

## Q and A with Ed Tech Leaders

### AN INTERVIEW WITH CHARLES REIGELUTH

Michael F. Shaughnessy  
Eastern New Mexico University  
Portales, New Mexico  
Susan M. Fulgham  
West Texas A & M University  
Lubbock, Texas

#### **1. What are you currently working on/writing/researching?**

I'm working on a number of things. Mostly, I am focused on systemic change in education. I have done that through instructional theory with my Volume II of *Instructional-Design Theories and Models*, which describes the learning-focused paradigm of instructional theory. But more importantly in my view, I am focusing on developing guidance that a facilitator could use to help all the stakeholders within a school district to reinvent and transform their educational system – starting with the nature of the learning experience – which entails converting from an industrial-age paradigm of instruction that's teacher-centered and sorting-focused to a learner-centered paradigm that's learning-focused. But a lot of the changes that are necessary to have a learning-focused paradigm of instruction in K-12 school districts require fundamental changes in the educational system. As Phillip Schlechty says, they require different uses of time, talent, and technology. They require different roles, rules and relationships, including different roles for students, teachers, and technology. Rather than using technology to enhance what we're *already* doing in the classroom, we should be using technology to *transform* what we're doing in the classroom.

Technology allows us to do things very differently from the way we're currently doing them, which is that paradigm shift from a teacher-centered system to a learner-centered system. So, my focus on systemic change is concerned with developing guidance that will help school districts, including all the stakeholders in the district, to explore a different paradigm of teaching and learning and a different paradigm of school organization. This requires a different goal for assessment and student record-keeping. Rather than comparing students with each other, we need to maintain an "inventory" of attainments that certify what each student has learned. So, systemic change is the major thing that I am currently working on.

I'm working with a small school district in Indianapolis to facilitate systemic change. I've been working with them for over two years now, and I think they're making good progress in rethinking their paradigm of education (see Reigeluth & Stinson, 2007a, 2007b; Reigeluth & Stinson, 2007c, 2007d).

A second area I'm working on is within instructional theory itself. I've become increasingly concerned that, as we evolve deeper into the information age, the kinds of tasks that people need to perform are becoming more and more complex. And those complex cognitive skills require a lot of tacit knowledge for their performance. It's very important in education and training for us to develop better methodologies for teaching and eliciting that tacit knowledge. It is important to make that tacit knowledge explicit so that it can be explicitly taught.

I believe there are two ways that tacit knowledge can be taught. One way is for it to be acquired through an apprenticeship experience with a master. In this way, the tacit knowledge never becomes explicit. The master possesses the knowledge and the apprentice acquires it through experience without ever becoming consciously aware of it. But there is another way that tacit knowledge can be acquired, and that is by eliciting that tacit knowledge, turning it into explicit knowledge, teaching that explicitly to a learner, and then helping the learner to engage in a process whereby that knowledge becomes automatized or internalized to the point where it typically becomes tacit knowledge again. Obviously the apprenticeship model requires very little in the way of guidance, but it can take a long time to learn. You just put the apprentice together with the master, and eventually (hopefully) they'll learn the tacit knowledge. The difficulty arises when we want to take the quicker and more reliable route – if we want to make the passive knowledge explicit and teach it explicitly and help the learner to automatize it. And there I think we need to do a lot of research work. Some of the work that I've been doing has gone under the rubric of the "heuristic task analysis" methodology, and I've published a couple of pieces on that (Lee & Reigeluth, 2003; Lee & Reigeluth, in press; Reigeluth, 1999).

## **2. What research do we currently need in the field of instruction?**

I think the most important consideration is that we need a different paradigm of instruction in the majority of our various institutions -- K-12 education, higher education, even corporate training. The way I have talked about this in my work, as you may have noticed in Chapter 1 of Volume Two of *Instructional-Design Theories and Models* is that in the information age, we need to have systems that are focused more on learning than on test scores. Unfortunately, it seems our educational systems and training systems in the past have tended to focus on sorting rather than on learning, by virtue of the fact that what they do is to hold time constant and thereby force achievement to vary, as opposed to allowing people the amount of time they need to master the content or skills. That is a paradigm shift from what's often been called "teacher-centered learning" to "learner-centered learning". I think the kind of research that we need most in the field concerns how we can best meet each individual learner's needs. In other words, how can we design effective learner-centered instruction? And furthermore, with a more systemic view, how can we bring about changes in organizational structures that will best foster and support a learning-centered paradigm of education or training?

