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Philosophy and Pedagogy Statement: Cognitive Constructivism and the Influence of Motivation and Context

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Human learning is a complex phenomenon that cannot yet be fully explained by any one theory. Regardless, individuals naturally want to build personal theories of cognition and learning that adequately explain things for them (Jonassen, 2003). My personal philosophy conceives learners as knowledge constructors. I believe that learners, as cognitively active participants, always come to new situations with preexisting knowledge structures into which new experiences must be organized and integrated. What is more, I believe individuals approach everyday tasks with certain goals, purposes, and intentions that ultimately guide their actions. These personal motives are inextricably linked to the learning environment and, as such, should be considered an integral part of an individual's cognitive functioning.

The purpose of this paper is to provide a brief description of my personal philosophy of thinking and learning. To meet this objective, I offer a brief overview of my ideas regarding the nature of cognition. Using these ideas as a foundation, I then provide a short description of how my theoretical assumptions can be applied to educational practice. Finally, I end the paper with a look into the future of education, including a short explanation of how my personal philosophy might help educators and researchers understand and overcome the challenges that lay ahead.

Learning as Knowledge Construction

Although I am interested primarily in adult learners, I have directly observed the learning process in action through my three young children. Each day my kids seem to live this idea that learning is a dynamic, deliberate process. Young children are amazing examples of learning because on a daily basis their understanding of the world grows immensely. Like mature adults, young children learn best when given the opportunity to interact with their environment. Children do not sit back and passively listen to someone else's description of "the way things are"; instead, children engage their surroundings and learn for themselves. However young, children do have prior knowledge, and if you watch carefully, you can observe them absorbing new information; comparing, contrasting, and linking that information to their existing understanding of the world; and modifying those beliefs, as necessary, to achieve their goals.

My basic philosophy of learning, as described above, is based on the tenets of what some have come to call *cognitive constructivism* (see, for example, Derry, 1996; Mayer, 1996). Cognitive

constructivism is a progressive interpretation of the classic information-processing model that dominated much of American psychology in the second half of the twentieth century. According to this interpretation, "mental processing involves an active search for understanding in which incoming experience is reorganized and integrated with existing knowledge" (Mayer, 1996, p. 156). Stated another way, meaningful learning occurs when individuals are able to select relevant incoming experiences, organize them into understandable mental representations, and modify and elaborate their existing knowledge structures to accommodate new ideas (Derry, 1996). This process of knowledge construction occurs as a natural part of human existence. As Jonassen (2003) noted, "whenever humans encounter something they do not know but need to understand, their natural inclination is to attempt to reconcile it with what they already know in order to determine what it means" (p. 7). It follows, then, that teaching is less about transferring information to learners and more about providing learners with opportunities to construct their own understanding.

This constructivist view of information processing is noticeably different than the more literal view that is usually associated with the computer metaphor. In this traditional conceptualization the human mind is a processor of information, cognition involves the manipulation of that information, and learning is the acquisition and storage of information (Newell & Simon, 1972). Like a computer, then, humans "take information as input, apply one or more mental operators to that information, and produce information as output" (Mayer, 1996, p. 154). The instructional implication of this traditional view of information processing – in contrast to cognitive constructivism – is that learning becomes the transmission of information from the teacher to the learner.

Theoretical Foundations of Cognitive Constructivism

In many respects, the theoretical underpinnings of cognitive constructivism stem from the work of Jean Piaget (1977). Piaget believed that knowledge acquisition is a process of continuous self-construction (Rotman, 1977). In this view, knowledge is not "out there" to be transmitted to a child, but instead is invented and reinvented as the child develops and interacts with the world around her. For Piaget, learning was an active, deliberate process. Children do not interact with the world randomly;

