

# Philosophical and Theoretical Perspectives of Educational Technology (ET) and its Application to Facilitate Teaching / Learning in the 21<sup>st</sup> Century



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## ABSTRACT

*This paper attempts to define Educational Technology (ET) based on NCF-2005. It describes philosophical assumptions of ET such as AECT, assumes that Education is a process, Technology can facilitate the process of education, and that Intentional learning environments are complex. Moreover, the current definition of ET referred to is the one given by Januszewski and Molenda (2008). Further, different perspectives of ET: Behaviouristic, Cognitive and Constructivist are discussed with their application in teaching and learning. Finally, the article attempts to point out that today, teaching and learning have moved from instructive to constructive. The Constructive method demands a more effective use of technology; i.e to access, adapt, and create knowledge. All these theoretical principles played a major role in shaping the discussion about how to facilitate learning early in the 21<sup>st</sup> century.*

**Key Terms:** ET: Educational Technology, NCF: National Curriculum Framework, AECT: Association for Educational Communications and Technology.

**Key Words:** Behaviouristic, Cognitive, and Constructive.

## 1.1 Introduction

The NCF (NCERT's National Curriculum Framework 2005) *Position Paper* prepared by the 'National Focus Group' defines Educational Technology (ET) as "the efficient organisation of any learning system adapting or adopting methods, processes, and products to serve identified educational goals" ("Summary" V). On the role of new technologies, Januszewski and Molenda quote the words of Mc Luhan and Fiore from *The Medium Is the Message* (1967):

Technology is reshaping and restructuring patterns of social inter-dependence and every aspect of our personal life. It is forcing us to reconsider and re-evaluate practically every thought, every action and every institution formerly taken for granted. Everything is changing - you, your family, your neighborhoods, your education, your job, your government, your relation to others. And they're changing dramatically (Januszewski and Molenda, *Educational Technology* 18).

Technology has brought in a convergence of the media along with the possibilities of multi-centric participation in the content generation and dissemination process. This has implications not only for the quality of the interchange but also for drastic upheavals of centre-dominated mindsets that have inhibited qualitative improvement. Modern Educational Technology has its potential in schools, in the teaching of subjects, in examinations, in research, in systematic reforms, and, above all, in teacher education, overcoming the conventional problems of scale and reach through online anytime, anywhere (NCFV). Schumacher in his article “Technology with a Human Face” speaks about the importance of Science and Technology in education. To him, “Modern world has been shaped by its metaphysics, which has shaped its education, which in turn has brought forth its Science and Technology” (1). It is irrefutable that modern world has been shaped by technology and education in the computer age.

### **1.2 Philosophical Assumptions of Educational Technology**

Technologies should be considered as inventions that extend human capability. Technological inventions are convincibly infinite and limited only by our creativity (Januszewski and Molenda 197). *Association for Educational Communications and Technology* (AECT) assumes that ‘education is a process’, ‘technology can facilitate educational process’ and that ‘intentional learning environments are complex’ (qtd.in Januszewski and Molenda 198). The

following explanations of these assumptions provide a philosophical orientation to this study as given by Januszewski and Molenda in their book *Educational Technology* (2008), abbreviated to *ET*.

**Assumption 1** *Education is a process:* Education is a series of purposeful actions and operations - a process. The goals of education represent desired learning outcomes; thus, education in general can be regarded as a process.

**Assumption 2** *Technology can facilitate educational process:* Technological processes are dedicated means, based on scientific thinking, for communicating ideas and taking action to facilitate teaching and learning. Thus, technology facilitates educational processes.

**Assumption 3** *Intentional learning environments are complex:* Intentional learning environments refer to purposeful educational events that involve learners in multiple, concurrent interactions among people (e.g., teachers and peers), places, content, and media - situated within a context for a period of time, all seeking a common goal (*ET* 198).

### **1.3 New Concepts in Educational Technology (ET)**

As the concept of ET developed, the term ‘technology of education’ came into vogue. By the mid 1970’s, ET borrowed the term ‘systems approach’ from management studies and ‘corrective feedback’ from cybernetics. The arrival of digital convergent media encouraged inter-activity and inter-

connectivity. The universally accepted definition of ET involves “processes, methods and techniques, products, resources and technologies organised into workable systems...charts, graphs, textual materials, experimental kits, projected electronic aids, audio materials, computers, films, videos, internet etc which can usefully serve the purpose of education in their own special ways and which together can make learning an enriching experience” (*NCF Position Paper 1*).

