Emerging Work on the New Paradigm of Instructional Theories

Charles M. Reigeluth
Kurt Squire

In the May–June 1996 issue of this magazine, Reigeluth explored the question as to whether or not we need a new paradigm of ISD (Instructional Systems Development). He discussed how fundamental changes in the suprasystems that ISD serves are creating conditions that require similarly fundamental changes in ISD. He then explored the implications of those broader changes for **instructional theories** (e.g., Merrill's Component Display Theory), which offer guidelines for the nature of the instructional process. And he explored the implications for **ISD process models** (e.g., the Dick and Carey model), which offer guidelines for the nature of the development process, ranging from front-end analysis to formative evaluation and implementation.

Reigeluth briefly summarized the implications for instructional theories by indicating that the new paradigm of "Learning-Focused" theories needs to offer guidelines for instruction in which:

- learners continue to work on a task until they reach high standards of achievement;
- learners take more initiative and responsibility for their learning;
- learners can choose from a diversity of sound methods to support their learning;
- learners can work in teams as well as individually;
- learning tasks and methods are designed to be more motivational for learners;
- the teacher serves more as a "guide on the side" than a "sage on the stage";
- well-designed resources and peers do more of the "teaching"; and
- advanced technologies are used as integral parts of the learning process.

Charles M. Reigeluth, a Contributing Editor, is a Professor in the Instructional Systems Technology Department at Indiana University, Bloomington, Indiana (reigelut@indiana.edu). **Kurt Squire** is a graduate student in the Instructional Systems Technology Department at Indiana University, Bloomington, Indiana (ksquire@indiana.edu).

It is important to point out that this new paradigm of instructional theory should subsume, not replace, the predominant paradigm. For example, Merrill's (1983) Component Display Theory offered the guidance that people will learn a skill more effectively and efficiently if it is demonstrated (examples) with explanations (generalities) and learners are given the opportunity to practice performing the skill with immediate feedback. These "basic" methods are likely to be incorporated in some form within broader theories that integrate them with guidelines for the areas just listed. In essence:

> 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 different "approaches" to instruction, including problem-based learning, project-based learning, simulations, tutorials, and team-based learning. (Reigeluth, 1996, p. 15)

In recognition that many educators have for some time been working on this new paradigm of instructional theories, Reigeluth decided in February 1996 to edit a Volume II of *Instructional-Design Theories and Models* (in press) to describe a sample of the exciting work that is underway. Now that all 21 of the theory chapters have been sent to the publisher (Lawrence Erlbaum Associates), this article, which is based on a presentation made at the 1998 meeting of the Association for Educational Communications and Technology in St. Louis, strives to elaborate on the nature of this new paradigm of instructional theories.

Major Themes for Volume II

There are two themes that pervade Volume II. First is the importance of diversity. The old paradigm of instructional theory focused on relatively few kinds of learning. But needs for human learning and development have expanded to the point where the new paradigm must offer guidelines for fostering emotional, attitudinal, social, ethical, and even spiritual development in the affective domain, as well as deep understandings, complex cognitive tasks, higher-order thinking skills, and metacognitive strategies in the cognitive domain. Different instructional theories are needed to offer guidelines in each of these diverse domains of human learning and development. Furthermore, different theories often address different instructional situations within a given domain.

This diversity of theories allows instructional designers to choose the instructional theory that best addresses the needs of an instructional situation. Most often the theories are not in competition with one another; rather, each fills a unique niche and should be

valued for its contribution to instructional practice. Indeed, many of the theories are complementary, and could be integrated with each other or used to augment one another. The need for a diverse body of instructional theories implies that the emerging theories presented in Volume II are only a starting point; instructional theories should continue to proliferate and evolve to meet the needs of our changing society.

The second major theme is the importance of values (or philosophy, if you prefer) to instructional theories. Values are important in two ways. First, they play an important role for deciding what **goals** a theory will pursue. Second, for each goal, there is almost always more than one **method** that can be used to attain it. Which methods are offered by a theory depend on which criteria were used to judge the alternatives. Those criteria reflect the theorist's values. In Volume II, all the instructional theories state explicitly which values guided their selection of goals and which values guided their selection of methods.

