Constructivism, Instructional Design, and Technology: Implications for Transforming Distance Learning

Maureen Tam
Acting Director
Teaching and Learning Centre
Lingnan University, Tuen Mun
Hong Kong, China
Tel: +852-26167577
Fax: +852-25725706
mtam@ln.edu.hk

ABSTRACT
This paper examines the characteristics and value of designed instruction grounded in the constructivist theory. It also attempts to connect the theory to the prevailing technology paradigms to establish an alignment between pedagogical and technological considerations in support of the assumptions arising from constructivism. Distance learning provides a unique context in which to infuse constructivist principles where learners are expected to function as self-motivated, self-directed, interactive, collaborative participants in their learning experiences by virtue of their physical location. Hence, the aim of this paper is to provide a clear link between the theoretical principles of constructivism, the construction of technology-supported learning environments, and the practice of distance education. The questions driving the argument in this paper include: What do constructivist perspectives offer instructional design and practice? What do computing technologies offer? And what do the two afford in combination? In particular, how do the two combine to transform distance learning from a highly industrialized mass production model to one that emphasizes subjective construction of knowledge and meaning derived from individual experiences.

Keywords
Constructivism, Instructional Design, Technology, Distance Learning.

Introduction
The paper proceeds in five stages. Firstly, it begins with a basic characterization of constructivism, identifying what is believed to be the central principles in learning and understanding. The philosophical assumptions of constructivism are contrasted alongside objectivism, which holds very different views and approaches to learning and knowing.

Secondly, the discussion ensues to identify and elaborate on those instructional principles for the design of a constructivist learning environment. Exemplars of a constructivist learning environment will be identified and used to illustrate the design process that is based on the epistemological frameworks of constructivism.

Thirdly, the role of technology is examined for its support in the construction of constructivist learning environments. If aligned, possibilities and capabilities afforded by technology will help to influence how constructivist beliefs about learning and understanding ultimately become operational in any teaching and learning situation.

Fourthly, a link is established with distance learning. To that end, this part of the paper is intended to illustrate the infusion of constructivist principles and computing technology in distance learning contexts to cause the transformation of the system from a used-to-be industrial model to a post-industrial one, which is found congruent with the constructivist principles and developments in modern technology.

Finally, constructivism is critically appraised to identify some of its problems and limitations imposed on teaching and learning. The debate among theoreticians, researchers, and practitioners is essential to clarifying foundations and assumptions, and promoting understanding of the merits of different perspectives and methods. There is not a single way to conceptualize learning systems. The challenge is to understand and evaluate the worth of different perspectives and methods to guide the design of effective instruction for learners.
What is constructivism?

Constructivism is a fundamental departure in thought about the nature of knowing, hence of learning and thus of teaching. To facilitate understanding of the constructivist view and its implications, it is compared to a familiar mental model of learning held by many: the objectivist epistemology. Guiding the discussions on constructivism and its implications for teaching and learning are four main questions:

1. What is learning?
2. What is the learning process?
3. What is the teacher’s primary role in the learning process?
4. What can the teacher do to carry out that role?

1. What is learning?

The constructivist perspective describes learning as a change in meaning constructed from experience (Newby et al., 1996). Constructivists believe that ‘knowledge and truth are constructed by people and do not exist outside the human mind’ (Duffy and Jonassen, 1991:9). This is radically different from what objectivism conceives learning to be. To the objectivists, ‘knowledge and truth exist outside the mind of the individual and are therefore objective’ (Runes, 1962: 217). ‘Learners are told about the world and are expected to replicate its content and structure in their thinking’ (Jonassen, 1991:6). The role of education in the objectivist view is therefore to help students learn about the real world. It is asserted that there is a particular body of knowledge that needs to be transmitted to a learner. Learning is thus viewed as the acquisition and accumulation of a finite set of skills and facts.

Contrary to these notions about learning and knowing is the constructivist’s view of learning being ‘personal’ and not purely ‘objective’ (Bodner, 1986). Von Glaserfeld (1984) has written

…… learners construct understanding. They do not simply mirror and reflect what they are told or what they read. Learners look for meaning and will try to find regularity and order in the events of the world even in the absence of full or complete information.

