Revitalizing Educational Technology: A Response to Mitchell

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I greatly enjoyed David Mitchell's recent article on the state of Educational Technology (Mitchell, 1989). It raised a number of problems that we need to confront and proposed a solution that is appealing and potentially viable. Of the many telling points in the article, two stand out for me. The first is that technology is systematic in the way it goes about solving problems; yet the problems that technology is set to solve in Education are not amenable to systematic treatment because the cause-and-effect model that underlies our ways of making decisions are terribly unreliable when it comes to human activity. This unpredictability of human behavior is currently of considerable interest to a number of writers who question the validity of both our traditional methods of design and of research (Cziko, 1989; Streibel, 1989; Winn, 1989). The second important point is that Educational Technology lacks an organizing principle. If by this is meant a theoretical foundation, I thoroughly agree, in spite of AECT's (1977) claims to the contrary. The majority of people in our field have completely misunderstood system theory, interpreting a powerful conceptual tool as a series of mechanistic techniques. Our graduate programs have failed to provide students entering the field with anything like a conceptual basis for what they are being taught to do (Stewart, 1985). And our professional associations have failed miserably in the exercise of leadership in identifying and developing the theoretical framework, or organizing principle, the field so badly needs.

Although I therefore agree with a lot of what Mitchell has to say, there are two matters that I believe deserve some further thought. The first stems from the fact that I see Mitchell's criticism aimed more at scholars of Educational Technology than at those who practice it. There are a great many instructional designers at work in a variety of settings who are "doing" Educational Technology, and doing it well. I am thinking, for example, of those who develop computer-based training for the military or for industry. Of course, neither these people's conception of Educational Technology, nor of Education, nor therefore their assumptions about the means and ends of instructional design are the same as those Mitchell believes we should hold. Yet these folk show us that there are circumstances where it is possible, maybe even necessary, to ignore the constructive nature of learning, to concentrate upon improving instruction rather than facilitating learning, and even to infringe on students' freedom to choose, in order to get the job done. Such assumptions, and the instructional techniques that derive from them are anathema to educators and inappropriate for Education. Yet in the training setting a lot of what Mitchell implies is the misuse of technology is in fact working well. I therefore question

the conclusion that Educational Technology is dead. There are places where, in a different guise from a scholar's conception of what it should be, it is very much alive.

The second matter has to do with the manner in which Educational Technology might be revitalized. Mitchell's case for making cybernetics the organizing principle for the field is an appealing one, if for no other reason than it presents system theory, unattenuated, in the manner in which it was originally conceived. As such, it enables the educational technologist to look beyond the factors that, say, psychologists believe affect learning to a whole host of other influences about which we know very little and over which we have little control. However, the prospect of actually doing what Mitchell suggests is a daunting one, which I sense he realizes.

There are two alternatives that I believe are also worthy of pursuit. They are both more narrowly focused than Mitchell's proposal and may, in a sense, be counter to the purpose of Educational Technology as he sees it. However, both relate specifically to what it is educational technologists do and, more important, both would tie the field to a sound theoretical basis. (Both also have a psychological flavor, which reflects my biases.)

The first has to do with our idea of what good pedagogy is. It has always puzzled me that educational technologists set teaching by humans as a standard for judging the success of what they do. Thus, we find attempts to develop tutoring systems that are "intelligent", CAI software that interacts with students in a manner that attempts to imitate human discourse, distance education systems whose aim is to bring to students at remote sites instruction that is as good as what they would have received from a teacher in a classroom, and so on. Indeed, Mitchell himself sets up tutorial conversations as a standard which intelligent CAI might one day come close to attaining. Yet we have not asked whether what human teachers do is the best possible pedagogy. This standard has quite simply evolved as part of the traditions of practice of teachers. It has grown up unchallenged, and for all we know may not be the best way to help people learn. So why should we strive to develop instruction for delivery by non-human systems that attempts to emulate human teaching?

I propose a thought experiment in which we imagine that current pedagogy has evolved not within the traditions of practice of teachers but within the traditions of technology itself. In other words, if computers had been used in instruction rather than teachers, what would pedagogy look like today? It then becomes the task of the educational technologist to discover, or perhaps invent, the pedagogy that is most appropriate to instruction using non-human teachers (computers) and to use that as the standard against which we judge our success. Many will find such a proposal horrifying. But it has at least two things in its favor. The first is that it can allow the computer to become a true "tool for thought", as Salomon (1988) has suggested. Second it gives Educational Technology an independence from current practices and liberates it from the inertia of educational institutions that Heinich (1984) has seen as hampering our initiatives in public education.

My second alternative is to base our work on those aspects of human behavior that are predictable. Here I am referring to mechanisms that vary little from one person to another and that are rarely if at all influenced by volition (that are, if you will, "cognitively impenetrable" (Pylyshyn, 19841). An example would be preattentive perception. There is convincing evidence (Marr, 1982) that a great deal of organization occurs in the early stages of perception before conscious effort is expended on interpreting what is seen. On the reasonable assumption that this organization constrains attentive cognition, we can see that an understanding of these mechanisms is valuable to whose who design images for display by computer or by other devices. In terms of scholarly activity in our field, this represents the complete antithesis of what Mitchell has proposed -it is microscopic in the extreme, dealing with a small number of processes, involving only the presentation of information and none of the other activities that are necessary for learning. Yet the study of preattentive perception, and the development of design principles from that research, would provide a reasonably valid theoretical base on which to build at least a small part of what we do.

One healthy sign for our field is that just about everyone working in it has their opinion about what should be done. People are thinking and talking. Mitchell has very eloquently argued a case for making cybernetics a theoretical point of reference. I have added two more modest suggestions involving pedagogy and perceptual psychology. I imagine that others will also share their ideas. This kind of dialogue indicates to me that the field is neither dead nor moribund. Being an optimist, I suspect that what Mitchell has seen as death is in fact a mid-life crisis. Such crises are certainly not fatal; they are simply part of growing up. Educational Technology has a lot of growing up to do, but that does not require a miracle.

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