both about what to learn next and how to learn it. Also, the teacher or trainer will be afforded the opportunity to modify the system. The systems concept of "equifinality" reflects the reality that there are usually several acceptable ways to accomplish the same end. The new paradigm of ISD will, we believe, allow for such diversity of means, as well as a diversity of ends, for learners.

In another scenario of the concept of user-designers, computers play a relatively minor role in some instructional situations, so the users must—ahead of time—design the framework or support system within which the instruction will occur. Rather than this being done by a designer-based team, in which an instructional designer plays the leading role, it is done by a user-based team in which the designer plays a facilitating role and the users—teachers or trainers, along with learners—play the leading role (Nelson 1995). This user-based approach recognizes the need to put better design tools and knowledge into the hands of those who generally create and deliver the instruction anyway. In order for this to occur, we believe a new paradigm of ISD is needed that will empower the users to play a greater role in designing their instruction than our current conception of ISD allows.

This empowerment is particularly critical in the case of teachers. Teachers are a unique type of clientele for instructional designers. They share with us a common knowledge base in educational theory, as well as powerful perspectives in regards to what typifies appropriate instruction. Teachers also have been empowered, both through formal preparation and classroom practice, to feel a great deal of ownership regarding the instruction they create and deliver. Finally, teachers are the ones closest to the learners. Rather than using preconstructed instructional products, teachers use and create a wide variety of materials that support their own instructional activities. Other than perhaps novice teachers, most teachers tend to take preconstructed instructional products, deconstruct them, and then use the resulting resources in unique ways during instruction. This raises the questions, "Why do we continue to make complete instructional products for a clientele that doesn't want them and will not use them the way we, as instructional designers, intend for them to be used? Have we been out of touch with the real needs of our clients?" We propose that in fact we as a field have not fully recognized the need to support trainers, and particularly teachers, in designing their own instruction. And this should expand to include learners. Thus, our responsibility as a field is to conceive of and develop a whole new type of instructional design process—one that assists trainers, teachers, and learners in meeting their own instructional needs.

All of these significant changes in the ISD process add up to more than a bunch of piecemeal changes, because they are systematically interrelated. They reflect a consistent set of values and a fundamentally different view of how instruction should be designed, primarily including the importance of making the design process more inclusive and less rigidly fixed in time. Because of its centrality to those values, we refer to this emerging paradigm of the

ISD process as the "User-Designer Approach." Regarding *inclusivity*, the User-Designer Approach pays greater attention to the instructional system's supersystems, to all its stakeholder groups, and especially to its users. Regarding *time*, the ASEC cycles reflect the value of just-in-time analysis, zero-delay evaluation, and ongoing change, as well as the "yin and yang" of design:

- the contingent relationships among design decisions (one decision can only be made after another), and
- the iterative nature of the design process (similar activities are engaged in repeatedly, and earlier decisions are frequently revisited and revised).

Both inclusivity and time converge in the visioning activity that occurs with all the stakeholders early in the process and is continually revisited, revised, and elaborated as the process proceeds.

CONCLUSION

The first question posed in this article was, "Do we need a new paradigm of ISD?" We have looked at ISD's supersystems and seen some dramatic changes taking place—changes that have profound implications for what systems of training and education must do to meet the needs of their supersystems. Foremost among those implications is the need for a paradigm of training and education based on learning instead of sorting students. Other implications include the need to develop initiative, teamwork, thinking skills, and diversity. To help all learners reach their potential, we need to customize, not standardize, the learning process.

We have also seen that this new paradigm of education and training has important implications for ISD. Indeed, the health of the field (if not its survival) depends on the ability of its theorists and researchers to generate and refine a *new breed of Learning-Focused instructional theories* that help education and training meet those needs (i.e., that focus on learning and foster the development of initiative, teamwork, thinking skills, and diversity). The health of ISD also depends on the ability of its practitioners and researchers to develop a *User-Designer Approach* to the ISD process, which:

- conceives of the ISD process as a *series of design decisions*, each of which requires a cycle of analysis, synthesis, evaluation, and change (ASEC);
- attends more to the needs of, and ISD's impact on, its *supersystems*;
- includes *all stakeholder groups* in the ISD process; and
- envisions a *fuzzy* image of the instruction early in the ISD process.

Perhaps most important of all implications is that much of the designing should be done by the learners (*user-designers*) while they are learning, with help from a computer system that generates options based on information collected from the learners. We also need to better support trainers and teachers in their instructional design activities.

But with all this talk of a new paradigm of ISD, it is important not to completely reject and discard the old paradigm. In fact, the new paradigm needs to incorporate most of the knowledge our field has generated about both instructional theory and the ISD process. That knowledge must be restructured into substantially different configurations to meet the new needs of those whom we serve. Whether or not the field of ISD makes this transformation to a new paradigm will depend in great measure on the willingness of those of us in academe to develop the necessary theories and ISD processes and to provide the required professional development for the next generation of ISDers.

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