Techno LEARN: An International Journal of Educational Technology

Techno LEARN: 3 (1): 57-65. June, 2013

Education Technology — A Blend of Product and Idea Technology

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Paper no: 61 **Received:** 9 Feb 2013 **Revised and Accepted:** 20 May 2013

Abstract

Teaching-learning is a challenging job. The study comprises a flashback of educational technology in the light of present educational system. The two known types of educational technology – Idea and Product technology plays an integral part in teaching and learning. Both complement each other in keeping pace with the education system. The use of idea and product technology involves two trends in teaching-learning system – traditional and contemporary roles. The traditional system emphasizes the use of product technology. On the other hand, the present system throws light on idea technology. It has been seen that a combination of idea and product technology ensures a desirable feedback in students' learning. As a result the entire teaching-learning system reflects the transformation of one's learning philosophy from behavioral to cognitive. The introduction of contemporary principles adds to the conversion of instruction into construction in the teaching learning process.

Keywords: Education technology, idea technology

Introduction

Teaching-learning is a demanding job. Most people outside education probably think teachers spend most of their time teaching, but teachers are responsible for many tasks that have little to do with classroom instruction. Beyond planning and implementing instruction, teachers are also expected to be managers, psychologists, counselors, and custodian and community ambassadors, not to mention entertainers.

Most teachers enter the profession expecting to spark the joy of learning in their students but unfortunately the other demands of the classroom are very distracting and consuming. We envision educational technology as a teachers' liberator to help re-establish the role and value of the individual classroom teacher. In order to bring about this , first the perspective of the classroom must change to become learner centered, second students and teachers must enter into collaboration or partnership with technology in order to create a "community" that nurtures, encourages and supports the learning process (Cognition and Technology Group at Vanderbilt, 1999). In the light of this, it is significant to note that the focus in this discussion is an educational technology as compared to technology in education.

There is a difference. Technology in education is often perceived in terms of how many electronic gadgets are in a classroom and how they might be used to support traditional classroom activities. But this is a misleading and potentially dangerous interpretation. It not only places an inappropriate focus on hardware but fails to consider other potentially useful idea technologies resulting from the application of one or more knowledge bases, such as learning theory. Educational Technology (E.T.) involves applying ideas from various sources to create the best learning environments possible for students.

Objectives of the present study

- To highlight the different types of E.T. in use.
- To explore the various dimensions underlying in E.T.
- To focus on the contemporary roles of E.T.
- To assess the effectiveness of contemporary roles of E.T.

Types of educational technology

There have been two main types of technology in education that we choose to label as product technologies and Idea technologies.

Product technologies include

Hardware or machine oriented technologies that people most often associate with ET such as A.V. equipments, both traditional (i.e., filmstrips, movies, audio cassettes, players/recorders) and contemporary (i.e. VCP, VCR, laser disc, computers, CD-ROM). Software technology such as print based material (i.e. books, worksheets, OHTs) and Computer software (i.e. CAI).

In contrast, Idea technologies do not have such tangible forms. They include –

a. Advocate basic mastery skills,

b. Structured problem solving and

c. Generate meaningful relationships.

a. Different dimensions of Educational Technology

***(i)* Pedagogical dimension 1 - Epistemology**

As we know Epistemology deals with theories of knowledge. Recognition is growing that there is no absolute knowledge. Mind tools are in vogue today comprising of hyper text and multimedia. They provide opportunities for teachers and students to collaborate in construction of knowledge (Figure 1).

(ii)Pedagogical dimension 2 - Pedagogical Philosophy

There is a difference between instructive and constructivist approaches to teaching and learning. It is determined by the extent to which educators, parents, trainers etc. emphasize their Pedagogical Philosophy over another (Figure 2).

***(iii)* Pedagogical dimension 3 - Underlying Psychology**

This dimension stresses on the two ends of continuum, viz. behavioral psychology at one end and cognitive psychology on the other. Different form of technology based education varies in their potentials to implement different learning strategies – inductive and deductive (Figure 3).