Emerging Instructional Theories

Despite the diversity inherent to the emerging instructional theories, we found that the theories fell into seven broad categories:

- Understanding
- Problem-based learning
- Community of learners
- Higher-order thinking skills
- Diversity of others (categories of one)
- The psychomotor domain
- The affective domain

These seven categories represent the major groupings of the theories in the book. But there are many differences among the theories in each category, and some of the theories cross categories.

Theories for Understanding

"Understanding," with its relatively vague connotations for performance, has long been considered a four-letter word in instructional design. However, recent criticisms of students' ability to transfer knowledge from one context to another and "go beyond the information" given and think creatively with information have resulted in a rethinking of "understanding" as a desirable instructional goal. Theories for understanding attempt to foster "deep" understandings or cognitive development within content areas. Most of these theories also contain elements of the other categories; for example, Perkins and Unger's theory of "Teaching for Understanding" contains an affective component and also may be used within a problem-based learning environment. However, because its primary purpose is to develop deep understandings, we classified it as an understanding theory.

The four theories in this category include:

- Multiple Approaches to Understanding, by Howard E. Gardner;
- Teaching and Learning for Understanding, by David N. Perkins and Chris Unger;
- Open Learning Environments: Foundations, Methods, and Models, by Mike Hannafin, Susan Land, and Kevin Oliver; and
- Designing Instruction for Constructivist Learning, by Richard E. Mayer.

All of these theories share some common characteristics: They tend to emphasize deep understandings over rote knowledge, the ability to think and act with information over decontextualized knowledge, and higher-order thinking skills over basic fact acquisition.

Multiple Approaches to Understanding. Gardner situates his theory by persuasively arguing that *what* one teaches is linked with *how* one teaches. Gardner argues for using authentic, complicated topics as the basis for all instruction. This theory also provides powerful suggestions on how the multiple intelligences and modes of expression can be used to foster deeper understandings. Educators may take elements of this program and incorporate them into most any educational settings. To base an entire curriculum on this theory, however, would be much more difficult to achieve.

Teaching and Learning for Understanding. Perkins and Unger provide an instructional theory geared toward engendering deep understandings that learners can actively draw upon to think with in every day life. Perkins and Unger stress the importance of teaching with rich, complex topics that afford opportunities for the learner to go beyond the information given. They also stress the importance of authentic, performance-based assessment. Teaching for Understanding employs a flexible framework, offering practitioners the chance to combine direct and indirect instructional techniques in the service of fostering deep, meaningful understandings. By using language, concepts, and frameworks familiar to teachers, Perkins and Unger present a dynamic model of how classrooms can become more powerful learning environments.

Open Learning Environments. This theory provides a good *landscape portrait* of Open Learning Environments (OLEs) of all kinds. It lists the key resources, tools, and attributes of an OLE. OLEs situate learners in authentic contexts solving problems, working with content, or pursuing their own learning goals in a holistic fashion. The authors contrast OLEs with directed learning environments, which break down skills and knowledge into smaller parts and decontextualize learning experiences. Designers, teachers, or practitioners new to OLEs will find this theory especially useful, as it clearly describes the dynamics of OLEs, as well as insightful descriptions of

when OLEs are less appropriate.

Designing Instruction for Constructivist Learning. Constructivist learning environments demand a wide range of resources to support learners' inquiry. In this chapter, Mayer offers the SOI Model of Learning, which entails selecting relevant information, organizing it, and integrating it with existing knowledge. He then proceeds to identify instructional methods for helping learners to engage in each of those learning processes. In particular, he focuses on ways to design instructional messages (e.g., for text, lecture, or multimedia) to support those three learning processes. In this way, he provides a very different approach to fostering learner construction of knowledge.

Theories for Problem-Based Learning

Problem-based learning environments situate learning in the context of solving a complex problem. Predicated on the assumptions of constructivist learning theory, problem-based learning environments place the learner in an active, problem-solving role. These environments are especially effective for teaching complex or heuristic skills in ill-structured domains. The four theories in this category include:

- Learning by Doing, by Roger C. Schank, Tamara R. Berman, and Kimberli A. Macpherson;
- Toward the Development of Flexibly Adaptive Instructional Designs, by Daniel L. Schwartz, Xiaodong Lin, Sean Brophy, and John Bransford;
- Designing Constructivist, Case-Based Learning Environments, by David Jonassen; and
- Collaborative Problem Solving, by Laurie Miller Nelson.

