



New Technology in Education

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Doi:10.5901/jesr.2017.v7n1p9

Abstract

This paper discusses the use of new technology in education. It refers to different types of literacy namely technological, digital, mathematical, scientific and information literacy as well as to the definitions and characteristics of the use of computers in education such as CAL, CBE, CAT etc. The use of technology in the constructivist and behavioural learning approach are mentioned and the advantages and disadvantages of the use of new technology in education are given.

Keywords: Literacy, technology, education, Behaviourism, Constructivism, Sociocultural theories.

1. Introduction

The modern era is characterized by the rapid development of new information and communication technologies. This growth has led to the need for a higher level of education and new forms of education such as adult education and distance learning so that students can learn new skills to become more competitive to new conditions and work requirements (Kincheloe, 1995). According to the OECD (OECD, 2012) due to the rapidly changing economic and social conditions the level of qualifications and skills required in all professions is constantly increasing. Therefore the use of technology in education plays an important role in the acquisition of knowledge. The constant development of new technology and the social and economic impact of this forces us to improve and update the skills we have in relation to technology (European e - Skills Forum, 2004). Those who do not have the ability and the opportunity to keep up with technological developments are at risk of digital exclusion (OECD, 2003).

2. Types of Literacy

The definition of literacy used to be limited only to the skills of writing and reading (Nixon, 2003). Today the term refers not only to the knowledge and skills in reading and writing that one has but also concerns the knowledge and skills that enable a person to work effectively in diverse environments and in a variety of ways. Historically we can see this revision of the definition of literacy. According to Gray (Gray - UNESCO, 1956) literacy is the knowledge and skills in reading and writing that enable one to participate in literate activities. But according to the 1st World Meeting of Ministers of Education in 1965 in Tehran (The First World Congress of Ministers of Education on the Eradication of Illiteracy in Tehran), the concept of literacy should include a socio-economic and political role. Barton & Hamilton (1998) argue that literacy is the concept of social practice. Critical literacy refers to the individual abilities and skills to be able to understand hidden meaning in texts to achieve a critical analysis. Luke & Freebody (1999) proposed a model of critical literacy that has the

following stages:

- code breaking- code competence
- meaning maker - semantic competence
- use texts functionally - pragmatic competence
- critically analyze and use - critical competence

Nowadays there are several new types of literacy such as technological, digital, mathematical and scientific literacy to name but a few. The development of new technology leads to a revision of the perception of the concept of literacy and general perceptions about reading, writing, teaching and learning (Semali, 2001). One important type of literacy in modern times, because of the huge volume of information through new technology, is information literacy. There are several definitions of the concept of information literacy which all agree on the skills needed to be able to search, evaluate, organize and use the information collected. Information literacy has many common points with critical literacy (Brem & Boyes, 2000). Computer literacy refers to the knowledge and skills of effective computer usage at various levels i.e. basic knowledge in programming and advanced problem solving programming methods (US Congress, 1984). This type of literacy also refers to general working knowledge and workstations as well as software skills. However, the term digital literacy refers to attitudes, perceptions and skills needed to be able to handle and to effectively convey information using various media and formats (Bawden, 2008). According to the OECD (2016), scientific literacy is the ability of the individual to be able to use scientific knowledge, to identify questions and to draw conclusions based on scientific data in order to understand the natural world around him and helps in making decisions about changes which human activity makes to it.

3. Definitions and Characteristics of the Use of Computers in Education

In 1995 computers started to be used in the teaching of science and became known by the term CAL (computer assisted learning), particularly in the Department of Veterinary science at the University of Glasgow in which a software package was developed (and called the Physics of Diagnostic Imaging) to replace five hours of lectures. The following terms can be found in the application of computers in education:

- CAL (Computer Assisted Learning)
- CBE (Computer Based Education)
- CAT (Computer Assisted Testing)
- CBT (Computer Based Training)
- CAI (Computer Assisted Instruction)
- CMI (Computer Managed Instruction)

The first and second term refer to all types of computer applications used for learning such as word processors, utility software, etc. The third term refers to tests carried out with the help of computers. The student completes the test on the computer and then the computer marks it. The fourth and fifth term refer to education through the computer where there is interaction between the student and computer so that the latter can analyze trainee responses and give feedback. Munger (1996) defines the term Computer Based Training (CBT) as an interactive educational experience between a trainee and a computer during which the computer provides the main stimulus. Trainees are given information about which they are then questioned and checked by the software.