Constructivism emphasizes the construction of knowledge while objectivism concerns mainly with the object of knowing. It is the fundamental difference about knowledge and learning that departs the two in terms of both philosophy and implications for the design of instruction.

2. What is the learning process?

Central to the tenet of constructivism is that learning is an active process. Information may be imposed, but understanding cannot be, for it must come from within. In her Educational Psychology textbook, Woolfolk (1993:485) describes the constructivist view of the learning process as follows:

…… The key idea is that students actively construct their own knowledge; the mind of the student mediates input from the outside world to determine what the student will learn. Learning is active mental work, not passive reception of teaching.

During the process of learning, learners may conceive of the external reality somewhat differently, based on their unique set of experiences with the world and their beliefs about them (Jonassen, 1991). However, learners may discuss their understandings with others and thus develop shared understandings (Cognition and Technology Group, 1991). While different learners may arrive at different answers, it is not a matter of ‘anything goes’ (Spiro et al., 1991). Learners must be able to justify their position to establish its viability (Cognition and Technology Group, 1991).

While the important point is that the learner is central to the learning process, as epitomized by the Piagetian individualistic approach to constructivism, it is the collaboration among learners that makes constructivism not an example of solipsism (Jonassen, 1991). Rather, it encourages the construction of a social context in which collaboration creates a sense of community, and that teachers and students are active participants in the learning process.
In a learning environment, there is always some stimulus or goal for learning. In Dewey’s terms, it is the ‘problematic’ that leads to and is the organizer for learning (Dewey, 1938). Savery and Duffy (1995) prefer to talk about the learner’s ‘puzzlement’ as being the stimulus and organizer for learning. The important point here is that it is the problematic situation or context that is central to the learning process in constructivism.

Hence, according to the constructivist perspective, learning is determined by the complex interplay among learners’ existing knowledge, the social context, and the problem to be solved. Instruction, then refers to providing learners with a collaborative situation in which they have both the means and the opportunity to construct ‘new and situationally-specific understandings by assembling prior knowledge from diverse sources’ (Ertmer and Newby, 1993:63). Various authors have described the characteristics of constructivist instruction (e.g. Brooks and Brooks, 1993; Cognition and Technology Group, 1993; Collins, Brown, and Holum 1991; Honebein, Duffy, & Fishman, 1993). Two characteristics seem to be central to these constructivist descriptions of the learning process:

a. ‘Good’ problems
Constructivist instruction asks learners to use their knowledge to solve problems that are meaningful and realistically complex. The problems provide the context for the learners to apply their knowledge and to take ownership of their learning. Good problems are required to stimulate the exploration and reflection necessary for knowledge construction. According to Brooks and Brooks (1993), a good problem is one that

- requires students to make and test a prediction
- can be solved with inexpensive equipment
- is realistically complex
- benefits from group effort
- is seen as relevant and interesting by students.

b. Collaboration
The constructivist perspective supports that learners learn through interaction with others. Learners work together as peers, applying their combined knowledge to the solution of the problem. The dialogue that results from this combined effort provides learners with the opportunity to test and refine their understanding in an ongoing process.

There is another aspect of collaboration in a constructivist learning environment which involves the role of the teacher.

3. What is the teacher’s primary role in the learning process?

Vygotsky’s theory of social constructivism, as opposed to Piaget’s individualistic approach to constructivism, emphasizes the interaction of learners with others in cognitive development. His theoretical concept of the zone of proximal development embodies his belief that learning is directly related to social development (Rice & Wilson, 1999). ‘The discrepancy between a child’s actual mental age and the level he reaches in solving problems with assistance indicates the zone of his proximal development’ (Vygotsky, 1986: 187). Vygotsky felt good instruction could be provided by determining where each child is in his or her development and building on that child’s experiences.

This is congruent with what most constructivists advocate that instructional intervention should not only match but also accelerate students’ cognitive development. According to Copley (1992), constructivism requires a teacher who acts as a facilitator ‘whose main function is to help students become active participants in their learning and make meaningful connections between prior knowledge, new knowledge, and the processes involved in learning’. Omrod (1995) stated that teachers could encourage students’ development by presenting tasks that ‘they can complete only with assistance — that is, within each student’s zone of proximal development’.