Learning by Doing. Schank, Berman, and Macpherson provide an overview of why Goal Based Scenarios are useful, arguing that experts reason by referring to prior experiences that are relevant to the issue at hand (cases). By providing learners with opportunities to develop rich experiences, these authors reason that we can develop experts. They describe the process of developing Goal Based Scenarios, and the dynamics of how Goal Based Scenarios operate. They give criteria and principles for developing and implementing successful learning experiences with this framework.

Flexibly Adaptive Instructional Designs. Growing out of their work on the Jasper series, Bransford and colleagues introduce the STAR Legacy (Software Technology for Action and Reflection). The STAR Legacy is unique in that it not only situates learning in rich contexts, but it also scaffolds the learning process—it provides problem-solving steps for both students and teachers/designers. The STAR Legacy addresses implementation concerns that developed in the researchers' experience with the Jasper series by being flexible enough for practitioners to use, yet scaffolding pedagogically sound practices.

Designing Constructivist, Case-Based Learning Environments. Jonassen provides a good outline of constructivist learning environments. He gives considerable *rationale* behind the theory, citing numerous previous studies. He provides some good guidance on how constructivist learning environments work. This theory also provides useful guidance in designing such environments, making it especially useful to instructional designers.

Collaborative Problem Solving. Nelson's theory is unique in that it integrates research done on collaborative learning and research on problem-based learning into one cohesive theory. Nelson's theory is informed by research yet very accessible to practitioners. Furthermore, Nelson provides the reader with detailed guidelines for implementation.

Theories for Building Learning Communities

Learning communities are groups of learners gathered to accomplish tasks and further their own learning both as individuals and as a collective. Learning communities occur naturally throughout society in both formal and informal situations. These theories tend to emphasize the socially constructed nature of knowledge and stress the importance of situating learners in authentic contexts. By working in groups, learners acquire more than basic skills or knowledge; they learn to strategize and manage the learning process. The two theories in this category include:

- Learning Communities in Classrooms: A Reconceptualization of Educational Practice, by Katerine Bielaczyc and Allan Collins; and
- Collaborative Problem Solving, by Laurie Miller Nelson.

Learning Communities in Classrooms. This theory focuses on creating communities of learners. It requires a re-engineering of the learning environment towards facilitating collective learning and is particularly useful when community or organizational knowledge is a primary goal. Although the purpose of learning communities is to foster understandings in content areas, this theory also shows how learning communities can enrich our lives by making schools and work more humanistic, accepting places.

Collaborative Problem Solving. Not only is Nelson's theory dedicated to designing problem-based learning environments (as covered in the preceding section), but it also provides guidance in facilitating learning communities. Nelson's work synthesizes research and theory done in both cooperative learning environments and group facilitation to build a powerful theory of collaborative learning. This theory includes specific guidelines for implementation, making it accessible to the designer and instructor alike.

Theories for Higher-Order Thinking Skills

Being able to critically evaluate information, regulate one's own learning, and develop thinking skills that transfer across contexts are major goals of many emerging instructional theories. However, the theories listed below are specifically designed to develop higher-order thinking skills in learners. The three theories in this category include:

- A Design Theory for Classroom Instruction in Self-Regulated Learning, by Lyn Corno and Judi Randi;
- Systematically Using Powerful Learning Environments to Accelerate the Learning of Disadvantaged Students in Grades 4–8, by Stanley Pogrow; and
- Landamatics Instructional Design Theory for Teaching General Methods of Thinking, by Lev Landa.

A Design Theory for Classroom Instruction in Self-Regulated Learning. In this theory, Corno and Randi argue for the importance of developing self-regulated learners. They describe how this can only happen when teachers themselves are self-regulated learners. Educational research and professional development activities should not be designed to hand teachers models and concepts developed in the academy; rather, they should develop teachers' potential as innovators, problem-solvers, and experiential learners. This theory presents a way to foster self-regulated learning among both students and teachers. Furthermore, it presents an excellent framework for researcher/teacher collaboration.

