Learning With Technology from a Constructivist Point of View

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Abstract

Technology is becoming an integral part of the educational realm; this article provides an overview of constructivism and its implications for learner's practices inside the classroom. It describes the educational features of constructivism with its basic forms and/or variations. It then elucidates the constructivist view of technology, learning, and the relationship among them. It will provide various definitions of constructivist approaches, and explains the assumption and principles of constructivist pedagogy. Finally, this study presents how constructivism as a learning theory can guide the process of learning in classroom situations.

Key words: Educational Technology, Constructivism Approaches

Introduction

Globalization and rapid changes in technology have created a need for adults to update their skill sets for career advancement and to be prepared to make broad decisions about complex problems using myriad of information (Brown, Green, & Lauder, 2001). Adults are enrolling in higher institutions, in response to the changing demands of the workplace and to concerns coming with the emerging knowledge economy. Today's students have access to a broad range of information, knowledge, ideas, and opinions well beyond their classroom. Never before have learners been able to interact so closely with the instructors, mentors, subject-matter experts, and peers, and yet be so dispersed. And as the possibilities for educational institutions have increased, so have the challenged.

Theoretical Framework

The theoretical foundation used to study the process of subject matter beliefs shaping instruction in educational institutions was synthesized under a constructivist conceptual framework. Robinson, Molenda and Rezabek (2008) explain that "facilitating learning puts the emphasis on the learners and their interests and abilities (or disabilities)" (p.17), with defining their learning problem and controlling their internal mental processes, and teachers supporting this process. This constructivist view and shows teachers and learners as collaborations in the learning process and implies the need for student motivation (Bobinson et al, 2008).

Constructivism values social interaction in the learning process, promoted by Vygotsky with the assumption "that knowledge is constructed by learners as they attempt to make sense of their experiences" (Driscoll, as cited in Robinson et al., 2008, p.33). Constructivism differs from cognitivism essentially in the subject nature of this knowledge (von Glaserfeld, as cited in Robinson et al.,). Driscoll highlighted these essential constructivist elements: learning in relevant environments, social negotiation opportunities (collaboration), the need for multiple perspectives/representations, encouragement of ownership of learning and self-awareness (reflection). Practices include scaffolding, modeling and mentoring (Dennen, as cited in Robinson et al.,). The relevance of cognitivism is that highlights message design issues such as structuring knowledge and emphasizing key points with advanced organizers, chunking, and helpful visuals (Silber &Foshay, as cited in Robinson et al.,). Also, linking new knowledge to prior knowledge and assimilating and strengthening retention and transfer of this new knowledge are recommended by Foshay, Silber and Stelnecki(as cited in Robinson et al.,).

Molenda and Robinson (2008) explain "educational technology's distinctive ethical concerns focus on the processes of creating instructional materials and learning environments and on relations with learners during the use of those materials and environments"(p.245). They continue that critical theory highlights the need for sensitivity to power relationships in learning environments and that learners need to share this power; behaviorist learning theory shifted the focus from the group to the individual and cognitive and constructivist approaches also emphasize that the learner is unique. Facilitating learning is about the intended audience: students are the "the core of our activities as educational technologists" and truly facilitate learning Robinson et al., (2008) emphasize that "we must acknowledge the diversity of the individual" (p.42).

Ubiquitous computing and social software offer new learning opportunities, and are driving changes in the organization of the education system (Attwell, 2007), which are not only technological, but also social, with the learner at the centre (Ebner, Holzinger& Maurer 2007). For educational institutions they need to support the goal of facilitating learning and by using a systems theory approach educational technology helps organizations improve performance by recognizing and treating key factors (Molenda& Pershing, 20087).

In constructivist learning, students construct their own knowledge and there is a purposeful nature to designing learning activities. A bridge is built between what students already know and what they are expected to learn (Gagnon &Callay 2006:4). Furthermore, educational technology empowers learners, and teachers, through user-centered design (Molenda& Robinson, 2008). The significance of the social software is that it adapts to its environment and facilitates the trend of 'open content', which learners become the producers of their own learning materials (Attwell, 2007). This shift in the learning production process can be with or without the collaboration of the instructor (Molenda& Pershing, 2008) and the Horizon Report (Johnson, Levine, Smith & Stone, 2010) explains that collaborative technologies reflect current trends for collaborative student work and challenge our roles as educators. Collaborative learning can be computer mediated, the latter being the most favored (Robinson et al., 2008).

As technology becomes integrated into the teaching/learning process, the role of the classroom teacher changes noticeably. Classroom teachers become facilitators who assist students in constructing their own understandings and capabilities in carrying out tasks on computer technologies. The shift from lecture and recitation, which often still occurs in secondary classrooms, to coaching automatically supports a constructivist approach to learning; computer encourages the teacher to play the role of a coach (Collins 1991).

Salomon (1998) warns against the danger that technology might redefine the nature of learning environments and the principles of constructivism – the active and thoughtful construction of knowledge – into the active but thoughtless compilation of raw information. It is as if technology might take charge, demanding of constructivist philosophy and of the psychology of learning and instruction to follow suit and to adjust themselves to the technological affordances. In similar vein, Schnotz (2002) speculates that even if the general constraints of the human cognitive system will certainly not change as a result of new technologies, learners could have new attitudes and processing habits.