The sixth term refers to the use of computers in organizing school data and assisting in the assessment of learners according to their performance in various tests. It is worth noting that trainees retain 20% of what they hear, 40% of what they see and hear and 75% of what they hear, see and execute (Fletcher, 1990). Clearly the learner needs to hear, see and perform practical tasks during the educational process.

Taylor (1980) introduced a model that categorized the use of computers in education stating that the computer can be used in three ways i.e. as a Trainer, a Tool and a Trainee (Tutor, Tool, Tutee - The Three Modes of Computer Usage in Education). Special software can be used so that the computer can act as a 'Tutor' while with the use of utility software such as a word processor, the role of the computer becomes that of a 'Tool'. Finally, if the computer has the role of a 'Tutee' then whoever programs the computer will acquire new knowledge and skills through this process (Stosic, 2015). The use of the computer upgrades the learner's role as well. Learners no longer receive knowledge passively, but they become independent and responsible for their learning. More specifically, Dickinson (1993) states that autonomous learners learn to understand the purpose of the teaching process, set their own learning goals, choose and use the appropriate learning strategies and self-evaluate the progress they have made.

4. The Use of Technology in the Constructivist Learning Approach

There is a difference between the use of computers to teach exclusively and the use of computers to facilitate learning (Jonassen & Reeves, 1996). According to Jonassen (1991) the use of technology in education is more effective in teaching when technology is used as a tool of education, but the technology itself should not be the object of learning. Jonassen, Peck and Wilson (1999) argue that when students use technology in the constructivist learning style it needs to be used to manipulate data and students must take an active part in the processing of information but also reflect on the learning process. Lajoie and Derry (1993) describe technological applications used with the constructivist learning approach as cognitive tools, the use of which does not have information and knowledge transfer as the primary purpose but to help, support and encourage the active participation of the trainee. These tools can be spreadsheets, databases, communication software, network tools etc.

Jonassen (2000) introduced the term mindtools which are software tools that support, guide, expand, stimulate and facilitate critical thinking and higher order learning skills. When learners use technology as a communication tool with others, then their role is active and they choose for themselves how to manage the information they receive and therefore do not function as passive recipients of knowledge and information (Means & Olson, 1997). The use of new technology in education should be such that it creates the conditions for learning, but learners should be the ones to discover and build knowledge through situations and activities. Here it should be noted that the constructivist learning style fits well with the activities associated with the internet, such as selective acquisition of information online through search engines, the collection and classification of information and communication via e-mails, blogs and forums with other trainees in order to enhance their knowledge infrastructure.

5. Using Technology with Behavioural Learning Style

According to Jonassen (2000) the use of technology in behavioural learning is marked by the trainees passive involvement in the learning process and interaction between software and trainee are set in advance. Driven by the theory of behaviourism, educational software such as coaching and mentoring programs, presentation software and lectures, training programs and practical and educational multimedia games was designed. Such software follows specific steps which consist of the introduction, presentation of the audiovisual information and then questions on the information originally given follow, proceeded by the testing of the response and finally feedback to the learner. This learning model is an attempt to mechanize education and the computer substitutes, to a large extent, the trainer while the software assesses the trainee.

6. Advantages and Disadvantages of the Use of New Technology in Education

Some advantages of computer use in the educational process are:

- Trainees adapt to their individual learning needs (Thompson, 1997).
- Trainees gain skills related to problem solving easier (David, 1994).
- Trainees are able to search for information leading to discovery and test newly acquired knowledge (Herman, 1994).
- Learners learn faster and more easily thus improving and increasing their performance (Dinkmeyer & Carlson, 1985).
- Trainees are not judged by the computer, i.e. there is no such bias as may occur between instructor and learner, thus trainees embrace learning more easily and so it becomes more efficient (Thompson, 1997).
- Students can test their hypotheses through simulations by performing experiments, which, by conventional means, would be prohibited either because of cost, risk or lack of access to laboratories (Herman, 1994).

Some of the disadvantages are listed below:

- Trainees can feel isolated by the instructor and other trainees (Preece, 2000).
- Dishonest interpersonal relationships (Preece, 2000).
- Computer technology evolves so fast and so constant replacement of equipment to keep pace with developments is required.
- The software cannot develop the manual skills of learners.
- Lack of technical knowledge on the part of both trainers and trainees on the new technology and computers (Roblyer, 2003).

- The inability of the computer to interact effectively with the learner because of the fundamental difference in the way people and computers use and handle information (Dent, 2001).
- Developers who build software do not often have experience in learning theories (Lawson, 1999).

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