Powerful Learning Environments for Disadvantaged Students in Grades 4–8. Pogrow's theory for teaching Higher-Order Thinking Skills (HOTS) is essentially a theory for using group discussion and reflection to teach higher-order thinking skills to "at risk" students in grades 4-8. Pogrow explains how many educational reform efforts fail because they attempt to improve higher-order thinking skills through drill and practice instruction. In HOTS, learners gather together to talk about what they're reading and learning with a group of learners and a faculty mentor in a manner similar to that of a "dinnertime" conversation. The teacher serves as a Socratic facilitator, encouraging students to analyze the learning material, evaluate their learning process, and relate school learning to their own lives. Tested with thousands of learners, HOTS has proven to cause dramatic increases in students' reading ability, ability to manage their learning, and ability to think critically about material. With a little adaptation, this theory could be used to improve instruction in a variety of learning situations.

An Instructional Theory for General Methods of Thinking and Learning and Methods of Cognitive Self-Regulation. Landa argues for the importance of teaching general higher-order thinking skills. This chapter offers a systematic set of methods for designing instruction on higher-order thinking skills. Landa employs a system using logical statements to facilitate analysis. While many of the principles Landa describes will be useful to teachers, instructional designers would probably find this theory most useful.

Diversity of Other Theories

As instructional theories continue to emerge, many new and unique types of theories will be needed. The theories in this category don't fit neatly into any category, for each tends to serve a very different function from the others. These instructional theories highlight the diversity of emerging instructional theories. The three theories in this category include:

- Integrated Thematic Instruction (ITI): From Brain Research to Application, by Susan Jafferies Kovalik with Jane Rasp McGeehan;
- Instructional Transaction Theory (ITT): Instructional Design Based on Knowledge Objects, by M. David Merrill; and
- The Elaboration Theory: Guidance for Scope and Sequence Decisions, by Charles M. Reigeluth.

Integrated Thematic Instruction (ITI). Kovalik argues for the importance of educating for a global village, espousing many traditionally progressive goals of education. She argues that brain research supports these goals, and presents several groups of principles and methods designed to achieve this end. Kovalik challenges educators to broaden their vision of schooling, and educators looking for inspirational principles should consult this theory.

Instructional Transaction Theory. Merrill's Instructional Transaction Theory is an extension of his Component Display Theory that uses knowledge objects to provide customized instruction for learners. The software acts as a tool that generates instruction. This innovative system will initially be of most interest to instructional designers.

The Elaboration Theory. Reigeluth's Elaboration Theory is designed for making scope and sequence decisions for relatively large bodies of instruction. It helps guide practitioners as to when sequencing instruction is likely to make a difference, as well as when to use various alternative methods for sequencing instruction. The Elaboration Theory provides detailed guidelines for scope and sequence decisions.

A Theory for the Psychomotor Domain

Physical skills have played a rich part in the human experience. Artisans, painters, athletes, and surgeons all craft and hone highly developed psychomotor skills, critical to successful performance in their domains. Over the centuries, apprenticeships, coaching, and formal training have all been used to facilitate learning in the psychomotor domain. Hitherto, instructional theory has paid little attention to this important learning

domain. This volume includes a theory that synthesizes much of the work in this category:

- The Development of Physical Skills: Instruction in the Psychomotor Domain, by Alexander J. Romiszowski.

The Development of Physical Skills. Situated within the rich history of psychomotor instruction, Romiszowski offers a comprehensive theory for teaching physical skills. He discusses the basic concepts and processes central to psychomotor instruction and suggests a reproductive to productive framework for understanding the nature of skill development. Romiszowski includes specific instructional tactics for teaching physical skills that are grounded in empirical research. In describing how psychological processes are a critical component in developing physical skills, Romiszowski integrates principles and research from a wide range of disciplines, theories, and philosophies. In doing so, he builds a compelling argument for the value of integrating multiple instructional approaches into a more cohesive instructional theory.