If we could, I'd like to address a new issue here which I think is closely related to the kind of research we need. It is an issue that has become a hot topic in our field lately with the emergence of what's called the "learning scientist." There is a special issue of Educational Technology that addresses the differences between the learning sciences and instructional design. One of the things that became apparent to me as I read through some of those manuscripts is that the learning sciences focus on knowledge about cognition. Their main purpose is to advance *theory* about cognition and learning and instruction. On the other hand, the field of instructional design focuses on knowledge *application* rather than knowledge creation. In other words, its main intent is to create the most effective instruction possible, given the knowledge that they currently have, as opposed to the learning sciences' focus on creating the best knowledge we can about how to create good instruction. Thus, there is a fundamental difference in focus on knowledge creation vs. knowledge application.

Now in my own work in the field of instruction I have focused on knowledge creation rather than application. Instructional theory development is concerned with creating knowledge about how best to foster learning. The major objective here, in my view, is to provide guidance

for teachers and designers.

This is very much related to the question: “What research do we currently need?” I think we need research that can offer better guidance for teachers and designers in the use of a learner-centered paradigm of instruction. I define instruction very broadly to include all ways of fostering learning and development, including those arising from a constructivist view of learning.

One of the important issues here is the general vs. local issue. There is a good deal of controversy over whether we should be creating local theories or more broadly applicable theories. Providing more detailed guidance for teachers and instructional designers necessarily makes that guidance more local. A general method of instruction, such as “involve the learner actively in the learning process,” is very broadly applicable because it could apply to almost any situation we can think of. But when we try to provide more detailed guidance about how to do that, it’s going to necessarily become more local – less broadly applicable. When methods become more local, we can identify the situational variables that make the more detailed methods appropriate or inappropriate. In other words, we can identify situations that help us to decide when to use each of those alternatives for accomplishing the more general guidance. Hence, we find that, in attempting to generate knowledge, we can indeed generate more detailed guidance as long as we identify the situations that govern when each is more advantageous than the alternatives.

A related issue that has not been addressed much in our field is values about instruction. Values, beliefs, philosophy – those are all fairly similar concepts. Basically what they come down to, in my view, is statements of importance about instruction--what we hold as being important that isn’t empirically verifiable. In other words, if one believes that collaboration is important or that self-directed learning is important, those things are values to the extent that we do not have empirical proof that one is better than another. In instructional theory, we have not tended to identify the values upon which our theories are based. And values come into play with respect to decisions about both what to teach and how to teach it. What to teach is typically thought of as curriculum theory, whereas how to teach it is more generally thought of as instructional theory. But the two are not completely separable. I think very often you need a theory that encompasses both curriculum theory elements and instructional theory elements, and what you teach often influences how you should teach it.

### ***3. What to teach and how to teach it is a recurring theme in education. Who decides or whose decisions should it be?***

That’s a very important issue. I think that those who are most directly affected by it should be the ones to have the greatest voice in making that decision. In my ideal vision of an information-age educational system, I would have the student, the teacher and the parent get together on, say, a quarterly basis and enter into a quarterly contract where they jointly decide what the student will learn over the next three-month period and decide on the role that each of them will play in helping the learner to accomplish that. What will the learner do to try to accomplish those goals?

What will the parents do to help the child accomplish those goals? And what will the teacher do? Both the goals in terms of what to learn, and the methods in terms of how to foster that learning, should be decided on by those three parties jointly. I also believe it’s important that there be certain checks and balances where the school or the school district or the community can say, “We think you’re overlooking some important skills or knowledge that this learner ought to

have.” And the state should have some ability to say, “That’s great, but here are some important things from the state’s perspective that we think this child should be learning.” So I think it is important to have some degree of input provided by those higher levels of the system or society, but the major decisions, in my view, should be made by those closest to the decision -- those affected most by the decision.

#### ***4. What would you then see as the benefits of learner control in education?***

One of the values I hold is that learners should become self-directed. We talk a lot about life-long learning, but how do you help someone to become an effective life-long learner? They need to become self-directed, among other things, and therefore it’s important that we provide the learners with guidance that will help them to become more effectively self-directed.