Feenberg (1991) sees technology as a contested field where individuals and social groups can struggle to influence and change technological design, uses and meanings. In fact, one of his key contributions to theorizing technology is linking philosophically-oriented social theory of technology with theories of democratization. He argues that while technology is considered to be a major contributor or contemporary society, it is often believed that it cannot exist within democracy. Feenberg, however, wants to demonstrate that in fact technology can be part of a process of social democratization and technology itself can function as a means to meet basic human needs. To him, technologies should contribute to helping produce a more democratic and egalitarian society.
More recently, Schmid(2006) explains, a critical theory of technology is considers that each piece of technology is constructed by the interaction between its design and how it is appropriated by its users. Thus, technology use is seen as the result of the interaction of several elements, such as the inherent characteristics of the technology, teacher's pedagogical beliefs and the kind of pedagogical activities that were designed as a result of them, student's own understandings of the potentials of the technology and the negotiations between students and the teacher regarding how the technology should be pedagogically exploited.

These technologies align strongly with the constructivist and social constructivist theories of learning, and therefore will also fit well into classrooms in new ways, so to does our ability as professional educators push the evolution of educational technologies.

Constructivism and the Learning Process

Constructivism is not a single or unified theory; rather, it is characterized by plurality and multiple perspectives. Varied theoretical orientations (Phillips, 1995) explicate such different facets of constructivism as cognitive development, social aspects, and the role of context. There are many definition of constructivism (Fosnot&Dolk, 2001; Gabler& Schroeder, 2003; Henson, 2004; Schwandt, 2003; Shapiro, 2002; von Glaserfeld, 2005), but they all adhere to the following characteristics:

- People of all ages do not discover knowledge; rather they construct it or make it.
- People create knowledge by relating or connecting it to their previous knowledge.
- Learning involves active cognitive activity and cognitive restricting.
- People use personal experiences to create knowledge.
- Cognitive growth is stimulated when people are confronted with practical or personal problems that create cognitive disconnects.

According to Matthews (2000), the educational literature identifies eighteen different forms of constructivism in terms of methodological, radical, didactic, and dialectical consideration, yet many theorists and scholars place all forms of constructivism in three radically distinct categories: (1) sociological, (2) psychological, and (3) radical constructivism. All three categories share the epistemological assumption that knowledge or meaning is not discovered but constructed by the human mind (Richardson, 2003).

Phillips (2000) has defined and explained the attributes of social and psychological constructivism:

> *Social constructionism or social constructivism*: A theory that bodies of knowledge or disciplines that have been built up are "human constructs, and that the form that knowledge has taken in these fields has been determined by such things as politics, ideologies, values, the exertion of power and the preservation of status, religious beliefs, and economic self-interests." This approach centers on the ways in which power, the economy, [and] political and social factors affect the ways in which groups of people form understandings and formal knowledge about their world. These bodies of knowledge are not considered to be objective representations of the external world.
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> *Psychological constructivism*: This approach relates to a developmental or learning theory that suggests that individual learners actively construct the meaning around phenomena, and that these constructions are idiosyncratic, depending in part on the learners' background knowledge. The development of meaning may take place within a social group that affords its individual members the opportunity to share and provide warrant for these meanings. If the individuals within the group come to an agreement about the nature and warrant of a description of a phenomenon or its relationship to others, these meanings become formal knowledge. (p.6)
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> *Radical constructivism*: Introduced by von Glaserfeld, assumes that external reality cannot be known and that the knowing subject constructs all knowledge, ranging from everyday observations to scientific knowledge; thus inevitably reflects the perspective of the observer (Molebash, 2002; Terhart, 2003). According to radical constructivists, it is impossible to judge knowledge as an ontological or metaphysical reality (Terhart. 2003). Knowing without metaphysics is possible; meaning exist in the realm of the experiential world and not ontologically, a view called "postepistemology" (Glaserfeld, 1995).
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> Gergen (1995) provides an explanation of radical constructivism by using esoteric terms borrowed from Moshman's (1982) classification of perspectives on constructivism as endogenous, exogenous, and dialectical. The first view emphasizes that individual's knowledge construction based on previous knowledge and experiences; the second, the role of environment or social context in knowledge construction; and the third, the relationship of various types of dynamic interactions between the individual and the environment.
> Gergen (1995) distinguishes between two categories of knowledge: *exogenic* (or word centered) and *endogenic* (or mind centered). The exoginic tradition generally embraces a dualism: the existence of an external world (typically a material reality) is set against the existence of a psychological world (cognitive, subjective, symbolic, or phenomenological). Knowledge is achieved when the inner states of the individual reflect or accurately represent the existing states of the external world or when the mind serves as a "mirror of nature." The exogenic theorist views the external world or material world as a given.