Theories for the Affective Domain

These theories focus primarily on fostering personal, emotional, attitudinal, social, or spiritual development. Recent attention given to "Emotional Intelligence" illustrates how instruction in the affective domain is becoming increasingly important. Each of these theories supports cognitive development as a part of affective development, but the focus is clearly on the affective domain. Even though many corporate and non-profit groups have begun instructing in this area, few K–12 schools devote serious energy to affective development yet. In each of these theories, the authors argue persuasively that educating in the affective domain is a primary purpose of schooling, and they challenge educators to include affective components in their curriculum. The five theories in this category include:

- Recapturing Education's Full Mission: Educating for Social, Ethical, *and* Intellectual Development, by Catherine Lewis, Marilyn Watson, and Eric Schaps;
- Self-Science: Emotional Intelligence for Children, by Karen Stone-McCown and Ann Hathaway McCormick;
- Structured Design for Attitudinal Instruction, by Tom Kamradt and Beth Kamradt;
- Character Education: The Cultivation of Virtue, by Thomas Lickona; and
- Adolescent Spiritual Development, by Joseph Moore.

Recapturing Education's Full Mission: Educating for Social, Ethical, and Intellectual Development. These authors argue for the importance of educating the whole person. They provide a theory designed to facilitate students' total development. In order to implement this theory, school- or system-wide support for encouraging students' total development is necessary. Educators looking for a fairly open-ended approach to character development may find this theory useful.

Self-Science: An Approach to Emotional Education. Based on a persuasive argument for the importance of emotional development in life and education, Stone-McCown and McCormick offer a field-tested theory for fostering emotional development. They use their Self-Science Program to show how emotional development can be taught in schools to children of many ages. This theory, developed and successfully used at the Nueva School, includes both general principles and specific methods that can be integrated into classrooms or used to design an emotional learning environment. Practitioners and theoreticians alike might find this theory useful.

Structured Design for Attitudinal Instruction. The Kamradts first provide a descriptive theory on what attitudes are (they are made up of three components: cognitive, affective, and behavioral) and how attitudes influence behavior (every attitude meets a need). Then they give detailed plans on how to teach in order to change attitudes, which entails simultaneously moving all three components of the attitude (affective, cognitive, and behavioral) the same amount in the same direction, using rapid shifts in instructional tactics, from one component to another. In the Kamradts' theory, the instructor always leaves the learner the choice to personally change his/her attitude.

Character Education: The Cultivation of Virtue. Lickona presents a theory on developing character and morality. Built on "timeless values," Lickona's theory should be used when socialization and transference of such values is an agreed-upon mission of education. Lickona argues that students need to understand the "why's" behind rules and laws and the value of objective, timeless truths.

Adolescent Spiritual Development. Virtually all religions recognize spiritual development as an important goal (somewhat akin to cognitive development or emotional development), and in this sense, spiritual development transcends particular religions and is distinct from "religious education." Although some settings may be inappropriate for fostering spiritual development, there are other settings where it may be very important. Moore identifies three stages of adolescent spiritual development and offers concrete strategies for fostering development within each stage. It appears that these strategies are

Further Theory Development

The theories presented here provide a good start for the educational community in redefining the paradigm

of instruction, but clearly, more work needs to be done. There is a need for further developing these new theories, a need for more new theories, and a need for providing some kind of theory (or guidance system) for deciding which theory to use when.

Further development. Most of the theories described in Volume II are still in their infancy. Most can benefit from incorporating additional methods for accomplishing their respective goals and additional ways in which the unique capabilities of advanced technologies can be utilized most cost-effectively. This is particularly true in the affective domain. But another dimension of further development is to provide more detailed guidance for the methods that each theory already offers. To be truly useful to practitioners, a theory should offer detailed guidance as to how to use a given method. But, as you get more detailed, more conditionalities come into play—that is, the method should be used differently depending on the conditions in the particular learning situation of interest. Some of these theories have been worked out to great detail through extensive application in authentic contexts (see, e.g., Pogrow's work), but many have not. And even those that have could benefit from broadening to different kinds of learning situations, with explicit descriptions of attendant conditionalities.

New theories. There is also a need for theories addressing whole new areas of instruction. For example, a much noted and regretted aspect of many emerging theories is that they do not work as well with some kinds of learners, such as non-self-guided or anxious learners. Perhaps theories about how to reduce student anxiety and increase student autonomy will be, or are already being, developed. Theories are also needed to offer guidance on how distance learning technologies can be used more effectively. In the affective domain, the five kinds of theories in Volume II may only be scratching the surface for the variety of kinds of affective development that should be addressed.