instead, children are goal-directed and spend much of their time attempting to fit new experiences into existing cognitive structures (Gruber & Voneche, 1995). Piaget (1977) hypothesized that these cognitive structures, or schemes, are modified through two fundamental, adaptive processes: assimilation and accommodation. In the words of Piaget (1977), assimilation involves the "incorporation of an outside element (object, event, and so forth) into the subject's sensorimotor or conceptual scheme" (p. 6). As such, assimilation represents the most commonly used cognitive process. Accommodation, on the other hand, refers to *changing* the cognitive structures to account for and make sense of new experiences that do not fit into existing schemes (Piaget, 1977). Accommodation, then, is a more difficult and significant event that does not happen regularly (Driscoll, 2005). Thus, in this Piagetian view of cognition, learning is a continuous process of modifying and adapting schemes to account for environmental changes.

The Role of Motivation and Context

Unlike machines, people are purposeful beings who enter into everyday situations with certain goals, purposes, and intentions that ultimately guide their actions (Dai & Sternberg, 2004; Pintrich, 1999; Pintrich, 2000; Pintrich & Schunk, 2002). And while some believe the computer metaphor provides a useful approximation of how the mind works, human thinking is much more fuzzy and flexible; subject to emotions and motivations that may serve multiple purposes at any given time (Dai & Sternberg, 2004). For me, then, human cognition, and thus, human learning, is inextricably linked to peoples' emotions and motives, which are, in turn, shaped by the constraints and affordances of the environment.

In many classic models of cognition, motivation is not a theoretically interesting or important construct (Dweck, Mangels, & Good, 2004). In fact, some psychologists make the assumption that human thinking – and more specifically, *academic* thinking – is a purely cognitive activity, relatively free from emotion or motivation (see discussion of isolated and cold cognition in Brown, Bransford, Ferrara, & Campione, 1983). Some even argue that motivational constructs are, at best, peripheral and, at worst, epiphenomenal (see critique of cognitivism in Johnson & Erneling, 1997). The result of these cognition-only models of human thinking is, "an account of thinking as fully disembodied, objective, mechanical, rational, and cold" (Dai & Sternberg, 2004, p. 5). Described by some as *cold cognition* models (Pintrich,

2003; Pintrich, Marx, & Boyle, 1993), these theoretical perspectives fail to account for students who seem to have the requisite prior knowledge but fail to activate this knowledge when necessary.

In direct contrast to this cognition-only view, I subscribe to what Dai and Sternberg (2004) have called an *integrative approach* to understanding how people function. Such an emphasis on the whole person in real situations puts perception and thinking back in the context of humans adapting to and interacting with their environments (Mayer, 1996). Pintrich et al. (1993) made the case for just such an integrative approach to cognition when they declared, "models that focus only on cognition tend to avoid including constructs such as an individual's goals, intentions, purposes, expectations, and needs" (p. 168). The authors went on to explain that while the cognition-only approach may be useful for investigating the general cognitive processes of compliant subjects in experimental settings, the model loses some of its applicability when applied to students' actual cognitive engagement in school tasks, let alone non-school-related tasks. In everyday educational practice, then, it becomes extremely important for teachers to consider students' goals and purposes, as well as how classroom contexts influence these personal motives, because these interacting components will undoubtedly influence students' choice of task, level of engagement, and willingness to persist over the long term (Perry, Turner, & Meyer, 2006).

The idea that effective functioning requires more than just cold cognition is reflected in Bandura's (1986) social cognitive theory. Bandura (1986) hypothesized a reciprocal relationship between the learner, the learner's behavior, and the environment – a relationship that he has coined *triadic reciprocal causation*. In this interactive view of human functioning, "internal personal factors in the form of cognitive, affective, and biological events; behavior; and environmental events all operate as interacting determinants that influence one another bi-directionally" (Bandura, 1997, p. 6). Like Bandura, I believe that when thinking occurs in the context of a social system, learning becomes about more than just cognitive factors; it becomes an interactive phenomenon, the product of a dynamic interchange between personal, behavioral, and environmental influences (Pajares, 2002).