#### ***5. In your mind, is knowledge acquisition or knowledge construction more important?***

These two terms may mean different things to different people. I think of knowledge construction as occurring through conscious effort by the learner, and knowledge acquisition as occurring unconsciously in the learner. Much expertise that an expert gains while performing a task is acquired unintentionally on an unconscious level. The learner is not consciously aware of it. And certainly there are situations in which a person can be bombarded, say in watching TV, with similar information over and over again and acquire that information without consciously constructing it. So if we use the term “knowledge construction” in the sense of conscious learner effort to learn something, I don’t think that is the sole way in which learning can occur. I think knowledge can be acquired in an unconscious way or in an absorption kind of way to some extent. But I also believe that the learning process is usually more effective when the learner is consciously constructing knowledge. I think knowledge construction is the most productive way, and hence the most important way, to think about how to foster learning.

#### ***6. Should we be focusing on the learner or the teacher?***

First of all, who are you referring to as “we”? Remember my earlier comment about knowledge creation vs. knowledge application? Are we talking about people who are applying knowledge – in other words, teachers who are utilizing knowledge about how to best foster learning? Or are we talking about learning scientists and instructional theorists, who are attempting to advance our knowledge? I think the answer to the question will vary considerably depending on who “we” is.

The very question of saying the learner OR the teacher is an example of dualistic thinking, which was often fine during the industrial age, but in a post-industrial world, it’s much more complex than that. It’s not a matter of the learner or the teacher, but both. We need to be focusing on both the learner and the teacher. We want to provide guidance to the teacher about how best to foster learning, but that guidance has to be primarily focused on the learner’s needs. So both should be focused on in order to come up with a useful theory of instruction.

#### ***7. Should we be focusing on the instructor or instruction?***

Similar issues are involved there. I think it’s the learning experience that we really want to be focused on, and the things that an instructor can do to best foster that learning experience are certainly important. The nature of the instruction strongly influences the nature of the learning experience. Hence, I believe we should focus on the nature of the instruction, which requires focusing on both the instructor and the learner.

### **8. *Should we focus on assessing the learning or the learner?***

I believe both are important. We need to assess the learner to know when to stop helping that learner to learn something. And we need to assess the learning to constantly figure out how we can improve the instructional process – the process of fostering learning.

### **9. *How can we best incorporate testing, evaluation and assessment into our schools?***

I believe that clearly the most important role is the diagnostic role, that we need to use information about what has been learned and what hasn't yet. We need to incorporate that information into making good decisions about what to do next in fostering that learning. And in addition to being diagnostic, it also should be criterion referenced, as opposed to a norm referenced system where we have a course title and a grading scale that compares how well one student did relative to another. What we ought to be thinking about is more “an inventory of attainments” that can be checked off as they're attained. So to have a criterion focus and a diagnostic focus are two important things for testing and assessment.

Now, related to that is the notion that different kinds of learning should be developed in quite different ways – that different methods of instruction are required for different kinds of learning. As an example, to help someone acquire a skill, it really helps to demonstrate to them how to do it and give them lots of opportunities to do it. On the other hand, if you're trying to develop a deep understanding of causal relationships, then you would use quite a different approach. You might use a computer simulation to allow a learner to manipulate causal factors and observe what effects result from those various factors. You're not developing a skill, you're developing a deep understanding, and the method should be very different.

### **10. *How can we best foster meaningful student learning and problem solving?***

There are different types of meaningful learning that are developed in different ways. I think causal understandings, for instance, with their probabilistic nature and their multiple causes and multiple effects, are developed as complex causal models that can often be learned most effectively through virtual worlds or simulations that allow the learner to manipulate causal factors and observe what happens. Conceptual understanding is another very different type of meaningful learning. It is primarily a matter of making links among different concepts in one's head. I find schema theory very helpful for visualizing what conceptual understanding is all about.

There are different types of relationships that make a concept meaningful, each of which constitutes a different dimension of understanding for that concept. So for instance, to understand what an atom is, you can't take a look at real-life examples – it's much too small and you can't see actual examples. What you can do is develop some other types of relationships. Some of the major ones include the superordinate, coordinate, subordinate, analogical, functional, and experiential relationships. Thus, to understand what an atom is, it would be helpful to understand that it is a part of matter (a small particle that makes up all matter). So “matter” is a broader (superordinate) concept. “Molecule” would be another broader concept – to understand that an atom is part of a molecule. Understanding the superordinate relationship provides one dimension of understanding.