Which theory to use when. Practitioners need guidance for deciding which theories to use when. Such decisions may depend on many factors, including the users' values about means and ends of learning, the nature of the kinds of learning desired, the nature of the learners, and the nature of constraints in the learning environment, to name a few of the major ones. Such an "umbrella theory" of instruction might be most useful in the form of an electronic performance support system, which could also include guidance for the application of each theory selected.

An important consideration for the further development of the new paradigm of instructional theories is research. Perhaps the most important kind of research is developmental research, which several of the theories have already used. This entails extensive field testing, formative evaluation, and revision. A promising methodology for such research, called "formative research," is described by Reigeluth and Frick in Volume II. It entails implementing the theory, conducting formative evaluations of that implementation to find ways to improve it, and hypothesizing corresponding ways to improve the theory. With replications, sufficient evidence in support of the improvements may warrant revisions to the theory. This methodology also aids the discovery of conditionalities that explain differences in findings about which methods work best. Developmental research will show more conclusively how these theories work and when they do, as well as give educators and community members added confidence in the power of these emerging theories. Another important kind of research, once a theory has gone through extensive developmental research, is to compare different theories that are intended for similar learning situations.

The importance of research highlights the importance of assessment. Also, the new paradigm's emphasis on integrating teaching and testing places assessment issues in the center of instructional debate. Many of these new theories call for new assessment strategies based on authentic performances. What kinds of assessment are appropriate, given the goals of the theory? These issues, which call for a deep rethinking of assessment and research, reflect the emerging nature of these theories and the paradigm shift we are experiencing. Caught between two paradigms, thoughtful practitioners will need to be given the support and resources necessary to make beneficial changes in their instructional practices.

Conclusion

This article has elaborated on the nature of the new paradigm of instructional theories introduced by Reigeluth in the May/June 1996 issue of this magazine. It has done so primarily by summarizing 21 theories that are described in the forthcoming Volume II of *Instructional-Design Theories and Models: A New Paradigm of Instructional Theory*. Although these theories share some characteristics (summarized earlier) that place them within the new paradigm, they also reflect considerable diversity—considerable differences in goals and methods. But educators should approach these not as competing theories, but as unique theories that have utility in different circumstances. For example, educators might find a more general theory, like Open Learning Environments (Hannafin, Land & Oliver), to be useful in one situation and Teaching for Understanding (Perkins & Unger) useful in another.

When viewed as a whole, these theories make a powerful statement about the future of instructional theory. Nearly every theory stresses deep understandings over rote, decontextualized performances.

Furthermore, nearly every theory advocates using authentic, challenging tasks that require learners to think and act with information as the basis of instruction. These methods fly in face of current educational practice; when taken as a group, they re-emphasize the importance of rethinking the very basis of how education should be working. Similarly, almost every theory challenges educators in some way to rethink what and why we teach. When taken as a whole, these theories give an emerging picture of the new paradigm of instruction. □

References

Merrill, M. D. (1983). The component display theory. In C. M. Reigeluth (Ed.), *Instructional-design theories and models: An overview of their current satus.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Reigeluth, C. M. (1996). A new paradigm of ISD? *Educational Technology, 36*(3), 13–20.

Reigeluth, C. M. (Ed.) (in press). *Instructional-design theories and models: A new paradigm of instructional theory. Volume II.* Mahwah, NJ: Lawrence Erlbaum Associates.

Article Correction

A number of words were deleted at the bottom of page 10 in the March–April issue article titled "Instructional Design Models and Teacher Thinking." The full paragraph beginning on the last line of page 10 should have read as follows:

Second, teacher knowledge is grounded in a systemic and holistic notion of learning, practice, and relationships. It is constructed in the process of reflection, inquiry, and action by teachers themselves (Schön, 1987), and it is used in complex ways during the process of planning for and executing teaching activities, as well as in making sense of decisions already made (Johnston, 1992). Knowledge consists of past construction (Fosnot, 1989). Teachers bring a set of predispositions and personal knowledge from their private lives to their practice of teaching (Grossman, 1992; Johnston, 1989, 1992; Lortie, 1975).

We regret this editorial error in the processing of the article.

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