The Relationship Between Situated Cognition and Anchored Instruction: A Response to Tripp

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Tripp's analysis of our article begins with a variant of the "We love you, but..." structure that is often used by reviewers and always dreaded by reviewees (i.e., "I have the greatest respect for the work the Vanderbilt Group is doing. However...," Tripp, 1993, p. 75). His "however" involves two "small" points of contention. First, he states that what we are doing is not situated learning; second, we are not teaching problem solving. Needless to say, these two claims by Tripp caught our attention because they suggested a perspective on our work that was novel to us.

The experience of reading Tripp's analysis reminded us of the physicist David Bohm's (1969) descriptions of scientists who are confronted by criticism, plus his advice to heed criticism carefully:

> His (her) first reaction is often of violent disturbance, as views that are very dear are questioned or thrown to the ground. Nevertheless, if he (she) will "stay with it" rather than escape into anger and unjustified rejection of contrary ideas, he (she) will discover that this disturbance is very beneficial. For now he (she) becomes aware of the assumptive character of a great many previously unquestioned features of his (her) own thinking. This does not mean that he (she) will reject these assumptions in favor of those of other people. Rather, what is needed is the conscious criticism of one's own metaphysics, leading to changes where appropriate and, ultimately, to the continual creation of new and different kinds.

We have tried to follow Bohm's advice.

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Assumptions About "Situativity"

One benefit of Tripp's analyses is that it prompted us to re-articulate our beliefs about the situated cognition perspective in light of his seemingly self-contradictory view of situativity. For example, Tripp argues that every situation is a situated learning situation (p. 75), and we certainly agree with this position (see especially Greeno, Smith, & Moore, 1993). However, Tripp then argues that our learning environments are *not* situated because "It is the core of the situated cognition position that knowledge is socially situated in the world" and "The Jasper videos are not in the world" (p. 75). This inconsistency in argumentation leaves us perplexed. Also puzzling is the idea that Jasper videos and classrooms are not "in the world." Where are they?

Tripp's primary argument seems to be that our students are not engaged in situated learning because he wants to reserve the term "situated" for a particular type of non-school setting involving apprentices and masters. His emphasis is also on a particular process of learning, namely, observing and "stealing moves" from the master. "If this were situated learning one would actually enter the situation and observe the master as he works out a solution. One would not pose the dilemma and then ask the students to work it out" (p. 75).

We disagree with the idea that situated learning occurs only in non-school settings and that it always involves learning by observing. These points are discussed below.

School vs. Non-School Settings: Many researchers interested in the situated nature of learning investigate learning that occurs in non-school settings (e.g., Lave, Murtaugh, & de la Rocha, 1984; Saxe, 1988, 1991; Hutchins, 1983). However, the situated perspective is not that non-school activities are situated and school activities are not situated. Rather, the perspective is that much can be discovered about the nature of learning by investigating situations in which individuals appear to be effective problem solvers. For example, Brown and colleagues (Brown, Collins, & Duguid, 1989b) did not equate situativity with non-school settings. Instead they stated that "one of our goals is to understand what underlies successful learning and to try to discover ways to use that understanding to produce better methods of teaching" (p. 12).

The goal of the research on situativity is to explore how learning arises out of the interaction of a person and a situation, which includes other people. For example, some researchers have observed that problems are embedded in larger social, cultural, and physical arenas. These arenas support and constrain the structure of a problem and its solution (Lave, 1988). Scribner's (1984) study of dairy workers provides an example of the use of a physical arena to support and constrain reasoning. She found that dairy workers varied strategies for packing and unpacking cases of dairy products depending on the properties of the task environment. The dairy workers used the structure of the packing cases to carry some of the cognitive burden of the task, and to constrain the possible strategies for filling any given order. This interdependency between person and situation is one of the reasons that people are effective in these situations.

Situativity researchers are not advocating that all school learning be overthrown in favor of "street" learning. Instead, they are suggesting that the structure of school activity be reconsidered in light of the information gained in the analysis of non-school activities. The reform of school-based activity becomes especially pressing when we observe individuals who achieve their goals through sophisticated reasoning in non-school events, yet who perform poorly on typical school tasks. One of the educational implications of research like Scribner's is the need to design instructional materials that provide such rich sets of constraints and supports for reasoning. For example, when students are learning about linear functions, there are usually few constraints other than the syntactic constraints of algebraic notation. However, when using a physical device that embodies linear relationships, such as a pair of winches, students can use the device to shape and support their mathematical conjectures (Moore & Greeno, in preparation).