(iv)Pedagogical dimension 4 - Goal Orientation

Goals and objectives of technology based education ranges from sharply focused ones to unfocused ones. Decision making is strictly based on the type of teaching – learning environment (Figure 4).

(v)Pedagogical dimension 5 - Experiential Validity

This dimension is an important concern for all trainers', teachers and educators. This is because it assess to which classroom learning gets transferred to external situation (Figure 5).

(vi)Pedagogical dimension 6 - Teacher Role

Technology based education has different roles for teachers at different times. It selects the teachers' role from a didactic one to a facilitative one in the teaching- learning process (Figure 6).

(vii)Pedagogical Dimension 7 - Flexibility

How far the technology-based education is flexible is also an important criterion for teachers. It is mandatory to check whether the technology is teacher proof or can be easily modifiable (Figure 7).

(viii)Pedagogical dimension 8- Learner Control

This is a significant part of technology based education. It judges the extent of participation of students through interactive materials (Figure 8).

(ix)Pedagogical dimension 9 - Cooperative Learning

Technology – based education allows cooperation. It is also an integral system of learning. It is often questioned whether the goals are shared or individualistic (Figure 9).

(x)Pedagogical dimension 10 - Cultural Sensitivity

Cultural sensitivity is sometimes responsible for a blockade towards technology-based education. It is therefore necessary to accommodate diverse ethnic and cultural backgrounds among learners (Figure 10).

Contemporary Role of Educational Technology

How can teaching-learning with the use of technology facilitate deeper, more meaningful, cognitive processing? Moreover what framework should be used to inform such decisions? In a sense, teaching with technology is unlikely to differ greatly from teaching in general. Effective educational technology based teaching is more likely the result of teachers' abilities to design lessons based upon robust instructional principles than of the technology per se (Savenye *et al.*, 1992). Consequently guidance for designing effective technology-based classrooms should be grounded in the literature on effective pedagogy in general.