> The endogenic thinker, however, is likely to view the mental world as self-evident. In contrast to the exogenic theorist's concentration on the environment, the endogenic theorist often emphasizes human beings' intrinsic capacities for reason, logic, and conceptual processing. Radical constructivism's endoginic view knowledge emphasizes the mental processes of individuals and the ways in which they construct knowledge of the world from within. This perspective does not see knowledge as a reflection of the world as it is (p.18).

Constructivist theory is descriptive rather than prescriptive; it does not prescribe rigid rules or procedures for designing a learning environment (Wasson, 1996). Because the constructivist view of learning evolved from cognitivism, it shares several similarities with cognitive learning theories. What distinguishes constructivism from cognitivism is the notion that "knowledge does not and cannot have the purpose of producing an independent reality, but instead … has an adaptive function" (Glasersfeld, 1995).

The basic assumptions and principles of the constructivist view of learning can be summarized as follows:

- Learning is an active process;
- Learning is an adaptive activity;
- Learning is situated in the context in which it occurs;
- Knowledge is not innate, passively absorbed, or invented but constructed by the learner;
- All knowledge is personal and idiosyncratic;
- All knowledge is socially constructed;
- Learning is essentially a process of making sense of the world;
- Experience and prior understanding play a role in learning;
- Social interaction plays a role in learning;
- Effective learning requires meaningful, open-ended, challenging problems for the learner to solve. (Boethel&Dimock 2000; Fox 2001).

Fosnot (1996) suggests that several general principles of the constructivist view of learning can be applied to educational practice:

- *Learning is not a result of development; learning is development.* it requires invention and self-organization on the learner's part. Teachers should thus allow learners to raise their own questions, generate their own hypotheses and models as possibilities, and set them for viability.
- *Disequilibrium facilities learning.* "Errors" should be perceived as a result of learners' conceptions and therefore not minimized or avoided. Challenging, open-ended investigations in realistic, meaningful context will allow learners to explore and generate many possibilities, whether affirming or contradictory. Contradictions, in particular, need to be illuminated, explored, and discussed.
- *Reflective abstraction is the driving force of learning*. As meaning-makers, human seek to organize and generalize across experiences in representational form. Reflection through journals, representation in multisymbolic form, or connections made across experiences or strategies may facilitate reflective abstraction.
- *Dialogue with a community engenders further thinking.* The classroom should be a "community of discourse engaged in activity, reflection, and conversation." Learners (rather than teachers) are responsible for defending, proving, justifying, and communicating their ideas to the classroom community. Ideas are accepted as truth only as they make sense of the community and thus rise to the level of "taken-as-shared."
- *Learning proceeds toward developing structures.* As learner struggle to make meanings, they undertake progressive structural shifts in perspectives- in a sense, "big ideas." These learner-constructed, central-organizing ideas can be generalized across experience, and they often require undoing or recognizing earlier conceptions. This process continues throughout development. (Pp.29-30).

Constructivism and Its Implications for Educational Technology

Richardson (2003) identifies several principles as the premises of the constructivist pedagogy. These principles suggest that the teacher first recognize and respect students' backgrounds beliefs, assumptions, and prior knowledge; provide abundant opportunities for group dialogue aimed at fostering shared understanding of the topic under study; establish a learning environment that encourages students to examine, change, and even challenge their existing beliefs and understandings through meaningful, stimulating, interesting, and relevant instructional tasks; help students develop meta-awareness of their own understandings and learning process; and introduce the formal domain of knowledge or subject matter into the conversation through a sort of loosely structured instruction and the use of technological tools as Web sites.

Other educators have also attempted to elaborate on the characteristics of constructivist teaching and learning. Brooks and Brooks (1993) describe both the pillars of constructivist pedagogy and the characteristics of constructivist teaching practices in *In Search of Understanding: The Case for Constructivist Classrooms,* which remains one of the most-cited books on the constructivist approach to teaching. The authors enumerate five pillars on which constructivist classrooms are based:

1) Posing problems of emerging relevance to learners;
2) Structuring learning around primary concepts;
3) Seeking and valuing students' points of view;
4) Adapting curricula to address students' suppositions; and
5) Assessing student learning in context of teaching.

Translating these principles into instructional practices, these authors argue that teachers in constructively planned and conducted classroom environment should have students engage in raw data or primary sources, aiming to develop students' cognitive and higher-order thinking skills. Taking into account students' concepts, misconceptions, modes of thinking, and responses, these teachers accordingly shift their teaching methods or content when needed.

Conclusions

Positive attitudes and beliefs are the foundation for successful inclusion; constructivist theories are of great value to teachers in their efforts to help students grasp the substantive and syntactic components of the subjects they are teaching. This article has explained constructivism in terms of its epistemological, philosophical, and theoretical underpinnings, and its implications for educational technological practices. Educational technologists need to ensure that these meaningful and relevant practices are accessible and used to promote learning about critical literacy and identity, which are so important for contribute, reshape, and enrich the educational experience. One of the distinct advantages a constructivist learning environment utilizes experience, collaborative discourse, and reflection which, together assist the learner to confront his/her own learning needs (Brooks & Brooks, 1999).

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