To further determine how learning emerges from the interactions of people and situations, research is needed (a) to continue the analysis of non-school activities to determine how they support reasoning, and (b) to consider how to design school activities that will allow students to utilize the abilities they manifest in other activities.

Learning by Observing Models: We also disagree with Tripp's argument that situativity involves an exclusive emphasis on learning by observing a master rather than working out posed dilemmas. Being exposed to a master and stealing moves is one possible way in which people learn. However, it is not the only way in which skill is acquired and its exclusiveness is not implied by any situativity theory of which we are aware. For example, Brown and colleagues (Brown, Collins, & Duguid, 1989a) offer it as a possibility, without suggesting that learning needs to occur in this way, or that "masters" only exist outside of the classroom. They were interested in exploring how "some of the characteristics of learning [through apprenticeship] ... can be honored in the classroom" (p. 37). Two of the examples they provided were the mathematics teaching of Schoenfeld (1985) and Lampert (1986). Both instructors attempt to create classroom cultures that capture some of the practices of the culture of mathematics. Clearly these are cases of school learning, and they were offered by Brown *et al.* as important examples of classroom-based cognitive apprenticeship.

Modeling also had a place in our original article on anchored instruction (CTGV, 1990). We noted that there were different types of apprenticeships and that, in our opinion, not all were equally likely to result in the kinds of learning that would produce strong transfer. In particular, we compared two hypothetical mentors (see p. 8) and argued that the one who taught only by modeling (rather than also by questioning and encouraging problem solving) would not be very successful.

Our approach to instruction *includes* an emphasis on having teachers and other members of the community provide models of problem solving and reasoning (see especially sections 2.1, 2.2, & 4.3 in CTGV, 1993), but not as the sole method of instruction. Each adventure in our Jasper series includes models of successful problem solvers as part of the video solution. However, our approach to instruction also emphasizes the importance of opportunities for students to generate questions and become actively involved in problem solving, including an exploration of "what if" scenarios designed to facilitate flexible transfer (see section 3.3). Furthermore, we never advocate showing videos of someone modeling a Jasper solution before students have had a chance to solve the problems themselves. The reason for this is because students understand a model differently after having tried to perform the task themselves.

Models of masters solving problems are more or less valuable depending on the expertise of the person doing the observing (e.g., Bransford, Franks, Vye, & Sherwood, 1989). To a novice, many features of an expert model go unnoticed and unappreciated; the same model becomes more meaningful after novices have gained more information about the domain being modelled. Activities such as actively attempting to formulate and solve problems can help students reach a stage where the opportunity to observe models results in further learning opportunities (e.g., Bransford, Vye, Kinzer, & Risko, 1990). Indeed, in our anchor "The Golden Statuette" (CTGV, 1992b), students see a model of an expert performing various actions. Novices have little idea why the expert did what she did. The problem solving challenge for the students is to acquire the knowledge necessary to understand the reasons for the model's comments, actions, and conclusions. This requires active problem solving (and multiple viewings).

We have never considered conducting a study to evaluate the degree of learning from only watching someone (a teacher or our video characters) model a Jasper solution because it seems so obvious to us that very little effective learning would occur. Tripp's emphasis on modelling as the primary feature of situated learning suggests that such a study might be useful.

Discussions of "Real-world" Problem Solving

Tripp's statement that acting on propositions is not problem solving (p. 76) is analogous to the statement that school activity is not situated; however, the dichotomy is false. It is not a question of situated or not situated, but rather *how* it is situated. The same is true of problem solving: it is not a question of whether reasoning about verbal information is problem solving or not, but whether it is a form of problem solving which we as researchers, educators, or individual problem solvers find valuable in some way.

Tripp also makes the interesting claim that "Real-world problem solving comes relatively easy to people" (p. 76). As evidence of this he argues that (1) South American druglords who are caught smuggling do not complain that their school failed to teach them problem solving, and (2) North American settlers who were taught only rote memorization nevertheless figured out how to take land away from the Indians.

Tripp's claim about the ease of "real world" problem solving is an unproductive simplification. However, for those problems that are easily solved, it is productive to seek the reasons for their ease. One factor may be that the structure of the environment and the structure of activity coevolve over protracted periods of adjustment and adaptation (Varela, Thompson, & Rosch, 1991). We create—socially, culturally, and physically—environments that support certain kinds of activities. We then utilize the constraints of the environment in our activities (Greeno, Moore, & Mather, submitted for publication).

Despite the fact that situations often provide rich resources for problem solving, people do encounter problems in their life that are nearly intractable. Tripp's claim about the ease of "real-world" problem solving ignores that these problems can vary tremendously in difficulty. Moreover, his claim obscures the fact that large individual differences exist in inventiveness and adaptiveness to life events.