Appendix

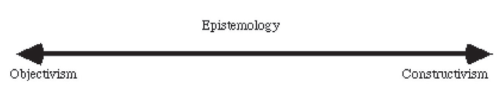

Figure – 1 : Epistemological dimension

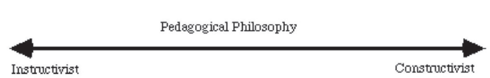

Figure – 2 : Pedagogical philosophy dimension

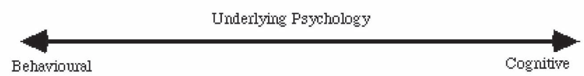

Figure – 3 **:** Underlying psychology dimension

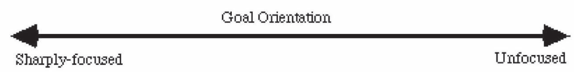

Figure – 4 **:** Goal orientation dimension

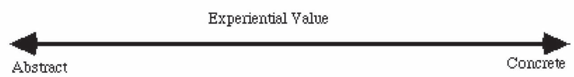

Figure – 5 **:** Experiential value dimension

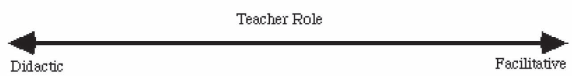

Figure – 6 **:** Teacher role dimension

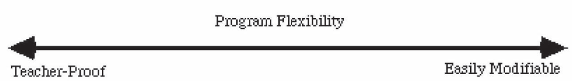

Figure – 7 **:** Program flexibility dimension

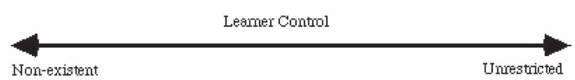

Figure – 8 **:** Learner control dimension

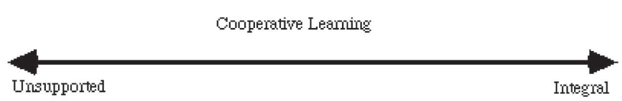

Figure – 9 **:** Cooperative learning dimension

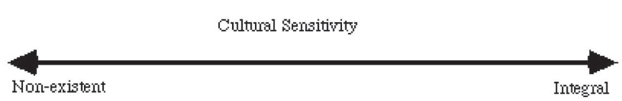

Figure – 10 **:** Cultural sensitivity dimension

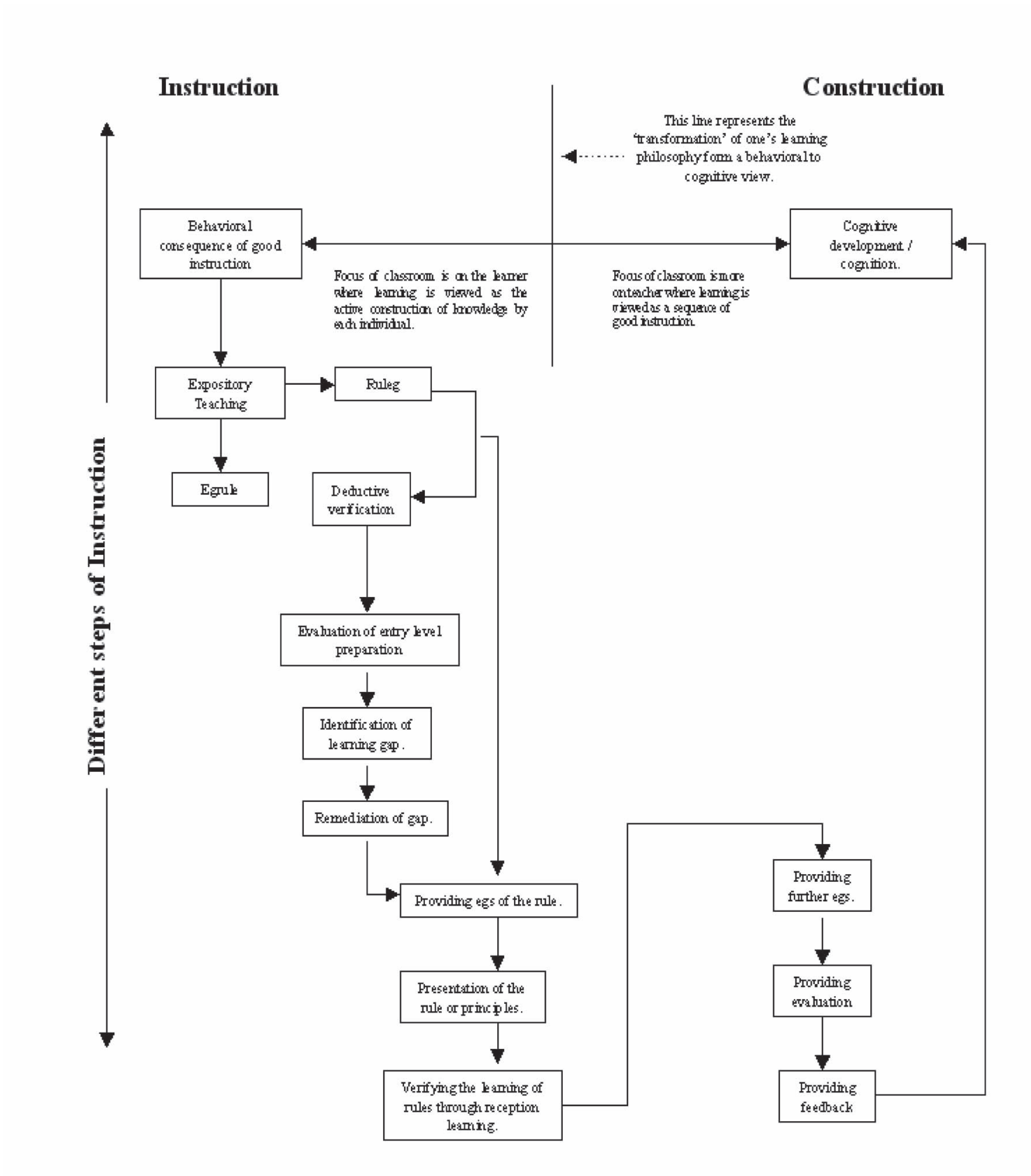

Figure 11: Transformation of one's learning philosophy from behavioral to cognitive view.