As Chung (1991) described, a constructivist learning environment is characterized by (1) shared knowledge among teachers and students; (2) shared authority and responsibility among teachers and students; (3) the teacher’s new role as guide in instruction; and (4) heterogeneous and small groupings of students.

Resonant with the idea that the teacher is a guide instead of an expert, constructivism instruction has always been likened to an apprenticeship (e.g. Collins et al., 1991; Rogoff, 1990) in which teachers participate with students in the solution of meaningful and realistic problems. Here, the teachers serve as models and guides, showing
students how to reflect on their evolving knowledge and providing direction when the students are having difficulty. Learning is shared and responsibility for the instruction is shared. The amount of guidance provided by the teacher will depend on the knowledge level and experience of the students (Newby et al., 1996).

4. What can the teacher do to carry out that role?
Brooks and Brooks (1993) summarize a large segment of the literature on descriptions of ‘constructivist teachers’. They conceive of a constructivist teacher as someone who will:
- encourage and accept student autonomy and initiative;
- use a wide variety of materials, including raw data, primary sources, and interactive materials and encourage students to use them;
- inquire about students’ understandings of concepts before sharing his/her own understanding of those concepts;
- encourage students to engage in dialogue with the teacher and with one another;
- encourage student inquiry by asking thoughtful, open-ended questions and encourage students to ask questions to each other and seek elaboration of students’ initial responses;
- engage students in experiences that show contradictions to initial understandings and then encourage discussion;
- provide time for students to construct relationships and create metaphors;
- assess students’ understanding through application and performance of open-structured tasks.

Hence, from a constructivist perspective, the primary responsibility of the teacher is to create and maintain a collaborative problem-solving environment, where students are allowed to construct their own knowledge, and the teacher acts as a facilitator and guide.

Constructivism and Instructional Design
The constructivist propositions outlined above suggest a set of instructional principles that can guide the practice of teaching and the design of learning environments. It is important that design practices must do more than merely accommodate the constructivist perspectives, they should also support the creation of powerful learning environments that optimize the value of the underlying epistemological principles.

Bednar et al. (1992) help to put things in perspective by saying:

Instructional design and development must be based upon some theory of learning and/or cognition; effective design is possible only if the developer has developed reflective awareness of the theoretical basis underlying the design.

Lebow (1993) has hit upon a strategy for summarizing the constructivist framework in a way that may help with the interpretation of the instructional strategies. He talks about the shift in values when one takes a constructive perspective. He notes that:

……. Traditional educational technology values of replicability, reliability, communication, and control (Heinich, 1984) contrast sharply with the seven primary constructivist values of collaboration, personal autonomy, generativity, reflectivity, active engagement, personal relevance, and pluralism.

Such incompatibility between the traditional instructional design practice and the constructivist perspective of designing instruction is arising from the epistemological differences of the two contrasting theories of instruction.

In the traditional approach to instructional design, the developer analyzes the conditions which bear on the instructional system (such as content, the learner, and the instructional setting) in preparation for the specification of intended learning outcomes. Procedural ID models ‘describe how to perform a task and are formulated to simplify and explain a series of complex processes’ (Bagdonis & Salisbury, 1994).

Procedural models in the instructional systems design (ISD) field….. attempt to account for all relevant components using a systematic approach to designing instruction, from needs assessment through the development of material, implementation, and evaluation. Each component within the process builds upon the other…….
Traditional ISD models are generally viewed by individuals in the instructional design field as representing a linear process, a plan of separate steps that proceed in a linear sequence.

A typical ISD model is divided into five stages: analysis, design, production/development, implementation, and maintenance/revision. The five stages consist of an integrated set of components that are sequenced so that each component within the process must be completed before continuing to the next (Bagdonis and Salisbury, 1994).

To summarize, the traditional Objective-Rational Instructional Design model has the following eight characteristics (Willis, 1995):
1. The process is sequential and linear
2. Planning is top down and systematic
3. Objectives guide development
4. Experts, who have special knowledge, are critical to ID work
5. Careful sequencing and the teaching of subskills are important
6. The goal is delivery of preselected knowledge
7. Summative evaluation is critical
8. Objective data are critical.