Tripp's arguments suggest that students would encounter little difficulty if our Jasper problems occurred in three-dimensional reality rather than on videodisc (e.g., if students had to help someone decide how to rescue a real eagle by using a real ultralight). This is an empirical claim that we very much doubt. In any event, to simply state that "real-world" problem solving is easy misses the educational opportunities to exploit the findings of the research on situativity.

Transfer Failures?

Tripp also argues that, with our anchored situations, students learn only to talk about things rather than do things such as solve actual problems. He notes that one of the studies we reported confirms his argument because it showed little evidence of transfer, and he suggests that the literature on case-based instruction probably contains similar failings as well.

As noted in our article, we subscribe to the definition of transfer put forward by Greeno, Smith, and Moore (1993); namely that issues of transfer involve attempts to understand "...how learning to participate in an activity in one situation can influence (positively or negatively) one's ability to participate in another activity in a new situation." In both our work and in the case-based literature (c.f., Williams, 1992), there are clear examples of transfer to new problems that are set in non-school contexts. For example, if you observe (as we have) medical students in the problem-based learning track at institutions such as Southern Illinois University, it is very difficult to doubt that their skills at diagnosing "pretend" patients will transfer to real patients. Similarly, students who worked on estimating dimensions in the context of the anchor "Raiders of the Lost Ark," and students who have solved our Jasper geometry adventures, improved in their abilities to engage in wayfinding and use geometry and geometrically-based tools to make estimates of lengths and distances (e.g., Bransford, Hasselbring, Barron, Kulewicz, Littlefield, & Goin, 1988; Zech, Vye, Bransford, Swink, Mayfield-Stewart, Goldman, & CTGV, in press). In addition, teachers and parents report numerous instances where students ask important questions and solve everyday problems by making reference to their experiences with Jasper (e.g., CTGV, 1992a).

The one example of "transfer failure" that Tripp refers to in our article represents a case in which we tried to cross new methodological boundaries in order to assess spontaneous transfer in a setting where the goals were very different from problem solving. In retrospect, we discovered many reasons why we did not find evidence of spontaneous transfer, including the realization that the task we gave the students was probably not one in which we should have expected ubiquitous positive transfer effects of having solved other Jasper adventures (CTGV, in press). To argue from this one example that learning from video anchors does not transfer seems unwise and flies in the face of other evidence we have collected.

Summary and Future Work

We attempted to approach Tripp's analysis of our work from the perspective of Bohm's suggestion to use criticism as an opportunity to explore the assumptive nature of our own thinking. Because Tripp used the concept of situativity in contradictory ways, we were prompted to rearticulate some of our understanding of situativity. Our analysis is quite different from Tripp's position that only non-school activities are situated, and that the only situated method of learning involves observing models and "stealing moves."

Tripp's comments show two preferences: (1) for doing over knowing (including performance skill over "knowledge about," artifact over theory, and engineering solutions over general principles of science); and (2) for non-school over school activities (including master performers over teachers, and "real-world" solutions over critical thinking about alternatives). We emphasize the use of knowledge and the evolution of theory by combining research with implementation. We do not see non-school and school activities as a dichotomy. In any event, we would not claim that non-school activities guarantee better learning. For example, in aircrew training, simulations allow rehearsal of procedures for high-risk situations. Simulations can also expand and contract space and time, and permit control over "real-world" complexity that can hinder learning.

Our best assessment of the implications of Tripp's analysis for our future work is that we have the option to go in two directions: (1) Keep doing what we are doing but change how we talk about it (i.e., stop talking about it as situated learning and as teaching problem solving); (2) Continue to think about our work from the perspective of situativity.

We believe that the latter option is the most fruitful because it allows us to connect our work to a theoretical perspective that seems to have valuable implications for educational theory and practice. For example, as we discussed in the article that Tripp reviewed, the situated cognition perspective has led us to a more explicit emphasis on the social structures within which our materials and instructional activities are embedded. Our emphasis on the importance of creating learning communities that break the isolation of individual learners and classrooms represents the clearest example of this point of view (see also CTGV, in press). For example, students have presented business plans to community leaders, communicated with experts via two-way video conferencing, and sponsored school fairs modelled after one of the Jasper episodes.

In addition, our experiences have also taught us that the materials that we use as anchors play a valuable role in promoting learning communities. By becoming the focus of authentic community discussion, inquiry and debate, the anchors help create a cognitive/social environment that is exciting for students and helps them participate as both experts and learners in activities that occur within and outside of school. □

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