Among many educational goals, three cognitive outcomes are that students should be able –

i) to remember,

ii) to understand and

iii) to use information

Apparently one of those outcomes is very difficult to achieve. It has been noticed very often that schoolwork focuses on remembering and organizing lesson content, but rarely on making information meaningful (Papert and Harel ,1991). Meaningful learning is the product of building external connections between existing and new information. Mayer (1984) identified three learning stages that affect meaningfulness: selection, organization and integration. Information must initially be selected. Selected information must be organized in working memory if it is to be transferred to long-term memory, information that is not organized is meaningless. The nature of the organization determines the degree of meaningfulness.

The contemporary role of technology identifies several principles to guide effective teaching leaning (Koschman *et al.*, 1977). We will examine three principles and consider the implications of each for using contemporary roles of technology in the Teaching Learning process:

Effective Learners actively process lesson content

During the past 30 yrs the shift from behaviorism to cognitivism has modified our conceptions of effective learning and instruction (Bransford, 2002). One common myth is that product technologies increase interactivity and thereby improve learning. The source of this perception is not difficult to trace. The results of research on student's attitudes towards working with product technologies (e.g. Computers) are generally positive. (Martin *et al.*, 1991). Many researches also support the belief that product technologies improve learning (Kulik *et al.*, 1993). It is necessary to mention here that product technology alone do not ensure learning (Clark, 1983). It is seen that in some cases they may detract from learning by diminishing the amount of effort a student invests.

We know that learning requires students to invest considerable mental effort in the task. It is to be taken into account that students appear to vary the effort they invest during learning according to their self-perceptions and their beliefs about the difficulty of learning from different media (diSessa, 2000).

This issue is by no means opponents of product technology in education. However, a combination of product and idea technologies into "technological partnerships" is recognized as desirable e.g. an effective technological marriage is that of a musical symphony. A good symphony combines an ideal blend of musical instruments (product technology) and musical compositions (idea technology). Together they form environments that unite technological capability with pedagogical necessity. Combining what can be done with what should be done".

Presenting information from multiple perspectives increase the durability of instruction

Although instruction has traditionally focused on learning specific content, much of contemporary curriculum development focuses on solving problems that require learners to develop ever evolving networks of facts, principles, and procedures, e.g. connecting mathematics with other content areas, and using computer-based tools to allow students to speculate and explore interrelationships among concepts rather than spending time on time consuming calculations (Glasersfeld, 1983). To achieve such goals, learning should take place in environments that emphasize the interconnectedness of ideas across content domains and help learners to develop flexible networks of propositions and productions (Gagne, 1985).

Cooperative learning and hypermedia represent technologies with significant potential for developing multiple perspectives. Cooperative learning is an idea technology that stimulates the development of alternative perspectives through exposure to multiple viewpoints. Two important differences exist between cooperative learning and traditional instruction. First, information to be learned by the students is not transmitted by the teacher. Instead, students teach each other in small groups of between two and five students. Second, students are made responsible for each other's learning. Students must ensure that every member of their group achieves the lesson's objectives. These experiences appear to benefit students of all abilities. More able students gain from the cognitive restructuring associated with teaching, and less able students benefit from the personalized attention available from group members. Moreover, groups appear to create environments in which all members benefit from exposure to diverse attitudes and opinions that are often unavailable in the traditional classroom.

Hypermedia is a product technology that represents a shift in beliefs about how information should be presented to and accessed by students. Hypermedia refers to computer programs that organize information non-sequentially. Information is structured around series of nodes that are connected through associative links. Node is the term used to describe an information chunk that is stored in the hypermedia program. Information in a node may be represented through text, illustrations, or sounds. Associative links, which allow users to navigate among nodes, represent the main difference between traditional ways of presenting information on the computer and hypermedia (Jonassen, 1994).