In summary, I believe a complete model of human cognition and learning must include an account of how personal motives and contextual features of the environment affect an individual's ability

to learn. Simply put, individuals must have both the "skill" and the "will" to achieve meaningful learning; two requirements inextricably linked to the constraints and affordances of the environment (Bandura, 1997; Pajares, 1996; Pintrich & De Groot, 1990; Pintrich et al., 1993). For me, theories of cognition that fail to include motivation and context as important constructs do not yield a full and valid picture of how individuals think and learn in "real, culturally significant situations" (Neisser, 1976, p. 2).

From Cognitive Theory to Instructional Practice

Using cognitive constructivism as a framework, I propose the following three instructional practices as exemplary applications of my personal philosophy of thinking and learning:

(1) *Activate prior knowledge*. Students' knowledge representations, or as Piaget (1977) might have said, their schemes, develop throughout a lifetime as learners observe similarities and differences across diverse events (Bransford, Brown, & Cocking, 2000). Consequently, students' ability to learn new material is based, in large part, on their previous knowledge, which they bring to any new learning situation. This prior knowledge can either help or hinder a student's ability to learn unfamiliar material. With this in mind, teachers can build on the foundation of students' *relevant* prior knowledge by helping them activate this knowledge during learning activities (Gagne, Wager, Golas, & Keller, 2005).

Specific strategies for activating students' prior knowledge *before* teaching new material include (a) review concepts that have already been covered and ask students to recall previously learned material (Gagne et al., 2005) and (b) present advance organizers to help bridge the gap between students' prior knowledge and general features of the to-be-learned material (Mayer, 1979). Additionally, teachers can use strategies *during* instruction to help learners' activate relevant prior knowledge. These strategies include (a) use concept mapping activities to help make visible students' current understanding (American Psychological Association, 1997) and (b) provide students with opportunities to test and reconcile tacit beliefs with formal concepts (Land & Hannafin, 2000).

(2) *Promote transfer by extending material learned in a specific context*. Learning is said to transfer when individuals can extend what they have learned in one context to solve new problems encountered in other situations (Mayer, 2002). As such, developing learning activities that promote

transfer has become an important objective for many educators. Research results have revealed that transfer is affected by the context of original learning (Bransford et al., 2000). When individuals learn material in one context, it is often difficult for them to apply that knowledge elsewhere. Alternatively, material that is learned only at the abstract level can be difficult for learners to apply to real problems. Ultimately, the transfer research suggests that, "the most effective transfer may come from a balance of specific examples and general principles, not from either one alone" (Bransford et al., 2000, p. 77).

There are a number of strategies that have been developed in the areas of anchored instruction and problem-based learning to facilitate transfer. These strategies include (a) have learners solve a specific problem and then provide them with additional, similar cases to consider (Cognition and Technology Group at Vanderbilt [CTGV], 1997); (b) let students learn in a specific context and then ask them to *reflect* on their learning and consider what would happen if different aspects of the problem were changed (CTGV, 1997; Hmelo-Silver, 2004); and (c) ask students to create a solution that applies not only to one problem, but to an entire class of related problems (Bransford et al., 2000). Altogether, these methods are designed to help students develop more flexible knowledge structures that can be applied across multiple contexts.

(3) *Guide and encourage students to set challenging, proximal goals.* Goal setting has been shown to improve student effort and persistence (Pintrich & Schunk, 2002). When students set *realistic* goals, they are more motivated to perform than students who are given no goals or who are simply told to try their best (Locke & Latham, 1990). According to Bandura (1997), students who set a goal are likely to experience an initial sense of self-efficacy, or confidence, in their ability to achieve the goal and also are apt to make a commitment to attempt it. As students progress, "they engage in activities that they believe will lead to goal attainment: attend to instruction, rehearse information to be remembered, expend effort, and persist" (Schunk, 1991, p. 213).