Although the behavioural, objective-rational approach to instructional design is well entrenched in practice and has influenced teaching and learning in many ways, an alternative to this approach has emerged over the last decade. While constructivist approaches have not yet replaced behavioural approaches as the dominant theoretical framework, they have already made a significant impact on how learning should be conceived of and provide wide-ranging implications for instructional design derived from a constructivist view.

The constructivist view is very different from the objectivist approach to instructional design. It summons instructional designers to make a radical shift in their thinking and to develop rich learning environments that help to translate the philosophy of constructivism into actual practice. Reigeluth (1989) argues for a ‘new mindset’ to combine constructivist elements in the instructional design models.

In a recent review of the literature on how instructional designing should respond to constructivism, Lebow (1993) proposes ‘Five Principles toward a New Mindset’ as constructivist values might influence instructional design.

**Principle 1** Maintain a buffer between the learner and the potentially damaging effects of instructional practices by:
- Increasing emphasis on the affective domain of learning
- Making instruction personally relevant to the learner
- Helping learners develop skills, attitudes, and beliefs that support self-regulation of the learning process
- Balancing the tendency to control the learning situation with a desire to promote personal autonomy.

**Principle 2** Provide a context for learning that supports both autonomy and relatedness.

**Principle 3** Embed the reasons for learning into the learning activity itself.

**Principle 4** Support self-regulated learning by promoting skills and attitudes that enable the learner to assume increasing responsibility for the developmental restructuring process.

**Principle 5** Strengthen the learner’s tendency to engage in intentional learning processes, especially by encouraging the strategic exploration of errors.

(Lebow, 1993:5-6)

These principles support many of the views of constructivism that objects and events have no absolute meaning; rather, the individual interprets each and constructs meaning based on individual experience and evolved beliefs. The design task, therefore, is one of providing a rich context within which meaning can be negotiated and ways of understanding can emerge and evolve (Hannafin et al., 1997). Constructivist designers tend to avoid the breaking down of context into component parts as traditional instructional designers do, but are in favour of environments in which knowledge, skills, and complexity exist naturally. Hence, instead of adopting a linear and ‘building-blocks’ approach to instructional design, constructivist designers need to develop procedures for
situations in which the instructional context plays a dominant part, and the instructional goals evolve as learning progresses.

In his comprehensive review of the literature on instructional design models, Willis (1995) offers an alternative model to the traditional Objective-Rational ID model. Willis termed it the Constructivist-Interpretivist Instructional Design Model, which has the following characteristics:

1. The design process is recursive, non-linear, and sometimes chaotic.
2. Planning is organic, developmental, reflective, and collaborative.
3. Objectives emerge from design and development work.
4. General ID experts do not exist.
5. Instruction emphasizes learning in meaningful contexts (the goal is personal understanding within meaningful contexts).
6. Formative evaluation is critical.
7. Subjective data may be the most valuable.

The constructivist design principles, implemented within the framework of the values and procedures outlined in the above ID model, can lead to a variety of learning environments. Examples of these constructivist learning environments include situating cognition in real-world contexts, cognitive flexible learning, collaborative learning, etc.

In order to translate the philosophy of constructivism into actual practice, many instructional designers are working to develop more constructivistic environments and instructional prescriptions. One of the most important of these prescriptions is the provision of instruction in relevant contexts. Situated cognition (Brown, Collins, & Duguid, 1989) suggests that knowledge and the conditions of its use are inextricably linked. Learning occurs most effectively in context, and that context becomes an important part of the knowledge base associated with learning (Jonassen, 1991).

A related approach is anchored instruction (Cognition and Technology Group at Vanderbilt, 1992), which emphasizes embedding skills and knowledge in holistic and realistic contexts. Anchored contexts support complex and ill-structured problems wherein learners generate new knowledge and subproblems as they determine how and when knowledge is used (Hannafin et al., 1997). Apprenticeship models are similarly aligned as they promote scaffolding and coaching of knowledge, heuristics, and strategies, while students carry out authentic tasks (Collins, Brown, and Newman, 1989). Other related approaches include the problem based learning model (Barrows, 1985, 1992) and case-based learning environments in which students are engaged in solving authentic tasks.