Whereas traditional instruction often presents information sequentially to make the content easier to comprehend, hypermedia allows users to browse through an information base and to construct relationships between personal experience and the lesson. In doing so, it is often claimed, learning becomes more meaningful as students generate webs of semantically and logically related information that accommodate the learners knowledge structure rather than that of the teacher or designer. Although hypermedia environments can be used to present information sequentially to students, when carefully designed, users can create different diverse pathways through a lesson resulting in multiple cognitive representations of the content. By allowing exploration, students are encouraged to discover interrelationships that are often missed in traditional presentations of lesson content and to search for information that meets individual needs. Hypermedia is especially effective when users are encouraged to explore a database, to create links among information nodes, and even to modify a knowledge base, based on new insight into content structure (Nelson and Palumbo, 1992). Hypermedia and cooperative learning represent technologies that can make learning more meaningful. However, both must be managed carefully to achieve the intended outcomes. In cooperative learning, potentially damaging social effects often occur when individual accountability is not maintained. Similarly, hypermedia projects often focus on presenting information and rarely fulfill their promise as knowledge construction kits (Wieman and Perkins, 2006). Furthermore, although each can be used independently, the learning benefits may be magnified when they are combined. Although many computer lessons are designed for single users, the benefits appear to multiply when used collaboratively (Hooper, 1993).

Effective instruction should build upon students' knowledge and experiences are grounded in meaningful contexts

Philosophical beliefs about how educational goals can best be achieved have shifted from emphasizing curriculum content to focusing on learners' knowledge and experiences (Pea and Gomez, 1999).

This perspective has implications for teaching with technology. Instruction should attempt to build upon each student's experiential base (Finkelstein et al, 2005). What a student learns from education is, to a large extent, a function of prior knowledge, educational technology, therefore, is to bridge personal experiences and formal instruction. Educational Technology should also be sufficiently flexible to adapt to students' on-going instructional needs. One of the hallmarks of a master teacher is the ability to recognize and repair students' misunderstandings and misconceptions. When learning difficulties arise, therefore, technology-based instruction should be sufficiently flexible to adapt to student' experiences. Recently, however, researchers have argued that such practices actually hinder transfer. Instead, they claim, instruction should be rooted in real-life problem solving contexts. One such approach, known as situated cognition (Brown *et al.*, 1989), involves teaching across multiple contexts before generating rules. The different principles involve in contemporary functions of Educational Technology, depicts the transformation of one's learning philosophy from a behavioral to cognitive view. These interrelationships have been summarized in Figure 11.

Conclusion

Educational technology is often considered, erroneously as synonymous with instructional innovation. Technology, by definition, applies current knowledge for some useful purpose (Finkelstein et al, 2006).Therefore technology uses evolving knowledge to adopt and improve the system to which the knowledge applies. In contrast innovations represent only change for change sake.

The analysis of different dimensions proves the fact that technology based education provides a conducive and effective teaching learning environment. The facts underlying technology based education is very much paced with the modern education system. Information and communication technology are advancing at a faster rate- in this context few teachers feel confident and competent enough with respect to goals and functions of technology based education in classrooms (Riddle, et. al. 1995).

Closely related to building upon students' knowledge and experience is the belief that instruction should be grounded in familiar contexts. Teachers often de-contextualize instruction to stimulate transfer and improve instructional efficiency (Merrill, 1991). Grounding instruction in meaningful contexts appears to have both cognitive and affective benefits. One of the axioms of cognitive psychology is that learning occurs by building upon previously learned experiences (CERI, 2005). Teaching in familiar contexts appears to help learners to relate new information to those experiences. Contextualization also appears to have a strong motivational component (Ward, 2009).

In this study it has been examined and outlined the conditions necessary for educational technology to be used effectively in the future. To be used effectively, idea and product technologies must be properly united. The entire teaching-learning system involves two trends – traditional and contemporary technology. Last but not the least the transformation of one's learning philosophy from a behavioral to cognitive view is worth in understanding the teaching-learning process.

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