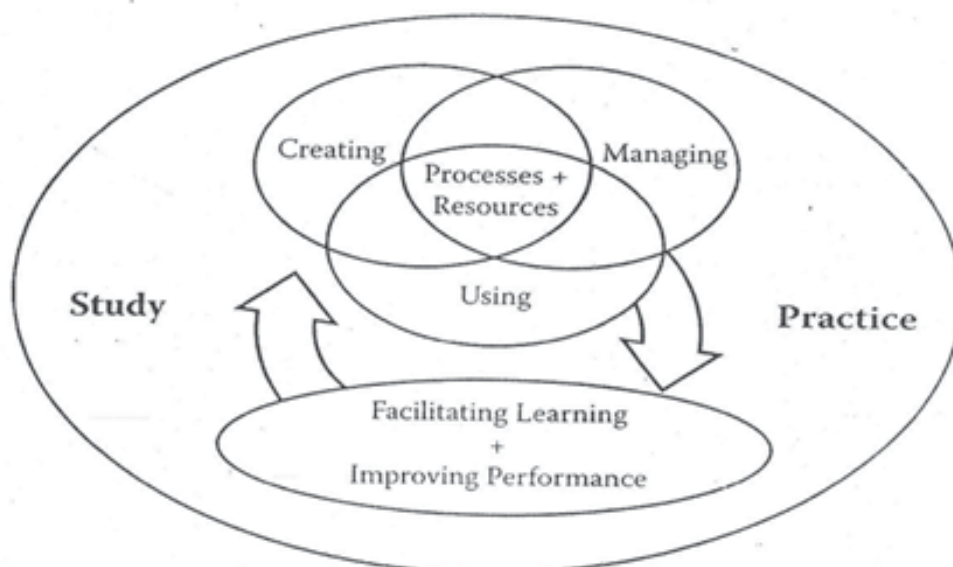
Januszewski and Molenda (2008) give a vivid definition of the term Educational Technology thus: “*Educational Technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources*” (*ET 1*).

What is proposed here is a revised definition

of the concept of ET built upon AECT’s most recent definition of Instructional Technology. It is a tentative definition subject to further reconsideration over time. ET is viewed as a construct that is larger than instructional technology, as education is more general than instruction. A summary of the key elements of the current definition on ET is given below (Fig.1):

#### 1.4 Different Perspective on Educational Technology

Different theories of learning regard different elements of the process as being of paramount importance and they use a different vocabulary to describe the underlying processes that they believe are occurring within the learner. The behaviourist, cognitivist, and constructivist perspectives are discussed here briefly in relation to their main elements, emphases, and relationship to ET concerns.



**Fig. 1:** A visual summary of the key elements in the definition of ET (Januszewski and Molenda 5).

#### **1.4.1 Behaviouristic Perspective of Educational Technology**

The name 'Behaviourism' refers collectively to several quite diverse bodies of thought in Psychology and Philosophy. B.F. Skinner, the key exponent of behaviourism, emphasises observable and measurable behaviour. His concept of 'operant conditioning' has had the greatest practical impact on the theory and practice of ET.

Prompted by his own experiences with schools as a parent, Skinner (1954) became interested in the possibility of applying operant conditioning to academic learning. This led to his analysis of the problems of group-based traditional instruction and his invention of a mechanical device for interactive learning, referred to as a 'teaching machine'. The pedagogical organization of stimuli, responses, and reinforcements in teaching machines became known as Programmed Instruction in 1960. He referred to his instructional strategies as a 'Technology of Teaching'. Other authors converted this term to 'Educational Technology' (Januszewski and Molenda 21).

Behaviourism's major impact on ET has been on the soft technology side, contributing several templates or frameworks for instruction, such as Programmed Instruction (PI), Programmed Tutoring (PT), Direct Instruction (DI), Personalised System of Instruction (PSI), Computer Assisted Instruction (CAI) and online learning.

#### **1.4.2 Cognitivism and Its Impact on Educational Technology**

Like behaviourism, cognitivism is a label for a variety of diverse theories in Psychology that endeavour to explain internal mental functions through scientific methods. From this perspective, learners use their memory and thought processes to generate strategies as well as store and manipulate mental representations and ideas. Theories were developed in the 1920's and 1930's by Jean Piaget in Switzerland and Lev Vygotsky in Russia (Januszewski and Molenda 25).

Cognitive instructional theories focus more on the presentation side of the learning equation - the organization of content so that it makes sense to the learner and is easy to remember. The goal is to activate the learner's thought processes so that new material can be processed in a way that it expands the learner's mental schemata. Audiovisual technology, which could stimulate multiple senses, provided new tools to surmount the limitations of the text book and teacher talk. Dale (1946) in his 'Cone of Experience' expanded the notion of visual instruction by proposing that learning experiences could be arrayed in a spectrum from concrete to abstract, each with its proper place in the tool kit (Januszewski and Molenda 27-28). See the Fig 2. of the Learning Pyramid prepared based on Dale's 'Cone of Experience'.