Another important strategy is the presentation of multiple perspectives to learners. The constructivist view emphasizes that students should learn to construct multiple perspectives on an issue. They must attempt to see an issue from different vantage points. It is essential that students make the best case possible from each perspective; that is, that they truly try to understand the alternative views (Bednar et al., 1992).

Cognitive flexibility theory is a conceptual model for instruction that facilitates advanced acquisition of knowledge in ill-structured knowledge domains (Jonassen, 1991). Flexibility theory (Spiro et al., 1988) avoids oversimplifying instruction by stressing conceptual interrelatedness, providing multiple representations or perspectives on the content because there is no single schema, and emphasizing case-based instruction that provides multiple perspectives or themes inherent in the cases.

A central strategy for building constructivist learning environments such as situated learning, multiple perspectives and flexible learning is to create a collaborative learning environment. Collaborative learning does not just entail sharing a workload or coming to a consensus. Rather, it is to allow learners to develop, compare, and understand multiple perspectives on an issue. It is the rigorous process of developing and evaluating the arguments that is the goal in collaborative learning (Bednar et al., 1992).

There must be other exemplars of a constructivist learning environment in addition to the few outlined in the previous paragraphs. All of them facilitate constructivist learning and have mirrored important underlying principles of constructivism towards learning and understanding. The task of the instructional designers is to assess and review instructional theories, tools and resources at their disposal, and to consider (if appropriate) how constructivist learning may be facilitated, and how instructional designing should respond to constructivism.
Constructivism and Technology

Instruction today faces two challenges. One challenge comes from the changing perceptions of what learning is all about. The second challenge comes from the new learning opportunities that technology now affords (Salomon, 1991). Constructivism has presented the first challenge of reconceptualizing learning as a constructive process whereby information is turned into knowledge by means of interpretation, by actively relating it to existing bodies of knowledge, by the generative creation of representations, and by processes of purposeful elaboration (e.g. Resnick, 1989).

Presenting the second challenge is the computer. Because of its versatility and accessibility, its use in education may help to shift the foci from knowledge-as-possession to knowledge-as-construction, and from learning as outside-guided to learning as self-guided. It also carries with it a renewed conception of instruction that shifts attention from instruction as the imparting of knowledge to instruction as the guidance of socially-based exploration in intellectually rich settings (Salomon, 1991).

It is no coincidence that these shifts, implied by the computer, happen to be highly congruent with the constructivist principles of learning and teaching. Constructivism and computing technology, separately and often together, have remade substantially the conception of the challenges of learning, and brought about new learning possibilities for almost all teaching and learning situations, including traditional classroom teaching, distance learning and self-learning.

Constructivism provides ideas and principles about learning that have important implications for the construction of technology-supported learning environments. One of these implications is the need to embed learning into authentic and meaningful contexts (e.g. Brown, Collins, & Duguid, 1989; Cognition and Technology Group at Vanderbilt, 1992). Here, students are required to engage actively in authentic problem-tackling or decision-making cases. There are numerous kinds of case-based learning environments. Among the better known forms are cognitive flexibility, hypertexts and anchored instruction (Jonassen et al., 1995). The central tenet of these forms of learning is improvement of students’ understanding and their transfer of information through exposure to the same material, at different times, in rearranged contexts for different purposes (Spiro et al., 1991).

Lancy (1990) reported that computers were effective in developing higher-order thinking skills, including defining problems, judging information, solving the problems, and drawing appropriate conclusions. The computer can serve in the process of information gathering, inquiry, and collaboration, not merely as a vestige of direct instruction with its reliance on integrating technology in the existing curriculum (Rice & Wilson, 1999). Technology tools that aid in case-based learning include various types of simulation and strategy software/CD-Roms, video discs, multimedia/hypermedia, and telecommunications (e-mail and Internet).

These tools present benefits including the ability to obtain relevant information in the form of documents, photographs, transcripts, video and audio clips; the capability of providing virtual experiences that otherwise would not be possible; and the opportunities for students to examine a variety of viewpoints so they can construct their own knowledge of various concepts (Rice & Wilson, 1995).