But developing coordinate, subordinate, and analogical relationships can broaden the understanding. For instance, if we take the concept of Revolutionary War. To understand that it is a kind of war, that is a superordinate relationship, and so context or advance organizer is the

instructional strategy that we would use. On the other hand, for the coordinate relationship, to understand how a revolutionary war is similar to or different from a civil war, comparison and contrast is different instructional strategy appropriate for developing that dimension of understanding. So we can continue to identify different dimensions of understanding for any given concept and identify different instructional strategies that are appropriate for each of those different dimensions of understanding.

Problem solving is quite different. It is more the “skill” type of learning, but typically also involves some deep understandings. To develop good problem solving capabilities, it’s helpful – like all skills – to have good demonstrations and some good generalities, as well as ample opportunities to practice and receive feedback.

Again, we come back to the basic issue I mentioned earlier, that different kinds of learning are developed in different ways. They require different methods of instruction to best foster those kinds of learning. Other kinds of learning include higher order and critical thinking skills. Those are extremely important skills, and like most skills, they can be fostered or cultivated pretty well through demonstrating how to do them and through providing learners with lots of opportunities to practice them with feedback. Feedback is extremely helpful. Various kinds of scaffolding and support can also be quite helpful here, and some generalities -- basic guidelines for learners about what sorts of things can be helpful to pay attention to when you are engaging in critical thinking or various other kinds of higher order thinking.

### **11. What about social affective elements?**

If you’re thinking of them in terms of the social and affective development of a learner, then those are additional types of learning that are extremely important and therefore I have addressed them in my Volume II, as I’m sure you know. There were I believe five chapters that were devoted to the affective domain including social, emotional, attitudinal and even spiritual development. Again quite different methods of fostering learning and development are required for those kinds of learning than for the cognitive area. There are some aspects of social learning that are cognitive in nature, and therefore methods that are good for developing cognitive knowledge of those various kinds would be appropriate to use. But there are also affective elements in social learning and development, and those various affective elements are developed in very different ways. Daniel Goleman has synthesized in a sort of a populist way some of the major works that have been done in that area of emotional learning and development. And this is also addressed in my Volume III (Reigeluth & Carr-Chellman, in press).

But very different from that is the notion of the affective element of instruction as *motivation* or some other means to foster cognitive learning. There I think, the work of Stanley Greenspan (1997), in his book, *Growth of the Mind*, is a significant contribution. Perhaps his major thesis is that all learning – even learning of a cognitive nature – is very heavily based in emotional learning, that emotional learning is really the foundation for all cognitive learning. And therefore it is extremely important to pay attention to the various aspects of the learning situation that are of an emotional nature that can foster or impede cognitive learning. Emotional learning in his view is a tool that can be used to help foster cognitive learning. I think there’s an awful lot of merit to that argument, and therefore I think it’s very important for all instructional methods to pay close attention to those emotional aspects of the learning environment.

**12. What do you believe about prescriptive/descriptive theory and where does instructional design theory fall?**

That's a good one. I go back to the work of Herb Simon. In his book, *The Sciences of the Artificial* (1969, 1996), he talks about the nature of design sciences as opposed to natural sciences. I think that's a very important distinction in that those are very different types of knowledge. The knowledge creation process needs to be quite different for generating those two types of knowledge, and the nature of research for helping to develop each of those kinds of knowledge is very different. The design sciences are goal oriented. They attempt to identify the best means for accomplishing any given goal. Therefore, the kind of central issue for that kind of knowledge is one of preferability, or optimality if you wish. And the criteria that one uses to judge whether one means of accomplishing a goal is better than another means are extremely important to consider carefully. The whole notion of "satisficing" I think is based on too narrow a view of what criteria are needed for making those judgments. So if Method A takes a lot more time or money to help a learner reach the same level of knowledge development as Method B, then Method A is not as good as Method B, but those are only two of the criteria that are important to consider. It's also important to consider how appealing or motivating the instruction is to the learner. So the instruction's effectiveness, efficiency (in terms of both cost-effectiveness and time-effectiveness), appeal, teacher-satisfaction, safety, and so forth are all important criteria to consider. It seems to me that, for whatever criteria are important in a given situation, you want to pick the best method available, not just one that sacrifices.