In more recent times, the computer captured the attention of cognitivists. First, the digital format can present multimedia displays more cheaply and easily than was possible

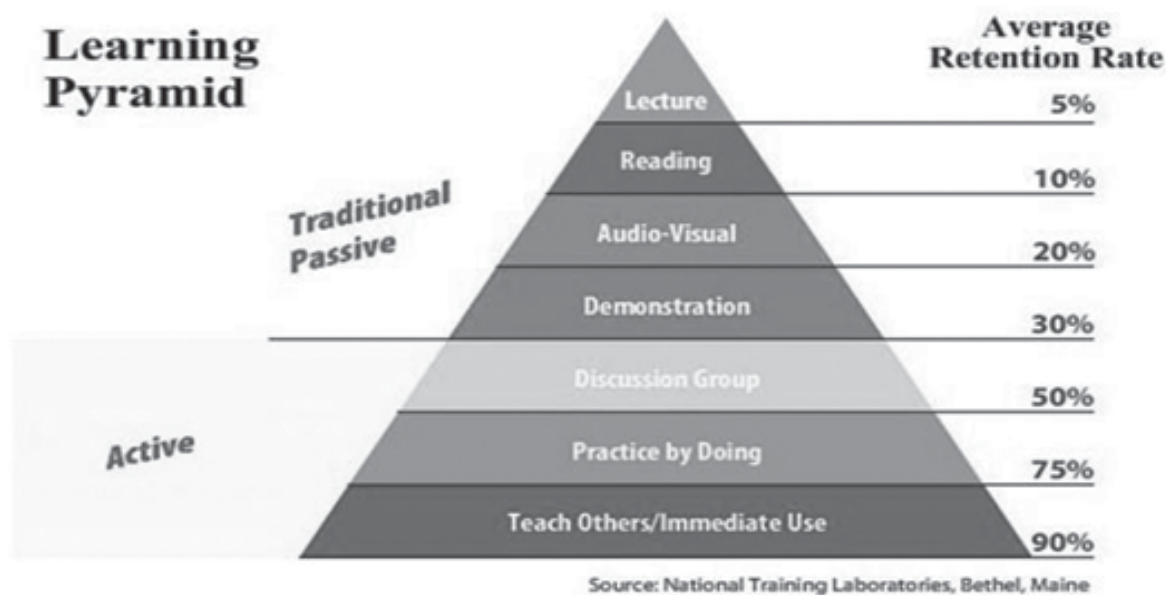


Fig.2: Learning Pyramid by Dale

with earlier analogue equipments. Second, computers can easily transform information from one symbol system to another.

### 1.4.3 Constructivism and its Role in Educational Technology

The most talked about learning perspective of the past decade has been labelled constructivism. The label itself is most closely identified with the self-educated philosopher, logician, linguist and cognitive theorist Ernst Von Glassersfeld (1984). Duffy and Jonassen (1992) used 'constructivism' as an umbrella term for a wide range of ideas drawn primarily from recent developments in Cognitive Psychology. Piaget and Vygotsky are also usually cited as formative influences on the development of this perspective (Januszewski and Molenda 32).

An analysis of 'constructivist didactics' by Terhart (2003) attempted to find out which elements of constructivist didactic theory are dependent on a new paradigm. Terhart concluded that constructivist didactics really does not have any genuine new ideas to offer to the praxis of teaching; rather it recommends the well-known teaching methods and arrangement of Self-Directed Learning (SDL), Discovery Learning (DL), Practical Learning (PL), and Cooperative Learning (CL) in groups (Terhart, "Constructivism and Teaching" 42).

Whereas Drisscoll (2005) concludes that "there is no single constructivist theory of instruction" (386), Terhart cites that 'knowledge is constructed by learners as they attempt to make sense of their experiences' (387). Drisscoll's social negotiation (derived from Vygotsky) is

represented in collaborative learning which supported Computer Supported Collaborative Learning (CSCL).

### 1.5 Conclusion

Today, teaching and learning have moved from instructivism to constructivism. Constructivism demands more effective use of ICT. The effective use of technology is to access, adapt, and create knowledge. Moreover, Technology provides various resources such as physical, digital, human and social. Neither the teacher nor the text book is the repository of all knowledge; the Internet is an embodiment of, and medium for, the practice of constructivism. This is because it is an expanding store of accessible information and it requires students to examine and evaluate relevant information as also their own pathways for learning. Student-centred learning is a natural consequence of Internet usage and is therefore a significant feature of technological usage in Education.

Robinson, Molenda and Rezabek in their article titled "Facilitating Learning" (Januszewski and Molenda, *Educational Technology*) claim that different theories of learning can naturally lead to instructional theories that offer guidance for different sorts of learning goals. The theories do not necessarily contradict each other; rather, some explain certain phenomena better than others (38). Ertmer and Newby (68-69) suggest one such fairly simple formula for combining the theoretical perspectives which are discussed here:

Employ the behaviourist perspective in situations in which learners have lower levels of task knowledge and for learning goals requiring lower cognitive processing. Use the cognitivist perspective for middle levels of task knowledge and cognitive processing; and consider the constructivist perspective for situations in which learners have a higher level of prior knowledge and are working on higher level tasks, such as complex problem solving in ill-structured domains...They were 'learner-centred' principles which played a major role in shaping the discussion about how to facilitate learning early in the 21<sup>st</sup> century (Januszewski and Molenda 38).

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