It is important that computer-supported constructivist environments should not involve the knowledge and intelligence to guide and structure learning processes, but rather should create situations and offer tools that stimilate students to make maximum use of their own cognitive potential (Scardamalia et al., 1989).

Another important implication of constructivism for the construction of technology-supported learning environment is that learning is a personal, as well as a social activity. The penetration of technology into the learning process can have profound consequences for how learning takes place socially. On one side, one can see even more individual learning in a student sitting in front of his or her computer. But on the other hand, the technology allows for much more diversified and socially rich learning contexts; peer tutoring via computer; computer networks, e-mail, telecommunications.

Increased recognition of the potential of computer-mediated communications, computer-supported collaboration work has enabled building the kinds of more supportive, collaborative and social learning environments called for by the constructivist perspective. Recent growth in telecommunications has led to the use of online services, electronic networks, and the World Wide Web, readily accessible to both homes and schools. Telecommunications include e-mail and Internet access. E-mail makes online discussion groups, electronic pen
pals, student-to-student projects, class-to-class projects possible. In addition, the Internet provides many resources, including text, pictures, video, sound, and downloadable software, and is an endless source of activities and information.

Telecommunication technologies easily lend themselves to constructivist principles by providing students with opportunities to communicate with people all over the world, conduct research, discuss issues and work cooperatively. The advent of computer-mediated communication (CMC), has permitted learners, in particular distance learners, to benefit from the shared experience of a group engaged in the same study and the opportunity to measure his or her ideas against those of others in the group. By way of CMC, the teaching and learning styles of both instructors and learners are transformed from information dissemination to critical inquiry and from instructor dominated to collaborative learning.

The potential of telecommunication technology lies in its ability to function as a gateway; a gateway to resources, collaborative learning and individual achievement. While it is true that telecommunication technology is not a necessary component to the development of a constructivist learning environment nor is it sufficient in and of itself to cause the emergence of such learning, it does provide a means which increases the possibility that constructivist learning can, in fact, take place.

Implications for Transforming Distance Education

According to the constructivist views of learning, as individuals bring different background knowledge, experience, and interests to the learning situation, they make unique connections in building their knowledge. Students and teachers both play a role in facilitating and generating knowledge. Students are encouraged to question each other’s understanding and explain their own perspectives. These opportunities help hand over responsibility for knowledge generation to the learners (Maxwell, 1995). Further, constructivism encourages active, rather than passive learning and the use of group-based cooperative learning activities, which can be best mediated through telecommunication technologies.

Such constructivist views of learning correlate nicely with the philosophy of open and distance learning. If learning truly depends on the unique base of experience and knowledge brought to the learning environment by the learner, the learner then certainly should play a role in determining the learning goals, strategies, and methods for building on his or her base of knowledge and understanding. The autonomy called for by open and distance learning advocates is reflected in the constructivist views to encourage active, collaborative and responsible learners.

Distance education provides a unique context in which to infuse constructivist principles. In distance education settings, where learners are not in close physical proximity to the instructors and where technology mediates the learning experience, there is a stronger need for the construction of technology-supported constructivist learning environments wherein students are required to work collaboratively with each other, and to move the teacher from podium to sideline, from leader to coach, from purveyor of knowledge to facilitator of personal meaning making (Romiszowski and de Haas, 1989).

Constructivist principles provide a set of guiding principles to help designers and instructors create learner-centred, technology-supported collaborative environments that support reflective and experiential processes. When applied to the distance learning context, there is no doubt that constructivism and the use of new technologies will help transform significantly the way distance education should be conducted.

To transform distance education, Jonasson et al. (1995) suggest using ‘constructivist tools and learning environment that foster personal meaning-making and discourse among communities of learners (socially negotiating meaning) rather than by instructional interventions that control the sequence and content of instruction that seek to map a particular model of thinking onto the learners’.