To sum it up, when one is talking about descriptive knowledge, the major research issue is one of validity. Are we describing this in an accurate way? Alternatively, with design knowledge the major research issue is one of preferability. Are the methods that we've selected for this situation the best known ones, given the criteria that we adopted? And it's quite likely that we would end up wanting to use different methods if our criteria changed. One situation might require quite different criteria from another situation, and therefore we get back to the issue of situations that I talk about earlier. Situations are an important basis for making a decision about how best to accomplish goals.

**13. How has instructional technology changed the way we teach?**

In most cases, I think it depends on where you look. If you look in many public schools, I think the answer would typically be that technology hasn't really changed the way we teach. There are obviously some contexts in which it has very successfully changed the way we teach. Perhaps the more important issue here would be, how can instructional technology or instructional theory (I would prefer to say) change the way we teach? I think instructional theory can change it very significantly, particularly with the learner-centered paradigm of instruction, and that's the one place where technology has played a very important role. It allows us to cost effectively create a learner-centered paradigm of instruction, to customize instruction to different learners' needs. If we think in terms of a class with 30 students and one teacher, there's no way the teacher without technology could provide really good, effective instruction where different students are learning different things all at the same time. Technology provides us with a tool that makes customizing the learning process much more cost effective, and I think it will end up even being less expensive than the current industrial-age paradigm of teaching as technology continues to increase in power and decrease in cost. So basically, I would phrase your question as, "How can instructional theory and technology change the way we teach?" And I would say they can revolutionize it. They can allow us to adopt a truly learner-centered paradigm of

teaching.

**14. *How can we best train teachers in instructional technology?***

Again, I think instructional theory is as important as technology. Pedagogy is as important as the technology itself. Some people define the term instructional technology to include pedagogy (“soft” technology) as well as hard technology. But unfortunately not everybody does, so we have miscommunication there depending on one’s view of the term. Based on my experience with teachers in schools, I think that collaboration between teachers who have developed a good understanding of instructional theory and technology and ones who are less knowledgeable along those lines can be an extremely powerful way to go. Certainly learning in context is extremely valuable for the teachers, and having their professional development tailored to their individual needs is also very important. Really, all the methods that are associated with the learner-centered paradigm of teaching would be appropriate for training teachers, both in-service and pre-service, for the use of instructional theory and technology.

**15. *Can we go back to the green books, because your text is probably the classic in the field. What started you or what prompted you to urge all those fine authors to write about their areas of expertise?***

I think we have to go back to Volume I of the book to answer that question. As I looked at the field of instructional design and technology, I saw a lot of attention going into the ISD process – the ADDIE model, for example – and that tells you how to conduct a task analysis, learner analysis, formative evaluation, and so forth. None of that gives any idea of what the instruction itself should be like. And I just didn’t see many people working in this area at all. I was fortunate to get teamed up with Dave Merrill, who was working in this area. Whenever I went to conferences, it was almost impossible to find sessions on instructional theory, and it was very difficult to find any publications on this topic. I felt it was an extremely important area that was largely being overlooked by scholars in our field. I felt it was important to try to make more public the work that had been going on, and try to get more people interested in doing work on instructional theory as opposed to the ISD process. So that was my motivation for Volume I.

Then my motivation for Volume II sprang primarily out of the work I was doing with systemic change in education. I felt that in order for systemic change to become easier for schools to engage in, they really needed a lot more guidance about the learner-centered paradigm of instruction, and therefore I decided that another volume was needed (as opposed to a second edition) that focused on instructional theories within the information-age paradigm of instruction. So again, my desire was to help draw attention to this fledgling new area of activity within instructional theory – the learner-centered paradigm of instruction. I felt it was really important to try to raise awareness that this new paradigm is different from the way we have traditionally viewed instruction and to encourage people to do more work within this area.

**16. *Who has influenced you and why?***

Dave Merrill had a huge influence in terms of giving me an understanding of what instructional theory is. Certainly, Bob Gagne also had a considerable influence on my understanding of instructional theory and its relationship to learning theory. Also, most recently Van Merriënboer (1997) with his focus on complex cognitive tasks. Within a more systemic-change view of education, Bela Banathy (1991, 1992, 1996) has had perhaps the greatest

influence, but most recently I've become aware of the work of Frank Duffy (Duffy, 2002, 2003, 2004; Duffy, Rogerson, & Blick, 2000), and his is the only work I've found in addition to our own that provides guidance for the process of systemic change. We have recently integrated our two lines of work (Duffy & Reigeluth, 2008).

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