Goals should be challenging but not outside the range of students' capabilities. Difficult but achievable goals give students the chance to put forth effort and obtain feedback as they make progress toward goal completion. Goals that are too far beyond students' skill level will likely lead to frustration

and may actually degrade their self-efficacy (Pintrich & Schunk, 2002). Moreover, research has shown that proximal goals tend to provide better information for students than do distant goals, because students can judge progress toward goal achievement more easily with the former than the latter (Schunk, 1991).

Peering Into the Future

In his 2005 national bestseller, "The World is Flat," Thomas Friedman discussed what he called the flattening of the global playing field, referring to the shrinking world and the idea that more people than ever have the opportunity to collaborate and compete in the global marketplace. According to Friedman (2005), "in a flat world so many of the inputs and tools of collaboration are becoming commodities available to everyone. They are all out there for anyone to grasp" (p. 443). If one accepts Friedman's fundamental thesis, then an important question for educators is – How can we help students succeed in this flat world? I believe that an integrative approach to understanding human performance, one that focuses on the interactions between cognition and motivation, as well as how these constructs are influenced by authentic learning situations, provides a useful lens through which to view this question.

Vanishing are the days when youth with limited schooling are able to obtain well-paying industrial jobs requiring minimal cognitive skills (Drucker, 2002; Reigeluth, 1999). Instead, these options are being replaced by emerging opportunities that require "communication and thinking skills to fulfill the more complex occupational roles and to manage the intricate demands of contemporary life" (Bandura, 1997, p. 212). Moreover, the information age is transforming educational systems from within, as Internet access to virtually unlimited resources creates extensive learning opportunities that are independent of time and place (New Media Consortium, 2005; Owston, 1997). Thus, it is fair to say that much learning, particularly lifelong learning activities that are required of individuals hoping to keep pace with the ever-changing global economy, will occur outside the classroom (Fischer, 2001; Resnick, 2002).

With learning resources becoming more accessible and with the process of learning becoming more individualized and independent, students will have the opportunity to take greater control over their own education (Moore & Kearsley, 2005). Those who succeed will be those who have the ability to regulate their own motivation and learning activities in these highly autonomous situations; that is, those

who have *learned how to learn* (Dabbagh & Kitsantas, 2004; Hartley & Bendixen, 2001; Zimmerman & Schunk, 2004). And so, while the content of most textbooks is perishable, the tools of self-directedness tend to serve individuals well over time, ultimately enhancing their potential for further independent learning (Barr & Tagg, 1995; Pajares, 2004). Therefore, I agree with Bandura (1997) that the primary goal of formal education should be to prepare students with the cognitive skills, self-regulated learning competencies, and positive motivational beliefs needed to educate themselves in an increasingly flat world. For learners in this new world, it is less about what they already know and more about possessing the personal resources necessary to efficiently find, evaluate, and use what they need to know to cultivate skills and lead a fruitful life (Brown, 2000; Leu, in press; Resnick, 2002). In sum, I believe that an integrative approach to understanding how people function in everyday situations, as opposed to a cognition-only view, will ultimately lead to a more educationally relevant psychology (Mayer, 2001; Simon, 1995); namely, a psychology that addresses students' cognition in situ, "embedded in specific functional contexts, directed, tinted or otherwise altered by motivation and emotions, for good or ill" (Dai, 2004, p. 419).

Conclusion

My personal philosophy of thinking and learning conceives learners as knowledge constructors. I believe individuals learn best when given the opportunity to organize and integrate new information and experiences with their existing knowledge structures. By becoming cognitively engaged with their surroundings, learners construct meaningful understanding and ultimately "come to know" the complex world around them. Moreover, I believe individuals enter into everyday situations with certain goals, purposes, and intentions that inevitably guide their thinking and learning activities. These personal motives are inextricably linked to the environment and, accordingly, should be considered an integral part of an individual's cognitive functioning. From my perspective, then, an ecologically valid model of cognition must include motivation and context as essential, interacting determinants of learning as it occurs during natural, purposeful activity (Neisser, 1976).

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