If developers of distance education want to apply constructivist principles to their instructional environments, they need to implement fundamental structural changes. First, distance education should change from being a highly industrialized orientation to a post-industrial one which emphasizes learner’s self determination, self-direction and self-control (Peters, 1993). Under the industrial model, distance instruction is perceived as a typical product of industrial society. ‘It pre-supposes that instruction can be planned, evaluated and improved considerably in the same way as the production of goods can be planned, evaluated and planned’ (ibid: 237). It also ignores the role of the learners, their wish, needs and motivations, in the design process.
In the post-industrial perspective, the role of learners has become a more prominent one. It is no longer sufficient to provide distance learners with pre-packaged self-instructional materials where there is very little opportunity for student choice and interaction. Instead, instructional designers and academics should allow distance learners to be more reflective, to give personal views on topics, to debate and argue their points of view, to question information given by the instructor and textbooks, based on personal observations and knowledge acquired elsewhere.

Second, distance education should exploit further the potentials and capabilities of information technologies to foster two-way, interactive communication and collaboration between the instructor and learners and among the learners themselves. Jonassen et al. (1995) believe that a constructivist approach to knowledge construction and learning can be well supported in distance education settings through a variety of technologies. Technology-supported environments — computer-mediated communication, computer-supported collaborative work, case-based learning environments, and computer-based cognitive tools, for example — can offer the field of distance education alternative approaches to facilitating learning. These constructivist environments and tools can replace the deterministic teacher-controlled model of distance instruction with contextualized work environments, thinking tools, and conversation media that support the knowledge constructions process in different settings.

Conclusion

Like other instructional theories, constructivism cannot be the panacea for all instructional problems. It has its own limitations and problems for learning situations that may mitigate against its application. Yet constructivism holds important lessons for how to interpret the results of learning and for how to design environments to support learning.

While a constructivist perspective makes perfect sense from a theoretical position, the notion of there not being ‘right’ or ‘wrong’ answers can easily strike fear in the heart of an educator responsible for demonstrating that his or her students are achieving ‘world class standards’, have attained specific performance based outcomes, or mastered activities prescribed by national education goal (Wagner & McCombs, 1995).

The absence of specific learning objectives and outcomes has earned the criticism for constructivism as ‘inefficient and ineffective’ (Dick, 1992). Furthermore, its lack of concern for the entry behaviours of students is being criticized for ignoring the gap between what a student must know or be able to do before beginning instruction.

Assessment may be a problem in a constructivist learning environment. Constructivists are concerned about context - but more for instruction than individual assessment. They have been accused of showing no concern for efficiency, and little apparent concern for certifying the competency level of individual students (Dick, 1992).

Constructivist instructional approaches in general are being criticized mainly for three things: (1) They are costly to develop (because of the lack of efficiency); (2) they require technology to implement; and (3) they are very difficult to evaluate (ibid). However, these allegations can be rectified by practitioners who are creative and innovative enough to introduce ways of measuring student learning and assessing individual progress. Constructivism can provide unique and exciting learning environments, it is the challenge for practitioners to engage the learners in authentic and meaningful tasks, and to evaluate learning using assessment methods that reflect the constructionist methods embedded in the learning environments.

Where the introduction of computers in constructivist learning involves providing students with greater autonomy as learners, this commonly conflicts with students’ past educational experiences and can require a shift in their conception of what learning involves and what constitutes appropriate roles of students and teachers. Student resistance to the inevitable stress of such change is to be expected, irrespective of the potential learning benefits of introducing the technology (Akerlind & Trevin, 1995).

Despite these criticisms, constructivism does present an alternative view of learning other than the objectivistic conception of learning, and provides a set of design principles and strategies to create learning environments wherein learners are engaged in negotiating meaning and in socially constructing reality. However, it is not suggested here that all designers should adopt constructivism as the only solution to all instructional problems. Rather they should reflect upon and articulate their conceptions of knowing and learning and adapt their methodology accordingly. The challenge for the design community is to understand and evaluate the different
perspectives, methods and assumptions appropriate to fundamentally different contexts. The possibility of different conditions for different outcomes is completely consistent with the long-standing notion in instructional design that different types of outcomes require different instructional conditions (Gagne, 1965; Reigeluth & Curtis, 1987).

References

- Akerlind, G. & Trevitt, C. (1995). Enhancing learning through technology: when students resist the change. ASCILITE 95 - Learning with Technology, 3-7 December, Melbourne, Australia.


